

DESIGN DATA				
RP 128.0128 to RP 132.879 NB				
Traffic	Average Daily			
Current 2013	Pass: 2,005	Trucks: 445	Total: 2,450	245
RP 132.879 to RP 134.079 NB				
Traffic	Average Daily			
Current 2013	Pass: 3,155	Trucks: 490	Total: 3,645	365
RP 134.079 to RP 144.1286 NB				
Traffic	Average Daily			
Current 2013	Pass: 1,870	Trucks: 440	Total: 2,310	235
RP 128.00 to RP 132.879 SB				
Traffic	Average Daily			
Current 2013	Pass: 2,085	Trucks: 460	Total: 2,545	255
RP 132.879 to RP 134.079 SB				
Traffic	Average Daily			
Current 2013	Pass: 3,125	Trucks: 495	Total: 3,620	365
RP 134.079 to RP 144.262 SB				
Traffic	Average Daily			
Current 2013	Pass: 1,790	Trucks: 450	Total: 2,240	225

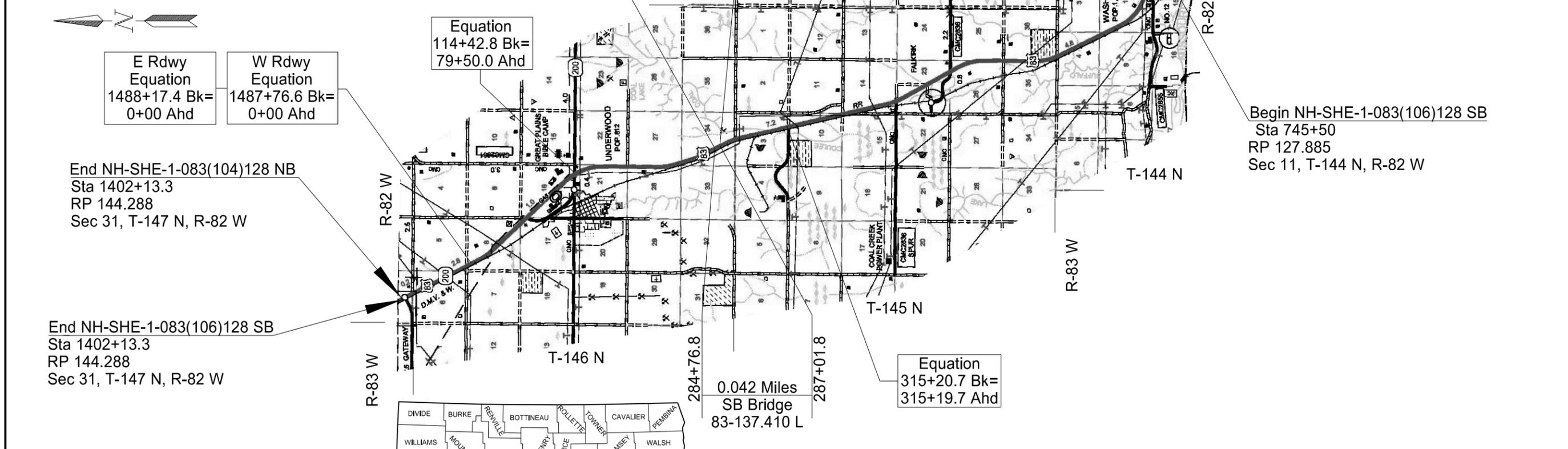
**JOB # 7**  
**NORTH DAKOTA**  
**DEPARTMENT OF TRANSPORTATION**

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128 NH-SHE-1-083(106)128	18061 18063	1	1

NH-SHE-1-083(104)128 NB  
NH-SHE-1-083(106)128 SB  
FHWA Full Involvement  
McLean County  
Washburn N to N Jct. 200 - NB and SB  
Hot Bituminous Overlay and Turn Lanes

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

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
NH-SHE-1-083(104)128 NB	16.360	16.402
NH-SHE-1-083(106)128 SB	16.360	16.402
0.042 miles deducted for bridges with approach slabs		



Begin NH-SHE-1-083(104)128 NB  
Sta 745+50  
RP 127.885  
Sec 11, T-144 N, R-82 W

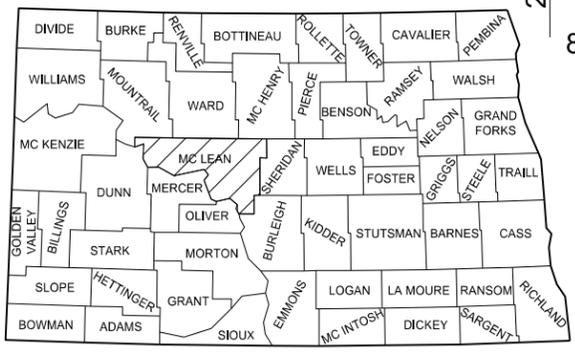
Begin NH-SHE-1-083(106)128 SB  
Sta 745+50  
RP 127.885  
Sec 11, T-144 N, R-82 W

End NH-SHE-1-083(104)128 NB  
Sta 1402+13.3  
RP 144.288  
Sec 31, T-147 N, R-82 W

End NH-SHE-1-083(106)128 SB  
Sta 1402+13.3  
RP 144.288  
Sec 31, T-147 N, R-82 W

E Rdwy Equation  
1488+17.4 Bk= 0+00 Ahd

W Rdwy Equation  
1487+76.6 Bk= 0+00 Ahd



STATE COUNTY MAP

DESIGNERS
Eric L. Rudrud /s/
Sarah BaeHurst /s/
Brian Rosin /s/

APPROVED DATE 1-15-2014

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 1-15-14

James Douglas Rath /s/  
NDDOT DESIGN DIVISION

This document was originally issued and sealed by James Douglas Rath, Registration Number PE- 4288, on 1/15/14 and the original document is stored at the North Dakota Department of Transportation

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**NH-SHE-1-083(106)128**

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SP 1010(08)	Temporary Erosion and Sediment Best Management Practices
SP 1101(08)	Split Sampling and Testing Requirements for Aggregate Base
SP 1244(08)	Flexible Pavement Surface Tolerance - M&B
SP 1258(08)	Flexible Pavement Surface Tolerance - M&B
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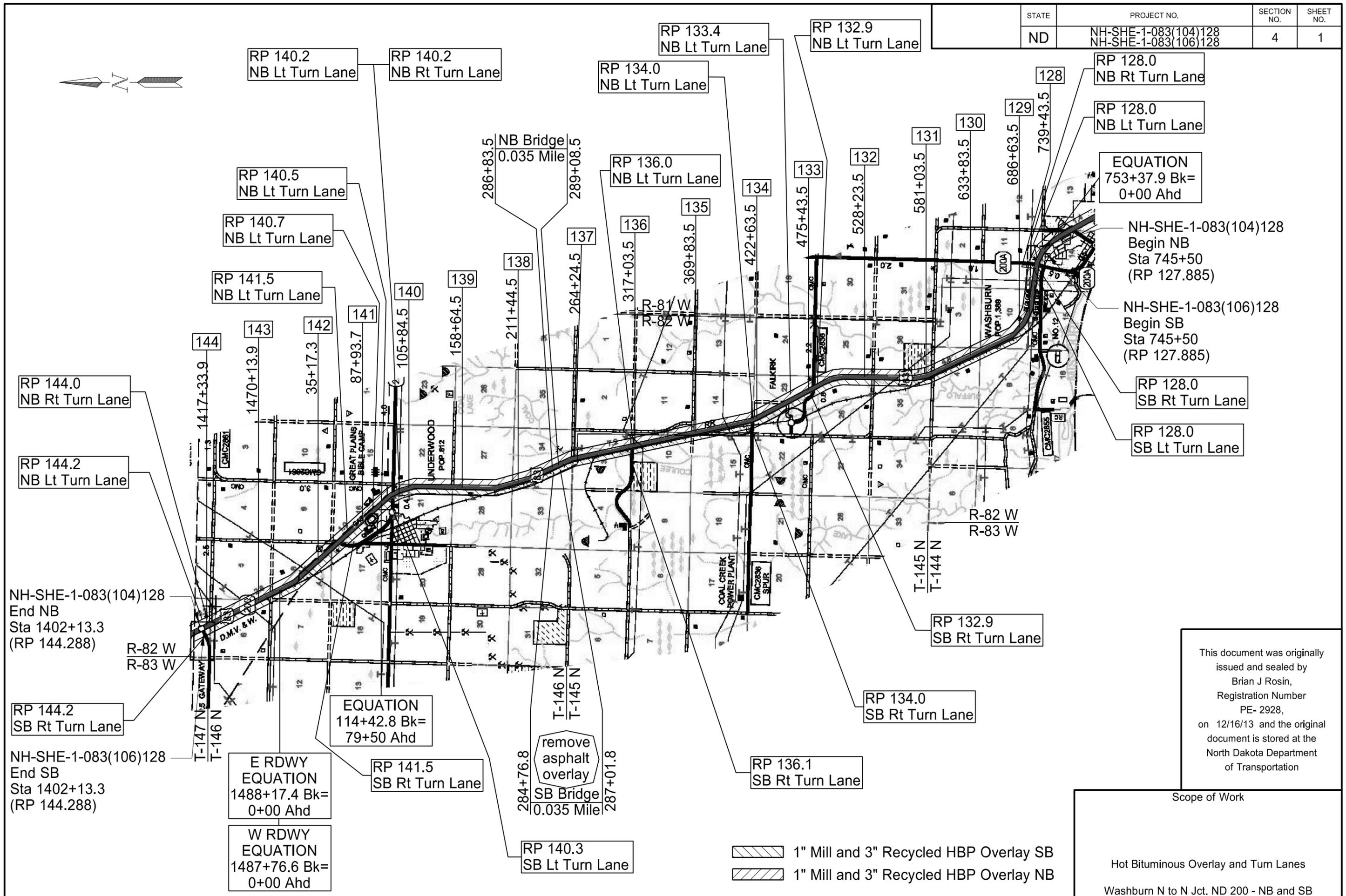
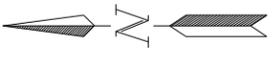
**LIST OF STANDARD DRAWINGS**

<b><u>STANDARD NO.</u></b>	<b><u>DESCRIPTION</u></b>
D-20-1, 2, 3	NDDOT Abbreviations
D-20-10	NDDOT Utility Company Abbreviations
D-20-20, 21	Linestyles
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D-704-1	Attenuation Device
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D-704-5	Contractor Sign Detail
D-704-7	Breakaway Systems For Construction Zone Signs - Perforated Tube
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D-704-13	Barricade And Channelizing Device Details
D-704-14	Construction Sign Punching And Mounting Details
D-704-20	Terminal And Seal Coat Sign Layouts
D-704-22	Construction Truck And Temporary Detour Layouts
D-704-26	Miscellaneous Sign Layouts
D-704-27	Traffic Control Plan For Moving Operations
D-704-34	Sign Layout For One Lane Closure
D-704-50	Portable Sign Support Assembly
D-704-56	Mobile Operation (Grinding Shoulder Rumble Strips)
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D-708-2	Erosion And Siltation Controls
D-708-5	Erosion And Siltation Control -Erosion Control Blanket Installation
D-708-6	Erosion And Siltation Controls - Median Or Ditch Inlet Protection
D-708-7	Erosion Control Fiber Roll Placement Details
D-714-1	Reinforced Concrete Pipe Culvert And End Section
D-714-22	Concrete Pipe Ties
D-714-26	Transverse Mainline Pipe Excavation And Installation Detail For Pipes 4 Feet Or Less Below The Top
D-722-7	Precast Concrete Median Drain

**LIST OF STANDARD DRAWINGS**

**NH-SHE-1-083(106)128**

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D-754-1	Pipe Or W-Shape Assembly Details
D-754-7	Mounting, Post Cap And Panel Details
D-754-9	Letter And Arrow Details For Variable Length Signs
D-754-12	Breakaway Coupler System - Structural Details For W-Shape Supports
D-754-13	Structural Details W Shape Supports
D-754-14	Wind Beams And Anchor Plates For W-Shape Supports
D-754-20	(Expressway-Freeway Use) Mile Posts
D-754-21	Reflectorized Delineators
D-754-23	Perforated Tube Assembly Details
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D-754-24A	Breakaway Coupler System For Perforated Tubes
D-754-26, & 27	Sign Punching, Stringer And Support Location Details Regulatory, Warning, And Guide Signs
D-754-28, 29, & 32	Sign Punching, Stringer And Support Location Details Regulatory, Warning, And Guide Signs
D-754-48 & 50	Sign Punching, Stringer And Support Location Details For Variable Length Signs
D-760-2	Rumble Strips Divided Highways (Non-Interstate)
D-762-1	Pavement Marking Message Details
D-762-3	Pavement Marking Standard 90 Degree Flared Intersections
D-762-4	Pavement Marking
D-762-6	Short-Term Pavement Marking
D-764-1	W-Beam Guardrail - General Details
D-764-6	Flared Energy Absorbing Terminal
D-764-7	Slotted Rail Terminal
D-764-11	W-Beam Transition To In Place Concrete Safety Shape Transition
D-764-20	Short Term End Treatment For Bridges (Attenuation Device Method)
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D-764-22	Typical Grading At Bridge Ends With W-Beam Guardrail
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D-770-3	Pull Box Details
D-770-4	Lighting & Signal Details
D-772-5	Loop Detectors Details (Saw Slot)



RP 128.0  
NB Rt Turn Lane

RP 128.0  
NB Lt Turn Lane

EQUATION  
753+37.9 Bk=  
0+00 Ahd

NH-SHE-1-083(104)128  
Begin NB  
Sta 745+50  
(RP 127.885)

NH-SHE-1-083(106)128  
Begin SB  
Sta 745+50  
(RP 127.885)

RP 128.0  
SB Rt Turn Lane

RP 128.0  
SB Lt Turn Lane

RP 144.0  
NB Rt Turn Lane

RP 144.2  
NB Lt Turn Lane

NH-SHE-1-083(104)128  
End NB  
Sta 1402+13.3  
(RP 144.288)

RP 144.2  
SB Rt Turn Lane

NH-SHE-1-083(106)128  
End SB  
Sta 1402+13.3  
(RP 144.288)

E RDWY  
EQUATION  
1488+17.4 Bk=  
0+00 Ahd

W RDWY  
EQUATION  
1487+76.6 Bk=  
0+00 Ahd

EQUATION  
114+42.8 Bk=  
79+50 Ahd

RP 141.5  
SB Rt Turn Lane

remove  
asphalt  
overlay  
SB Bridge  
0.035 Mile

RP 140.3  
SB Lt Turn Lane

RP 133.4  
NB Lt Turn Lane

RP 132.9  
NB Lt Turn Lane

RP 134.0  
NB Lt Turn Lane

RP 136.0  
NB Lt Turn Lane

134

422+63.5

133

475+43.5

132

528+23.5

131

581+03.5

130

633+83.5

129

686+63.5

128

739+43.5

RP 132.9  
SB Rt Turn Lane

RP 134.0  
SB Rt Turn Lane

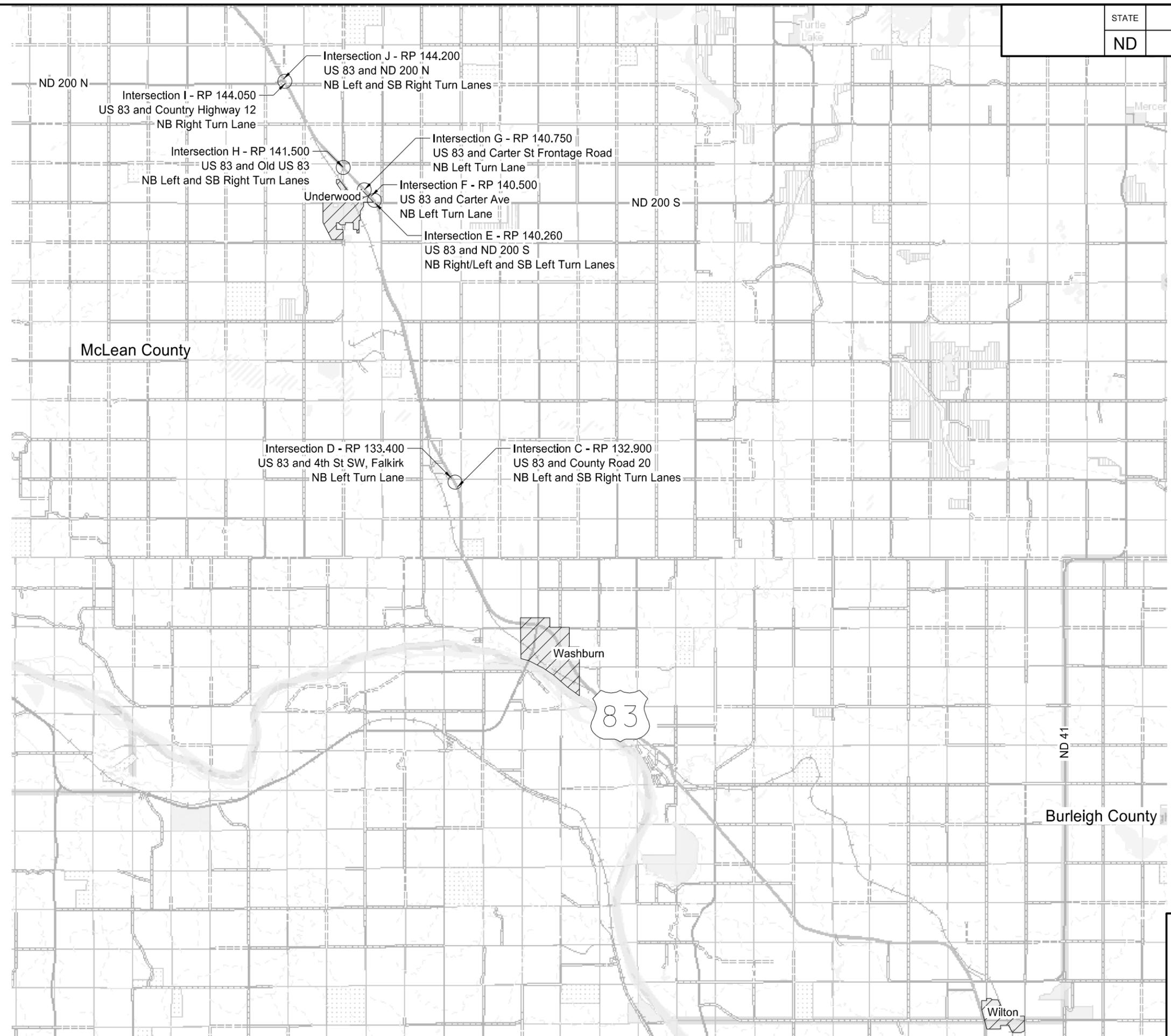
RP 136.1  
SB Rt Turn Lane

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Scope of Work

Hot Bituminous Overlay and Turn Lanes  
Washburn N to N Jct. ND 200 - NB and SB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128 NH-SHE-1-083(106)128	4	2



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Scope of Work  
 Turn Lane Grading Locations  
 Hot Bituminous Overlay and Turn Lanes  
 Washburn N to N Jct ND 200 - NB and SB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-1-083(104)128 NH-1-083(106)128	6	1

**NOTES**

**GENERAL NOTES**

107-P01 HAUL ROAD RESTRICTIONS: The Contractor shall contact the appropriate State, County, Township, City or Political Subdivision official(s) to determine if the proposed haul road has local road restrictions or is designated as a "No Haul Route" prior to preparing a bid for this project. Paved roads off the state system will not be designated as haul roads by the NDDOT. If the Contractor chooses to use a paved road off the state system for this project, the Contractor shall be responsible for all costs of the inspection, maintenance, restoration, and release of the haul road. The entire haul cycle, loaded and empty, will be considered for haul routes.

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

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

203-P02 BORROW EXCAVATION: The borrow required for constructing the turn lanes and turn lane extensions will not be obtained from within the right of way. It will be the Contractor's responsibility to obtain and clear borrow areas per 107.04.

203-P03 TOPSOIL - WETLAND: the contractor shall take care to minimize any temporary impacts to wetlands. Topsoil shall be stripped from all wetland areas which will be impacted by the project. The wetland topsoil shall be stripped to a maximum depth of 6" to sufficiently allow 6" of the topsoil to be spread on the wetland mitigation site. The final elevation of the mitigation area should be at or below the existing wetland elevation. Payment for "TOPSOIL - WETLAND" shall be in accordance with Section 203.03 B of the Standard Specifications (Contract Quantity Payment).

The wetland topsoil shall be stockpile separately from other topsoil. The locations and boundaries of impacted wetlands are shown in the plans. All costs to remove, stockpile, and place the wetland topsoil shall be included in the price bid for "TOPSOIL - WETLAND".

410-P01 SUPERPAVE FAA 45 PROPERTIES: The following aggregate and mix design properties are required for Superpave Volumetric Design.

Test	Criteria	Reference
Coarse Aggregate Angularity	85% min	NDDOT Field Sampling and Testing Manual
Fine Aggregate Angularity	45% min	AASHTO T 304
Gyratory Effort, # Gyration	N <sub>ini</sub> =7, N <sub>des</sub> =75, N <sub>max</sub> =115	AASHTO R 35
Voids Filled with Asphalt	65-75%	AASHTO M 323, T166
%G <sub>mm</sub> @ N <sub>ini</sub>	89% max	AASHTO M 323, T166
Lightweight Pieces for Virgin Aggregate % Shale	5.0% max	AASHTO M 113, NDDOT Modified

410-P02 SURFACING PLACEMENT: Place the 3" recycled hot bituminous pavement in two lifts on the driving lane, passing lane and the median shoulder. First lift shall be approximately 1 1/4" depth and second lift shall be approximately 1 3/4" depth. Place the recycled hot bituminous pavement for the 8' shoulder and slough in two lifts of approximately equal depth.

410-P03 CONTRACTOR DEVELOPED MIX DESIGN FAA 45: Submit Final Superpave Volumetric Mix Designs utilizing the millings from this project. Show the aggregate source and bitumen target percentage on the mix design. Submit the mix designs for approval 7 days before using the material.

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## NOTES

410-P04 **RECYCLED ASPHALT PAVEMENT:** Add 20 percent recycled asphalt pavement (RAP) and 5.1% PG 64-28 asphalt cement in the Superpave FAA 45 mixture. The contractor shall use 100% virgin material until enough RAP material is available to achieve the 20%.

Keep job mix formula tolerances for RAP within 5 percent of the target value.

Obtain recycled asphalt pavement from the material produced by cold milling on the project.

During mix production, the virgin aggregate shall meet the physical property requirements as determined from the mix design, except the Initial Control Points for Superpave Aggregate may be waived.

The mix design containing virgin and RAP material shall meet the requirements of Section 410 of the Standard Specifications.

Process the recycled asphalt pavement so the maximum particle size does not exceed 1-1/2 inches (37.5 mm) in the cold feed.

Introduce the recycled asphalt pavement into the drum and combine with the virgin aggregate to prevent the recycled asphalt pavement from direct contact with the burner flame. Add the asphalt binder to the mixture in the drum after the virgin aggregate and RAP have been combined.

Supply a 165 pound sample of material milled from the project in addition to the virgin aggregate and liquid asphalt required in Section 410 for mix design purposes. Submit the samples to the Bismarck District Materials Coordinator.

411-P01 **MILLED MATERIAL:** Use the milled bituminous material as recycle for "Recycled Asphalt Pavement-Superpave FAA 45" and for "Salvaged Base Course" at section lines, private drives, or field approaches.

411-P02 **MILLED TAPERS:** At milling transitions, remove the existing bituminous material to form a straight vertical edge to allow placement of the full depth of surfacing at the end of the surfacing placement.

411-P03 **TEMPORARY ASPHALT WEDGES:** Place temporary asphalt wedges (prior to allowing traffic onto the milled surface) at the beginning or end of the milled transitions to allow smooth passage of vehicles. Do not use salvaged milled material for the wedges.

411-P04 **MILLED MATERIAL DISPOSAL:** Milled material not incorporated back into the project, meeting a maximum size of 1 1/2", with 90% passing the 1" sieve, may be disposed of by stockpiling at the NDDOT Bismarck District Storage Yard. Upon stockpiling at the storage yard, the material becomes the property of the state.

704-254 **TRAFFIC CONTROL FOR UNEVEN PAVEMENT:** The contractor shall provide traffic control devices in accordance with department standards prior to paving. The contractor has the option of making the paving lanes even at the end of each day's paving operation or signing for the uneven pavement as follows: Install "Uneven Lanes" signs (Sign No. W8-11-48) and supplemental plates (Sign No. W20-52-54), identifying the distance, on both right and left sides of the roadway in advance of the beginning of the uneven pavement and at major intersections. A major intersection shall be defined as a CMC, state, U.S. highway, or Interstate ramp. Pave the alternate lane on the subsequent day to make the lanes even.

All traffic control devices shall be left in place until the lanes are even. These signs for uneven pavement are included in the "Traffic Control Devices List" and will be measured and paid for at the contract unit price for each device. No extra compensation will be allowed for relocation due to work progression.

704-255 **TRAFFIC CONTROL FOR SHOULDER DROP-OFF:** The contractor has the option of paving the adjacent shoulder with the driving lane or providing a slough and signing for the shoulder drop off as follows: Install "Shoulder Drop Off" signs (Sign No. W8-9a-48) and a supplemental plate (Sign No. W20-52-54), identifying the distance, in advance of the beginning of the shoulder drop off, each mile thereafter, and at major intersections. A major intersection shall be defined as a CMC, state, U.S. highway, or Interstate ramp. If the contractor is unable to make the driving lane and shoulder even at the end of the day, he will sign the shoulder drop off as specified above. The slough shall be a 2:1 slope. No slough will be required for drop-offs of 1 1/2" or less in depth.

These traffic control signs shall be in place until the shoulder is even. These signs are included in the "Traffic Control Devices List" and will be measured and paid for at the contract unit price for each device. No extra compensation will be allowed for relocation due to work progression.

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## NOTES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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704-P01 TRAFFIC CONTROL DEVICES: The traffic control devices list has been developed using the layouts shown in the plans and the following layouts on Standard Drawings.

D-704-20 Layout Type G for Intersecting Routes,

D-704-22, Layouts Type K, and Type L for Construction Trucks Hauling Material,

D-704-26, Layout Type Z for speed reduction at milled tapers,

D-704-26 Layouts Type BB, CC, EE, and GG as needed,

D-704-28 for striping operations,

D-704-34 for lane closure & flagging for grinding, milling and paving,

D-704-56 for Shoulder rumble strip operations.

Quantities have been developed based on a single lane closure and a 6-mile limitation in each direction for the paving operations and a single lane closure with a quarter mile limitation in each direction for the turn lane operations. The required traffic control signs and devices are included in the "Traffic Control Devices List" and will be measured and paid at the Contract Unit Price for each device. Additional devices required to accommodate the Contractor's operation shall be the Contractor's responsibility.

722-P01 MEDIAN DRAIN PRECAST: Include all costs for the work associated with the installation of the external pipe connection bands and 24" Traversable End Sections at these locations in the price bid for "Median Drain Precast Concrete-Type A."

762-P01 SHORT TERM PAVEMENT MARKING: Quantities for 3 applications of short term centerline pavement marking have been included in the plans (milling, and each lift of pavement.) Additional applications required to accommodate the Contractor's operation shall be at the Contractor's expense.

762-P02 PAVEMENT MARKING: The turn lane at RP 144.0 NBRT will be constructed as shown in the plans. If the intersecting roadway heading to the east is under water at the time of construction the contractor shall stripe the turn lane as a normal shoulder and disregard the turn lane striping. The Engineer shall be contacted prior to any striping at this location.

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## NOTES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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### GENERAL NOTES

760-P01 RUMBLE STRIP EXEMPTION: The rumble strips shall be discontinued 100 feet before and 100 feet after the ATR and ESS sites. This includes centerline and edge line rumble strips.

### SECTION 110

754-P01 ADOPT-A-HIGHWAY SIGN PANEL: The Adopt-A-Highway symbol sign panel shall be furnished and installed by NDDOT. The contractor shall furnish and install the remaining signs and support as shown in the special assembly detail.

754-P02 SIGN REMOVAL: The "City of the Year" signs at RP 140.102 rt and 141.550 It shall be delivered to and become the property of the City of Underwood. The cost of the delivery shall not be bid separately but shall be included in the price for other items.

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

### SECTION 130

764-800 REMOVE END TREATMENT & TRANSITION: The removed end treatment and transition shall become the property of the contractor.

The item "Remove End Treatment & Transition" shall be measured by the number removed.

The cost of removing the end treatment and transition, and disposing of the material shall be included in the price bid for the item "Remove End Treatment and Transition."

764-P01 REMOVE 3-CABLE GUARDRAIL & POSTS: The removed 3-cable guardrail materials which are not to be reset shall become the property of the contractor.

The item "Remove 3-Cable Guardrail & Posts" shall be measured by the linear foot of guardrail removed.

The cost of removing the guardrail and posts and disposing of materials not to be reset shall be included in the price bid for the item "Remove 3-Cable Guardrail & Posts."

764-P02 REMOVE W-BEAM GUARDRAIL & POSTS: The removed W-beam guardrail and posts that are not reset shall become the property of the contractor.

The item "Remove W-Beam Guardrail & Posts" shall be measured by the linear foot of guardrail removed.

The cost of removing the guardrail and posts, and disposing of these materials shall be included in the price bid for the item "Remove W-Beam Guardrail & Posts."

764-P03 EMBANKMENT FOR GUARDRAIL INSTALLATION: The embankment material required for guardrail installation is not available within the highway right of way. It will be the contractor's responsibility to obtain embankment material. The embankment will be measured by the number of sites complete and in place. A site is defined as the area of embankment needed to place a completed guardrail on as shown in the plans.

All costs to obtain the embankment material shall be included in the price bid for "Guardrail Embankment - Type C."

### SECTION 150

772-P01 AUTOMATIC TRAFFIC RECORDER SYSTEM: The Contractor shall furnish and install the Automatic Traffic Recorder (ATR) site after the roadway work is completed.

#### Representative

The Contractor shall ensure that a qualified PEEK Traffic Corp. representative will be on site to assist and supervise the system installation and all work. The Contractor shall ensure that a PEEK Traffic Corp. representative is certified for the ATR equipment installation, operation, calibration and vehicle verification processes.

#### Loops

All detector loops must follow minimum curing specifications for the sealant according to the detector loop manufacturer.

The detector loops shall be installed as shown in the plans. The loop wire shall extend to the recorder cabinet and shall only have one splice per loop.

Loop wire shall meet the requirements of Spec. 896.03.B. Loops shall be installed according to the plans. Loop saw slots shall be 2 inches deep, or as recommended by the manufacturer. The loop slot shall be sealed as per Spec. 772.03 F.8.

Loop lead-in conductor shall meet the requirements of Spec. 896.03.B and shall not be spliced from the pull box to the recorder cabinet. All loop splices will be made in the pull box. All loop splices will be soldered along with a 3M splice kit, or CK 137 Shake-N-Seal from Uraseal.

#### Sawing & Sealing Joints

The Contractor shall follow the provisions of Spec. 772.03 F when sealing any joints. Hot Poured Joint Seal shall not be used for sealing any saw slots.

#### Cabinet

The Contractor is responsible for all wire termination. All lug terminals for wire termination shall be crimped and soldered.

This document was originally issued and sealed by Douglas A Schumaker, Registration Number PE-5047, on 1/15/2014 and the original document is stored at the North Dakota Department of Transportation.

**NOTES**

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128 NH-SHE-1-083(106)128	6	5

The conductors shall meet the requirements of section 896 of the Std. Specs.

The 2" rigid conduit shall be at a minimum depth of 24" below finished grade. Conduit trenches will require final grading and seeding. This conduit shall meet the requirements of Spec. 896.02.B and shall not be spliced from the pull box to recorder cabinet, and shall be a continuous run.

All holes made or existing in the pull box for conduit access shall be plugged/sealed and made watertight. All conduit containing electrical wire (both in the pull box and the cabinet) shall be sealed and made watertight after the wire has been pulled through and terminated.

The ADR-6000 traffic recorder shall be manufactured by PEEK Traffic Corp.

All power feeds, data lines, and loops shall be protected with approved surge/line protectors. A 6 outlet DC line protector unit must be provided for the power source. The unit will be approved by Underwriter Laboratories (UL).

The Contractor shall install a 4G Cellular Modem in the ATR cabinet. The Contractor shall contact the Information Technology Division within the NDDOT:

Robert Steckler  
216 Airport Road  
Bismarck, ND 58504  
Telephone: (701) 328-6935

The Contractor must contact Robert Steckler a minimum of 3 weeks in advance of the installation.

Ground rods must be placed at all four (4) corners, located outside of the foundation pad. Each ground rod must be 5/8 inch diameter by 10 feet long. Connection of ground rods must be with a No. 2/0 AWG copper wire bonded to the cabinet. All buried connections will be made with a Cadweld type connection. The earth ground resistance will test to 25 ohm or less, and be tested with an earth/ground resistance tester capable of measuring earth ground resistance less than 25 ohm. The Contractor will install any additional ground rods to achieve the 25 ohm or less earth ground resistance. All test results will be documented by the Contractor and furnished to NDDOT in a clean, organized format.

Foundations

The ATR cabinet foundation and working slab shall be constructed using the ATR Detail Sheet and standard drawing D-770-1.

The cabinet foundation shall be of sufficient size so there is a minimum of 2" of clearance from the outside edge of cabinet to the outside edge of the foundation on any side. The Contractor shall ensure a water-tight seal between the cabinet and the foundation by caulking, except for V groove. Rodent protection shall be placed in the V groove between the concrete foundation and the cabinet, which shall allow water to

drain properly from the cabinet. The materials and preparation of the Working Slab shall be as approved by the Engineer.

Testing

All new loops shall be tested after installation and must test to manufacturers specifications or be replaced. If the loops meet manufacturer's specifications after installation, but do not perform traffic count or classification correctly, the Contractor will be responsible for any corrections up to and including replacing the defective part or parts. This includes loops and electronics.

The Contractor shall verify vehicle classification by comparing ATR results with base line traffic counts and classification obtained by videotaping and manually counting and classifying vehicles for a period of 2 hours.

Acceptance

Acceptance of the Automatic Traffic Recorder site will be determined after the site is in operation for 30 days and is working correctly. Any damage caused as a result of construction practices or techniques shall be paid at the Contractor's expense. This includes new items installed by this contract such as new detector loops.

The Contractor shall provide the operation and maintenance manuals and detailed wiring schematics for this ATR site.

Completion of work requires the following items to be completed: the Automatic Traffic Recorder site in working order as approved by the PEEK Traffic Corp. representative, site passed inspection by the Engineer, and successful completion of testing.

All costs for labor, equipment, materials, PEEK representative, and all testing necessary to install the ATR equipment, shall be included in the price bid for "Automatic Traffic Recorder System".

772-P02 EXISTING ATR EQUIPMENT: An ATR site is currently located at RP 129.85. The cabinet and electronic equipment are located on the east side of the northbound roadway. The existing solar panels, and electronic equipment shall be removed by the contractor and remain property of the NDDOT. The equipment shall be delivered to the NDDOT Bismarck District Radio Shop located at 216 Airport Rd, Bismarck, ND. Contact Leon Essler at (701) 328-6972.

The remaining ATR equipment including the cabinet, concrete foundation, and pull boxes shall be removed by the contractor and shall become property of the contractor.

This document was originally issued and sealed by Douglas A Schumaker, Registration Number PE-5047, on 1/15/2014 and the original document is stored at the North Dakota Department of Transportation.

**NOTES**

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128 NH-SHE-1-083(106)128	6	6

The existing loops and sensors in the roadway shall be abandoned. Any remaining conduit and conductor not disturbed by construction activities shall be abandoned.

All costs associated with removing and delivering the existing ATR equipment shall be included in the price bid for "Automatic Traffic Recorder System".

772-P03 ENVIRONMENTAL SENSOR STATION: The Contractor shall complete the work on the Environmental Sensor Station (ESS) after the roadway work is completed.

The contractor shall follow the provisions of Spec. 772.03 F when sealing any joints. Hot Poured Joint Seal shall not be used for sealing any loop saw slots.

The ESS cabinet foundation and working slab shall be constructed using Standard Drawing D-770-1 for Controller Cabinet Foundation Pad Mount.

The cabinet foundation shall be of sufficient size so there is a minimum of 2" of clearance from the outside edge of cabinet to the outside edge of the foundation on any side. The Contractor shall ensure a water-tight seal between the cabinet and the foundation by caulking, except for V groove. Rodent protection shall be placed in the V groove between the concrete foundation and the cabinet, which shall allow water to drain properly from the cabinet. The materials and preparation of the Working Slab shall be as approved by the Engineer.

All costs associated with this work shall be included in the price bid "Install ESS Station/RWIS".

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

**COMMITMENT NO. 1:** Unavoidable impacts to wetlands will be mitigated onsite, adjacent to the project, or at a NDDOT approved mitigation site or bank. Approximately 0.00 natural/jurisdictional, 0.07 natural/non-jurisdictional, 0.00 artificial/jurisdictional, and 0.28 artificial/non-jurisdictional acres of wetlands will be impacted permanently, and 0.00 acres will be impacted temporarily. 0.00 acres of Potential Other Waters will also be permanently impacted.

**ACTION TAKEN/REQUIRED:** Of the 0.341 acres of permanently impacted wetlands, the NDDOT will be mitigating 0.07 acres on-site. Mitigation is required on all permanent natural wetland impacts.

Wetland Number	Location	Cowardin Class.	Wetland Type	Wetland Size Ac.	Wetland Feature	USACE Jurisdictional Wetlands*	Wetland Impacts (acres)		USFWS Easement Impacts		WETLAND MITIGATION			
							Temp. Ac.	Perm. Ac.	Temp.	Perm.	Mitigation Required		Location	Onsite Mitigation Acres
							11990	USACE						
1	Sec. 21, T146N, R82W	PEMCx	Excavated	0.56	Artificial	N/A	0.000	0.219	0.000	0.000	N	N	none	N/A
2	Sec. 16, T146N, R82W	PEMCx	Ditch	0.24	Artificial	N/A	0.000	0.000	0.000	0.000	N	N	none	N/A
3	Sec. 17, T146N, R82W	PEMCx	Ditch	1.11	Artificial	N/A	0.000	0.029	0.000	0.000	N	N	none	N/A
4	Sec. 6, T146N, R82W	PEMC	Basin	0.19	Natural	N/A	0.000	0.066	0.000	0.000	Y	N	Onsite	0.066
5	Sec. 6, T146N, R82W	PEMCx	Ditch	0.12	Artificial	N/A	0.000	0.027	0.000	0.000	N	N	none	N/A
<b>Totals</b>				<b>2.22</b>			<b>0.000</b>	<b>0.341</b>	<b>0.00</b>	<b>0.00</b>	<b>N</b>			<b>0.07</b>

\* A wetland Jurisdictional Determination was issued by the USACE on 07/11/2012; NWO-2012-1556-BIS.

Total Permanent Impact Summary		Additional Impact Info for 404 Permit	
Wetland Type	Total (Acres)	Wetland Type	Total (Acres/Lf)
Natural/Non-JD	0.07	Permanent JD ≥ 0.10	0.00
Artificial/Non-JD	0.28	Temporary JD	0.00
Natural /JD	0.00	POW	0.00
Artificial /JD	0.00		
<b>Totals</b>	<b>0.34</b>		

# ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	8	1

SPEC	CODE	ITEM DESCRIPTION	UNIT	NH-1- 083(104)128 NB ROADWAY	NH-1- 083(106)128 SB ROADWAY	SHE-1- 083(106)128 SB ROADWAY	SHE-1- 083(104)128 NB ROADWAY	TOTAL
103	0100	CONTRACT BOND	L SUM	0.49	0.51			1
202	0135	REMOVAL OF BITUMINOUS SURFACING	TON			688	1,491	2,179
202	0153	SAW BITUMINOUS SURFACING-FULL DEPTH	LF			2,726	6,698	9,424
202	0170	REMOVAL OF CULVERTS-ALL TYPES & SIZES	LF			8	16	24
203	0101	COMMON EXCAVATION-TYPE A	CY			658	1,061	1,719
203	0109	TOPSOIL	CY			1,892	4,463	6,355
203	0121	TOPSOIL-WETLAND	CY				53	53
203	0140	BORROW-EXCAVATION	CY			2,559	6,946	9,505
203	0208	GUARDRAIL EMBANKMENT-TYPE C	EA	2	2			4
216	0100	WATER	M GAL	408	408	99	256	1,171
302	0100	SALVAGED BASE COURSE	TON	416	362	3,034	7,752	11,564
401	0100	MC70 OR 250 LIQUID ASPHALT	GAL			631	1,858	2,489
401	0150	SS1H OR CSS1H OR MS1 EMULSIFIED ASPHALT	GAL	36,329	38,670			74,999
410	0250	RECYCLED ASPHALT PAVEMENT-SUPERPAVE FAA 45	TON	57,713	64,300	207	614	122,834
410	0460	PG 64-28 ASPHALT CEMENT	TON	2,944	3,284	11	31	6,270
410	0910	CORED SAMPLE	EA	360	360			720
411	0105	MILLING PAVEMENT SURFACE	SY	296,972	296,212			593,184
550	0210	PCC PAVEMENT GRINDING	SY		1,050			1,050
702	0100	MOBILIZATION	L SUM	0.49	0.51			1
704	0100	FLAGGING	MHR	600	600			1,200
704	1000	TRAFFIC CONTROL SIGNS	UNIT	2,234	2,234	689	689	5,846
704	1052	TYPE III BARRICADE	EA	4	4	1	1	10
704	1060	DELINEATOR DRUMS	EA	58	58	20	20	156
704	1067	TUBULAR MARKERS	EA	213	212	20	20	465
704	1087	SEQUENCING ARROW PANEL-TYPE C	EA	1	1	1	1	4
706	0300	FIELD LABORATORY-TYPE C	EA	1	1			2
708	1325	SILT FENCE SUPPORTED	LF			191	638	829
708	1335	REMOVAL SILT FENCE SUPPORTED	LF			191	638	829
708	1430	FIBER ROLLS 12IN	LF			137	537	674
708	1431	REMOVAL FIBER ROLLS 12IN	LF			137	537	674
708	2240	SEEDING-TYPE B-CL II	ACRE			2.22	5.14	7.36
708	2260	SEEDING-TYPE B-CL IV	ACRE			2.22	5.14	7.36

# ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
<b>ND</b>	NH-SHE-1-083(104)128	<b>8</b>	<b>2</b>

SPEC	CODE	ITEM DESCRIPTION	UNIT	NH-1- 083(104)128 NB ROADWAY	NH-1- 083(106)128 SB ROADWAY	SHE-1- 083(106)128 SB ROADWAY	SHE-1- 083(104)128 NB ROADWAY	TOTAL
708	5500	MULCHING	ACRE			4.44	10.28	14.72
708	5650	ECB TYPE 1	SY			25	50	75
714	0300	PIPE CONC REINF 18IN CL II	LF				4	4
714	0815	PIPE CONC REINF 30IN CL II	LF			8		8
714	1200	PIPE CONC REINF 54IN CL II	LF				12	12
714	9660	REMOVE & RELAY END SECTION-ALL TYPE & SIZES	EA			1	2	3
722	4565	MEDIAN DRAIN PRECAST CONCRETE-TYPE A	EA			1	2	3
722	4580	RESET PRECAST CONCRETE MEDIAN DRAIN	EA				3	3
754	0110	FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING	SF	56	168			224
754	0112	FLAT SHEET FOR SIGNS-TYPE IV REFL SHEETING	SF	321	333			654
754	0195	DIAMOND GRADE DELINEATORS-TYPE A	EA	60	27			87
754	0206	STEEL GALV POSTS-TELESCOPING PERFORATED TUBE	LF	940	1,180			2,120
754	0214	GALV STEEL POSTS-W-SHAPE POSTS(TWO OR MORE)	LF	233	182			415
754	0534	PANEL FOR SIGNS-TYPE IV REFLECTIVE SHEETING	SF	193	170			363
754	0563	REFERENCE MARKER-TYPE C	EA	1	1			2
754	0592	RESET SIGN PANEL	EA	1	2			3
760	0005	RUMBLE STRIPS - ASPHALT SHOULDER	MILE	32.8	32.8			65.6
762	0112	EPOXY PVMT MK MESSAGE	SF	624	432			1,056
762	0113	EPOXY PVMT MK 4IN LINE	LF	194,857	194,857			389,714
762	0115	EPOXY PVMT MK 8IN LINE	LF	5,295	3,650			8,945
762	0430	SHORT TERM 4IN LINE-TYPE NR	LF	64,953	64,953			129,906
764	0131	W-BEAM GUARDRAIL	LF	204	191			395
764	0145	W-BEAM GUARDRAIL END TERMINAL	EA	2	2			4
764	0151	REMOVE W-BEAM GUARDRAIL & POSTS	LF	191	191			382
764	1050	RESET W-BEAM GUARDRAIL	LF	125	125			250
764	2020	REMOVE 3-CABLE GUARDRAIL & POSTS	LF	271	246			517
764	2081	REMOVE END TREATMENT & TRANSITION	EA	2	2			4
772	9010	AUTOMATIC TRAFFIC RECORDER SYSTEM	EA	0.6	0.4			1
772	9151	INSTALL ESS STATION/RWIS	EA	1				1

**BASIS OF ESTIMATE**

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
<b>ND</b>	NH-SHE-1-083(104)128	<b>10</b>	<b>1</b>

Description	Unit	NB Length = 863.808 Sta		NB Paving Transitions			
		RP 127.885 to RP 144.011		Length= 1 Sta/Ea		Length= 1 Sta/Ea	
		Width(ft)	Quantity/Sta	Begin Project		Begin Bridge	
				End Project	End Bridge	End Project	End Bridge
Width(ft)	Quantity	Width(ft)	Quantity	Width(ft)	Quantity		
Water @ 25 Mgal/Mile for Dust Palliative	MGal		0.47		0.47		0.47
Milling Pavement Surface	SY	30	333.33	37	411.11	37	411.11
SS1h or CSS1h or MS1 Emuls Asphalt @ 0.05 Gal/SY (1st lift)	Gal	27	15.00	27	7.50	27	7.50
Recycled Asphalt Pavement-Superpave FAA 45	Ton	26	20.10	26	5.03	26	5.03
PG 64-28 Asphalt Cement @ 5.1% of HBP	Ton		1.03		0.26		0.26
SS1h or CSS1h or MS1 Emuls Asphalt @ 0.05 Gal/SY (2nd lift)	Gal	26	14.44	26	14.44	26	14.44
Recycled Asphalt Pavement-Superpave FAA 45	Ton	25	27.64	25	31.59	33	31.59
PG 64-28 Asphalt Cement @ 5.1% of HBP	Ton		1.41		1.61		1.61
SS1h or CSS1h or MS1 Emuls Asphalt @ 0.05 Gal/SY (Shldr)	Gal	10 & 9	10.56	10 & 9	10.56	10 & 9	10.56
Recycled Asphalt Pavement-Superpave FAA 45	Ton	8	16.17	8	18.48	8	18.48
PG 64-28 Asphalt Cement @ 5.1% of HBP	Ton		0.82		0.94		0.94

**Salvaged Bituminous Needed For:**  
 20% RAP for RHBP 5,456 CY

<b>Short Term Pavement Marking</b>	
<b>Short Term 4In Line-Type NR</b>	
Milled Surface - 1,320 LF/Mile	21,651 LF
Top of 1st Lift - 1,320 LF/Mile	21,651 LF
Top of 2nd Lift - 1,320 LF/Mile	21,651 LF
<b>Total</b>	<b>64,953 LF</b>

**Recycled Asphalt Pavement Coring**  
 86,380.8 LF/2,000 LF/Sublot= 43 Sublots  
 43 sublots x 2 cores/sublot x 2 lanes x 2 lifts= 344 Density Cores  
 1 core/mile x 15.96 miles= 16 Additional Cores  
**360 Total Cores**

<b>Milled Bituminous Material Available:</b>	
ML	7,998 CY
Transitions (4)	57 CY
Lt Turn Lanes (9)	167 CY
Rt Turn Lanes (2)	40 CY
<b>Total</b>	<b>8,262 CY</b>

<b>Permanent Pavement Marking</b>			
<b>Epoxy Pavement Marking</b>			
	<b>4In Line</b>	<b>8In Line</b>	<b>Turn Arrows</b>
4" White Centerline Skip-(10' Line, 30' Skip)-1,320 LF/Mi	21,651 LF		
4" White Edge Line-5,280 LF/Mi	86,603 LF		
4" Yellow Edge Line-5,280 LF/Mi	86,603 LF		
8" White Channelizing Line		5295 LF	
Left Turn Arrows-16 SF/Ea			480 SF
Right Turn Arrows-16 SF/Ea			144 SF
<b>Total</b>	<b>194,856 LF</b>	<b>5295 LF</b>	<b>624 SF</b>

<b>Rumble Strips - Asphalt Shoulder</b>	
Right Shoulder - 5,280 LF/Mi	16.4 Mile
Left Shoulder - 5,280 LF/Mi	16.4 Mile
<b>Total</b>	<b>32.8 Mile</b>

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Basis of Estimate

Hot Bituminous Overlay and Turn Lanes

Washburn N to N Jct ND 200 - NB

**BASIS OF ESTIMATE**

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(106)128	10	2

Description	Unit	SB Length = 781.862 Sta		SB Length = 82.368 Sta		SB Paving Transitions			
		RP 127.885 to RP 142.728		RP 142.728 to RP 144.288		Length= 1 Sta/Ea		Length= 1 Sta/Ea	
		Width(ft)	Quantity/Sta	Width(ft)	Quantity/Sta	Begin Project		Begin Bridge	
						End Project	End Bridge	End Project	End Bridge
		Width(ft)	Quantity	Width(ft)	Quantity	Width(ft)	Quantity	Width(ft)	Quantity
Water @ 25 Mgal/Mile for Dust Palliative	MGal		0.47		0.47		0.47		0.47
Milling Pavement Surface	SY	30	333.33	29	322.22	37	411.11	37	411.11
SS1h or CSS1h or MS1 Emuls Asphalt @ 0.05 Gal/SY (1st lift)	Gal	31	17.22	31	17.22	31	8.61	31	8.61
Recycled Asphalt Pavement-Superpave FAA 45	Ton	29	25.09	29	28.94	29	6.27	29	6.27
PG 64-28 Asphalt Cement @ 5.1% of HBP	Ton		1.28		1.48		0.32		0.32
SS1h or CSS1h or MS1 Emuls Asphalt @ 0.05 Gal/SY (2nd lift)	Gal	29	16.11	29	16.11	29	16.11	29	16.11
Recycled Asphalt Pavement-Superpave FAA 45	Ton	28	30.96	28	40.13	28	35.38	28	35.38
PG 64-28 Asphalt Cement @ 5.1% of HBP	Ton		1.58		2.05		1.80		1.80
SS1h or CSS1h or MS1 Emuls Asphalt @ 0.05 Gal/SY (Shldr)	Gal	9 & 8.5	9.72	9 & 8.5	9.72	9 & 8.5	9.72	9 & 8.5	9.72
Recycled Asphalt Pavement-Superpave FAA 45	Ton	8	14.81	8	12.60	8	16.93	8	16.93
PG 64-28 Asphalt Cement @ 5.1% of HBP	Ton		0.76		0.64		0.86		0.86

**Salvaged Bituminous Needed for:**  
20% RAP for RHBP 6,087 CY

<b>Short Term Pavement Marking</b>	
<b>Short Term 4In Line-Type NR</b>	
Milled Surface - 1,320 LF/Mile	21,651 LF
Top of 1st Lift - 1,320 LF/Mile	21,651 LF
Top of 2nd Lift - 1,320 LF/Mile	21,651 LF
<b>Total</b>	<b>64,953 LF</b>

**Recycled Asphalt Pavement Coring**  
 86,423 LF/2,000 LF/Sublot= 43 Sublots  
 43 sublots x 2 cores/sublot x 2 lanes x 2 lifts= 344 Density Cores  
 1 core/mile x 15.96 miles= 16 Additional Cores  
**360 Total Cores**

<b>Milled Bituminous Material Available:</b>	
ML	7,977 CY
Transitions (4)	57 CY
Lt Turn Lanes (9)	38 CY
Rt Turn Lanes (2)	161 CY
<b>Total</b>	<b>8,233 CY</b>

<b>Permanent Pavement Marking</b>			
<b>Epoxy Pavement Marking</b>			
	<b>4In Line</b>	<b>8In Line</b>	<b>Turn Arrows</b>
4" White Centerline Skip-(10' Line, 30' Skip)-1,320 LF/Mi	21,651 LF		
4" White Edge Line-5,280 LF/Mi	86,603 LF		
4" Yellow Edge Line-5,280 LF/Mi	86,603 LF		
8" White Channelizing Line		3650 LF	
Right Turn Arrows-16 SF/Ea			432 SF
<b>Total</b>	<b>194,856 LF</b>	<b>3650 LF</b>	<b>432 SF</b>

<b>Rumble Strips - Asphalt Shoulder</b>	
Right Shoulder - 5,280 LF/Mi	16.4 Mile
Left Shoulder - 5,280 LF/Mi	16.4 Mile
<b>Total</b>	<b>32.8 Mile</b>

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Basis of Estimate

Hot Bituminous Overlay and Turn Lanes

Washburn N to N Jct ND 200 - SB

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-SHE-1-083(104)128	10	3

NH-SHE-1-083(106)128

NH-SHE-1-083(104)128

Spec	Code	Description	Qty	Unit
Use or Location		Rate or Station		
202	137	Removal of Bituminous Surfacing	1491	TON
Northbound			1491	TON
202	153	Saw Bituminous Surfacing-Full Depth	6698	LF
Northbound			6698	LF
216	100	Water	265	MGAL
For Aggregate		20 GAL/TON		
For Dust		25 MGAL/MI		
For Borrow		10 GAL/CY		
Northbound			265	MGAL
302	100	Salvaged Base Course	8238	TON
		1.875 TON/CY		
Northbound			8238	TON
401	100	MC 70 or 250 Liquid Asphalt	2241	GAL
For Prime Coat		0.25 GAL/SY		
Northbound			2241	GAL
410	250	Recycled Asphalt Pavement - Superpave FAA 45	614	TON
		2 TON/CY		
Northbound			614	TON
410	460	PG 64-28 Asphalt Cement	31.3	TON
		5.1% of RHBP		
Northbound			31.3	TON

NH-SHE-1-083(106)128

Spec	Code	Description	Qty	Unit
Use or Location		Rate or Station		
202	137	Removal of Bituminous Surfacing	688	TON
Southbound			688	TON
202	153	Saw Bituminous Surfacing-Full Depth	2726	LF
Southbound			2726	LF
216	100	Water	95	MGAL
For Aggregate		20 GAL/TON		
For Dust		25 MGAL/MI		
For Borrow		10 GAL/CY		
Southbound			95	MGAL
302	100	Salvaged Base Course	3270	TON
		1.875 TON/CY		
Southbound			3270	TON
401	100	MC 70 or 250 Liquid Asphalt	789	GAL
For Prime Coat		0.25 GAL/SY		
Southbound			789	GAL
410	250	Recycled Asphalt Pavement - Superpave FAA 45	207	TON
		2 TON/CY		
Southbound			207	TON
410	460	PG 64-28 Asphalt Cement	10.6	TON
		5.1% of RHBP		
Southbound			10.6	TON

This document was originally issued and sealed by  
 Aaron Murra  
 Registration Number  
 PE- 6536,  
 on 1/15/2014 and the original document is stored at the  
 North Dakota Department  
 of Transportation

Basis of Estimate  
  
 Hot Bituminous Overlay  
 Washburn N to N Jct. ND 200 - NB and SB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	11	1

NH-SHE-1-083(106)128

NH-SHE-1-083(104)128 - Northbound

Earthwork Summary										
Location	Excavation			Embankment				Balance		
	Common Excavation Type A	Topsoil	Topsoil-Wetland	Topsoil	Topsoil-Wetland	Embankment	Adjusted Embankment	Borrow Excavation	Topsoil Excess (To be Spread Evenly)	Topsoil-Wetland
	CY	CY	CY	CY	CY	CY	CY	CY	CY	CY
	I	J	K	L	M	N	O=N * 1.25	P=O-I	Q=J-L	R=K-M
RP 132.9 NBL	129	564	0	393	0	680	850	721	171	0
RP 133.4 NBL	86	633	0	448	0	1149	1436	1350	185	0
RP 140.2 NBL	92	290	0	191	0	260	325	233	99	0
RP 140.2 NBR	151	569	0	449	0	788	985	834	120	0
RP 140.5 NBL	100	268	0	162	0	220	275	175	106	0
RP 140.7 NBL	83	311	0	197	0	406	508	425	114	0
RP 141.5 NBL	76	379	0	269	0	547	684	608	110	0
RP 144.0 NBR	253	925	53	766	53	1520	1900	1647	159	0
RP 144.2 NBL	91	524	0	360	0	835	1044	953	164	0
	1061	4463	53	3235	53	6405	8007	6946	1228	0

\* 25% volume was added to embankment volumes to allow for shrinkage.

NH-SHE-1-083(106)128 - Southbound

Earthwork Summary							
Location	Excavation		Embankment			Balance	
	Common Excavation Type A	Topsoil	Topsoil	Common Excavated Volume	Common Compacted Volume	Borrow Excavation	Topsoil Excess (To be Spread Evenly)
	CY	CY	CY	CY	CY	CY	CY
	I	J	K	L	M=L * 1.25	N=M-I	O=J-K
RP 132.9 SBR	165	656	516	961	1201	1036	140
RP 140.3 SBL	94	306	270	361	451	357	36
RP 141.5 SBR	83	204	164	221	276	193	40
RP 144.2 SBR	316	726	533	1031	1289	973	193
	658	1892	1483	2574	3217	2559	409

\* 25% volume was added to embankment volumes to allow for shrinkage.

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 Aaron Murra  
 Registration Number  
 PE- 6536,  
 on 1/13/2014 and the original document is stored at the  
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Earthwork Summary

Hot Bituminous Overlay

Washburn N to N Jct. ND 200 - NB and SB

NH-SHE-1-083(106)128

T.S. Station	0+00
S.C. Station	2+00
P.I. Station	9+07.8
Delta =	16° 03' 00.0" (LT)
Degree =	1° 00' 00.0"
Tangent =	907.84'
Length =	1,405.00'
Radius =	5,729.65'
External =	199.99'
SE =	0.0297'
C.S. Station	16+05.0
S.T. Station	17+93.2

T.S. Station	283+54.6
S.C. Station	285+54.6
P.I. Station	291+36.0
Delta =	13° 28' 00.0" (RT)
Degree =	0° 59' 33.8"
Tangent =	781.45'
Length =	1,556.56'
Radius =	5,771.65'
External =	199.99'
C.S. Station	297+11.1
S.T. Station	299+11.1

T.S. Station	446+33.2
S.C. Station	448+33.2
P.I. Station	455+37.7
Delta =	16° 06' 42.00" (LT)
Degree =	1° 00' 26.5"
Tangent =	904.45'
Length =	1,798.22'
Radius =	5,687.65'
External =	199.99'
C.S. Station	462+31.5
S.T. Station	464+31.5

T.S. Station	731+94.2
S.C. Station	734+94.2
P.I. Station	752+65.2
Delta =	53° 23' 00.00" (RT)
Degree =	1° 30' 00.0"
Tangent =	2,070.98'
Length =	3,258.89'
Radius =	3,819.83'
External =	299.95'
C.S. Station	767+53.1
S.T. Station	770+53.1

T.S. Station	112+31.0
S.C. Station	114+42.8 Bk=79+50.0 Ahd
P.I. Station	101+70.5
Delta =	44° 05' 42.00" (RT)
Degree =	0° 59' 33.8"
Tangent =	2,437.58'
Length =	4,641.88'
Radius =	5,771.65'
External =	199.99'
C.S. Station	156+72.9
S.T. Station	158+72.9

P.C. Station	308+43.8
P.I. Station	312+43.8
Delta =	1° 59' 59.7" (RT)
Degree =	0° 15' 00.0"
Tangent =	400.00'
Length =	799.97'
Radius =	22,948.3'
P.T. Station	316+43.8

T.S. Station	523+14.5
S.C. Station	525+14.5
P.I. Station	539+44.0
Delta =	29° 41' 00.00" (RT)
Degree =	0° 59' 33.8"
Tangent =	1,629.50'
Length =	3,190.13'
Radius =	5,771.65'
External =	199.99'
C.S. Station	553+04.6
S.T. Station	555+04.6

T.S. Station	209+74.7
S.C. Station	211+74.7
P.I. Station	184+45.8
Delta =	17° 33' 00.0" (LT)
Degree =	1° 00' 26.5"
Tangent =	977.99'
Length =	1,942.16'
Radius =	5,687.65'
External =	199.99'
C.S. Station	227+16.9
S.T. Station	229+16.9

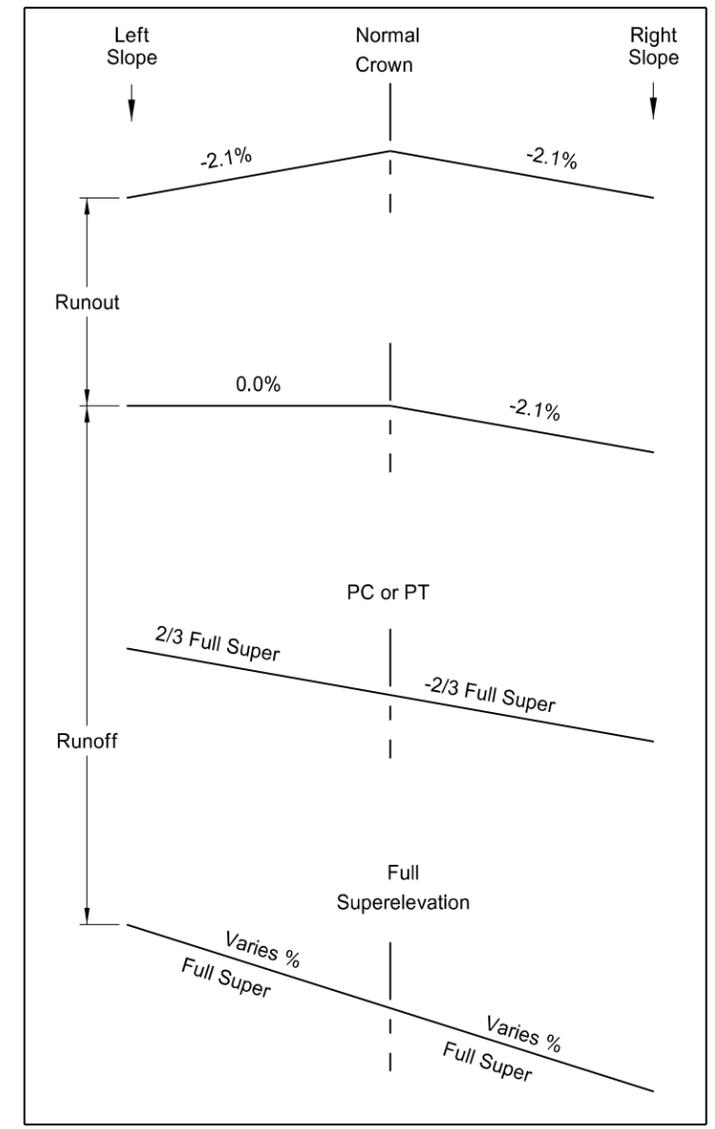
P.C. Station	325+34.3
P.I. Station	329+34.4
Delta =	3° 59' 59.5" (LT)
Degree =	0° 30' 00.0"
Tangent =	400.10'
Length =	799.97'
Radius =	11,459.15'
P.T. Station	333+34.2

T.S. Station	600+97.3
S.C. Station	602+97.3
P.I. Station	615+48.9
Delta =	26° 44' 00.00" (LT)
Degree =	1° 0' 26.5"
Tangent =	1,451.56'
Length =	2,853.77'
Radius =	5,687.65'
External =	199.99'
C.S. Station	627+51.0
S.T. Station	629+51.0

T.S. Station	244+46.9
S.C. Station	246+46.9
P.I. Station	250+22.9
Delta =	9° 34' 00.0" (LT)
Degree =	1° 00' 26.5"
Tangent =	575.96'
Length =	1,149.67'
Radius =	5,687.65'
External =	199.99'
C.S. Station	253+96.6
S.T. Station	255+96.6

P.C. Station	342+24.7
P.I. Station	346+24.7
Delta =	1° 59' 59.7" (RT)
Degree =	0° 15' 00.0"
Tangent =	400.00'
Length =	799.97'
Radius =	22,918.3'
P.T. Station	350+24.6

T.S. Station	693+74.5
S.C. Station	696+74.5
P.I. Station	719+55.4
Delta =	57° 45' 00.00" (LT)
Degree =	1° 18' 00.0"
Tangent =	2,580.95'
Length =	4,742.31'
Radius =	4,407.37'
External =	299.97'
C.S. Station	738+16.8
S.T. Station	741+16.8



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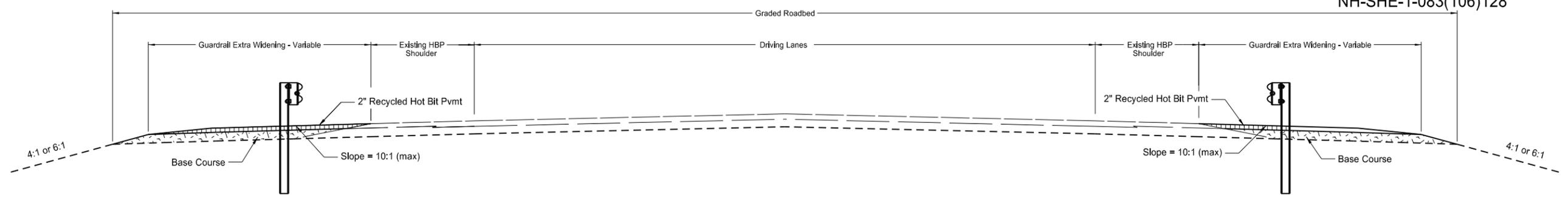
Curve Data Table

Hot Bituminous Overlay and Turn Lanes

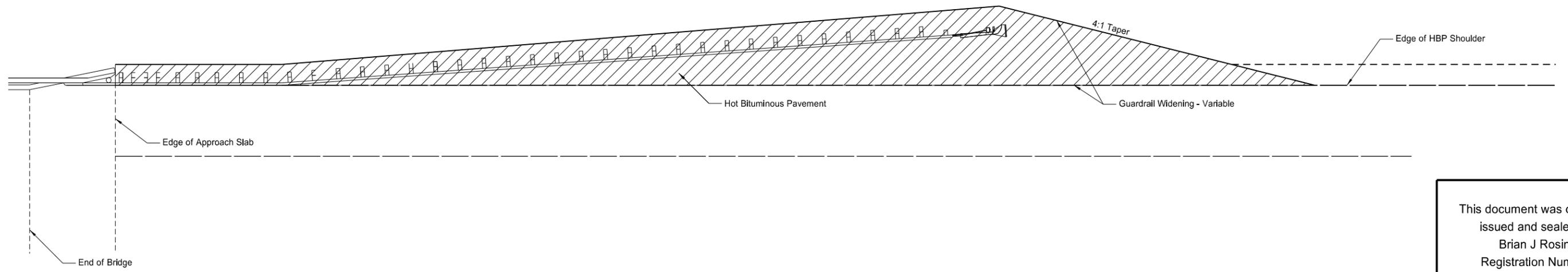
Washburn N to N Jct ND 200 - NB and SB

Note: Calculations based on AASHTO method five. A design speed of 75 mph and maximum superelevation of 6% were used.

NH-SHE-1-083(106)128



FALKIRK MINE SEPARATION				FALKIRK MINE SEPARATION			
South End - NB Rdwy				North End - SB Rdwy			
	UNIT	LT	LT MDN		UNIT	RT MDN	RT
SALV BASE	TON	93	129	SALV BASE	TON	129	93
TACK	GAL	15	21	TACK	GAL	21	15
RHBP	TON	33	46	RHBP	TON	46	33
AC	TON	1.7	2.4	AC	TON	2.4	1.7

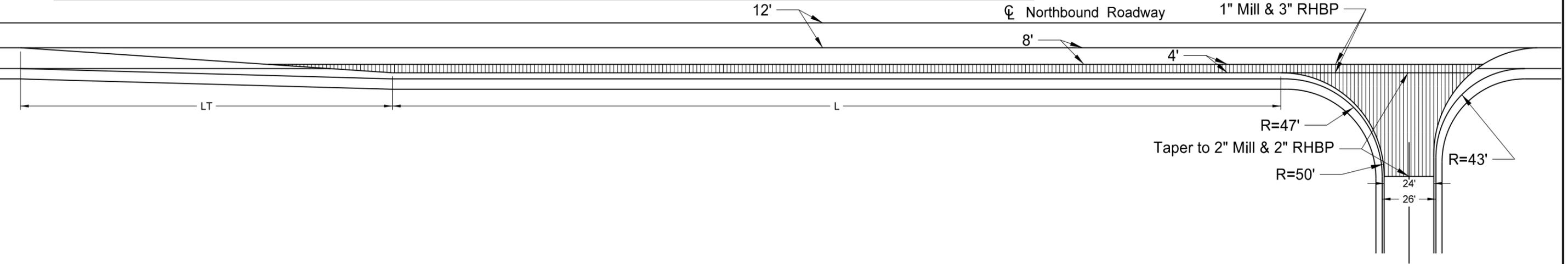


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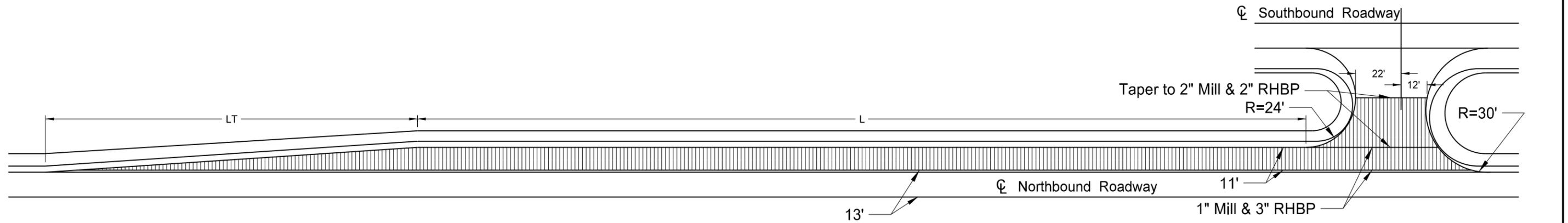
Typical Surfacing at Bridge Ends with Guardrail  
 Hot Bituminous Overlay and Turn Lanes  
 Washburn N to N Jct ND 200 - NB and SB

Right Turn Lanes	Milling		Paving		1" Mill and 3" RHBP				Taper 2" Mill and 2" RHBP			
	L (ft)	LT (ft)	L (ft)	LT (ft)	Mill (sy)	Tack (gal)	RHBP (ton)	PG (ton)	Mill (sy)	Tack (gal)	RHBP (ton)	PG (ton)
RP 128.0	300	180	300	180	354	35	59.0	3.01	363	18	50.4	2.57
RP 140.2*	210	185	430	180	149	25	41.1	2.10	218	11	30.2	1.54
RP 144.0*	160	130	430	180	123	25	41.1	2.10	218	11	30.2	1.54

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	20	2



\*Turn Lanes being lengthened.

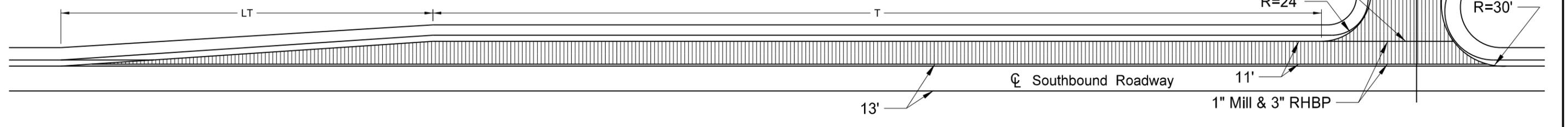


Left Turn Lanes	Milling		Paving		1" Mill and 3" RHBP				Taper 2" Mill and 2" RHBP			
	L (ft)	LT (ft)	L (ft)	LT (ft)	Mill (sy)	Tack (gal)	RHBP (ton)	PG (ton)	Mill (sy)	Tack (gal)	RHBP (ton)	PG (ton)
RP 128.0	300	240	300	240	795	79	132.5	6.76	364	18.2	60.6	3.09
RP 132.9*	100	100	430	180	264	71	118.7	6.05	108	5.4	15.0	0.77
RP 133.4*	100	75	430	180	250	71	118.7	6.05	108	5.4	15.0	0.77
RP 134.0	425	235	425	235	737	74	122.8	6.26	108	5.4	15.0	0.77
RP 136.0	400	185	400	185	678	68	113.0	5.76	108	5.4	15.0	0.77
RP 140.2*	210	185	430	180	446	71	118.7	6.05	108	5.4	15.0	0.77
RP 140.5*	130	130	430	180	317	71	118.7	6.05	108	5.4	15.0	0.77
RP 140.7*	160	105	430	180	340	71	118.7	6.05	108	5.4	15.0	0.77
RP 141.5*	210	130	430	180	415	71	118.7	6.05	108	5.4	15.0	0.77
RP 144.2*	160	130	430	180	394	129	215.1	10.97	105	5.2	14.6	0.74

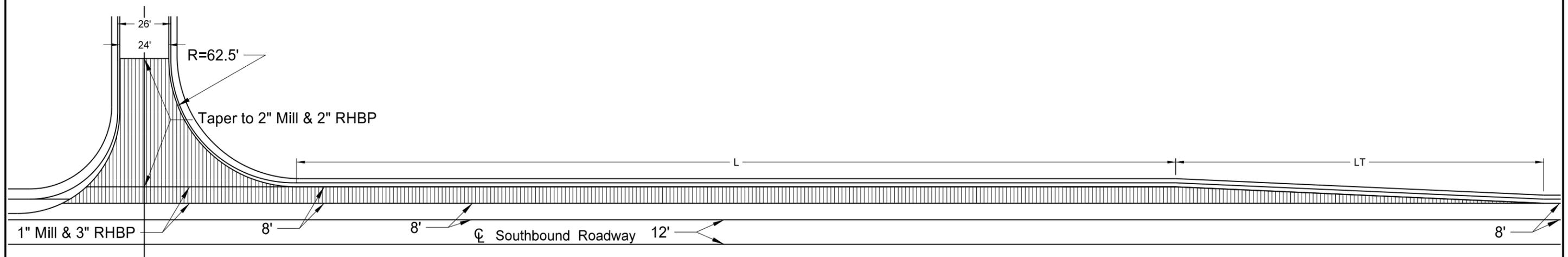
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Left and Right Turn Lane Details  
Hot Bituminous Overlay and Turn Lanes  
Washburn N to N Jct ND 200 - NB

Left Turn Lanes	Milling		Paving		1" Mill and 3" RHBP				Taper 2" Mill and 2" RHBP			
	L (ft)	LT (ft)	L (ft)	LT (ft)	Mill (sy)	Tack (gal)	RHBP (ton)	PG (ton)	Mill (sy)	Tack (gal)	RHBP (ton)	PG (ton)
RP 128.0	300	240	300	240	547	55	91.2	4.65	516	52	86.0	4.39
RP 140.3*	290	52	430	180	469	47	118.7	6.05	108	5	15.0	0.77



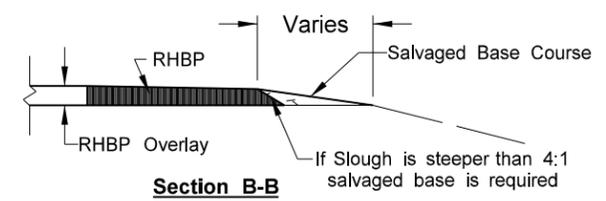
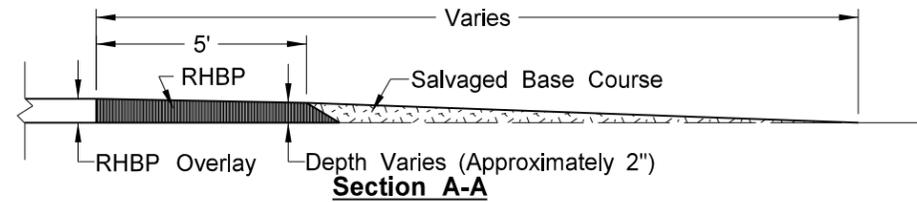
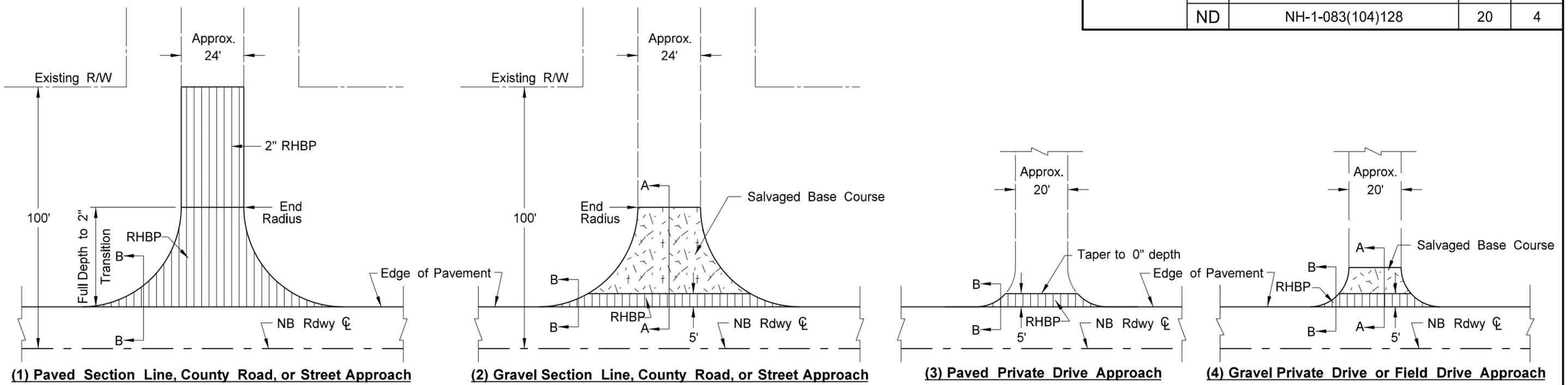
\*Turn Lanes being lengthened.



Right Turn Lanes	Milling		Paving		1" Mill and 3" RHBP				Taper 2" Mill and 2" RHBP			
	L (ft)	LT (ft)	L (ft)	LT (ft)	Mill (sy)	Tack (gal)	RHBP (ton)	PG (ton)	Mill (sy)	Tack (gal)	RHBP (ton)	PG (ton)
RP 128.0	300	115	300	115	547	55	91.2	4.65	516	26	71.7	3.66
RP 132.9*	130	100	430	180	245	55	93.1	4.75	214	11	29.7	1.51
RP 134.0	400	235	400	235	556	56	92.7	4.73	281	14	39.0	1.99
RP 136.1	500	260	500	260	656	66	109.4	5.58	281	14	39.0	1.99
RP 140.3*	340	210	430	180	492	56	93.1	4.75	281	14	39.0	1.99
RP 141.5*	315	130	430	180	434	56	93.1	4.75	281	14	39.0	1.99
RP 144.2*	240	100	430	180	586	59	97.7	4.98	399	20	55.4	2.83

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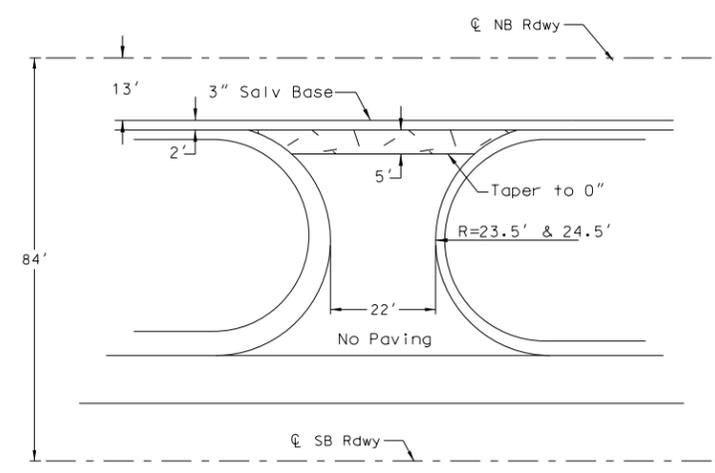
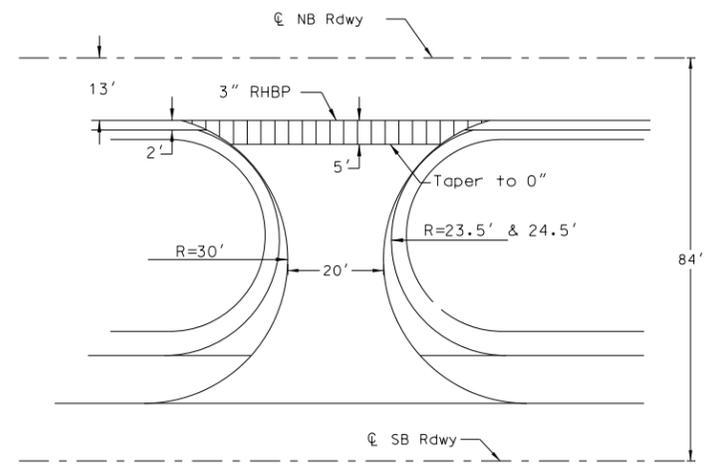
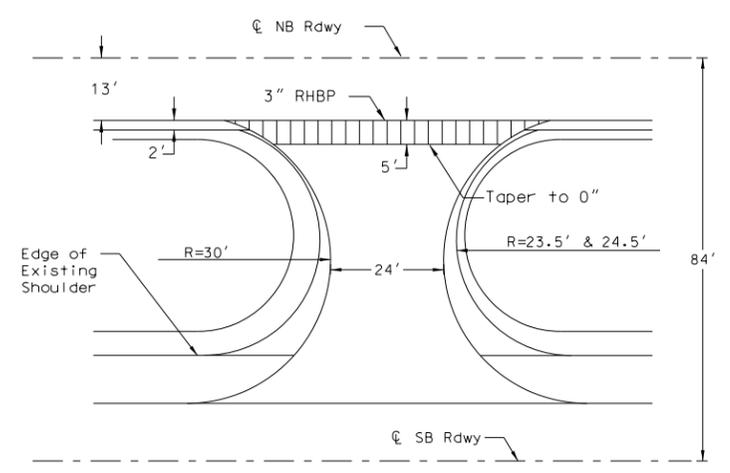
Left and Right Turn Lane Details  
Hot Bituminous Overlay and Turn Lanes  
Washburn N to N Jct ND 200 - SB



Notes:

1. A longer HBP wedge may be needed if an existing elevation difference between the mainline and the approach exists. Actual RHPB paving and salvaged base locations may vary in the field for situations, as approved by the Engineer.
2. Quantity totals have been included in the bid items of the "Estimate of Quantities" of the plans.
3. Approximately 100 tons of additional salvaged base have been provided to fill in around the radii. This material will be required when sloughs are steeper than 4:1. See B-B.

BASIS OF ESTIMATE		(1)	(2)	(3)	(4)	(5)	(6)	(7)	TOTALS
ITEM	UNIT	Paved Section Line	Gravel Section Line	Paved Private Drive	Gravel Field/Private Drive	Section Line X-Over	Private Drive X-Over	Field Drive X-Over	
Number of Locations	#	7	8	20	15	7	17	15	89
Salvaged Base	TON	N/A	6.7	N/A	1.3	N/A	N/A	1.4	94
Tack Coat	GAL	23.2	4.1	17.3	1.9	3.2	3.0	N/A	643
Recycled Superpave FAA 45	TON	37.3	5.8	2.7	2.7	2.7	2.5	N/A	462
Asphalt Cement	TON	1.90	0.29	0.14	0.14	0.14	0.13	N/A	23.5

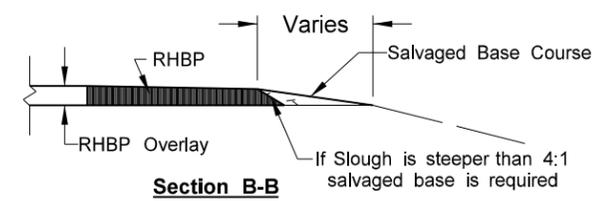
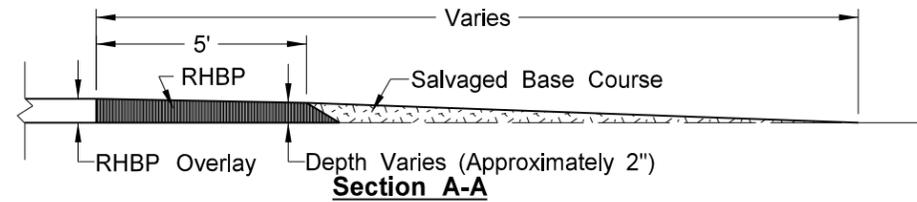
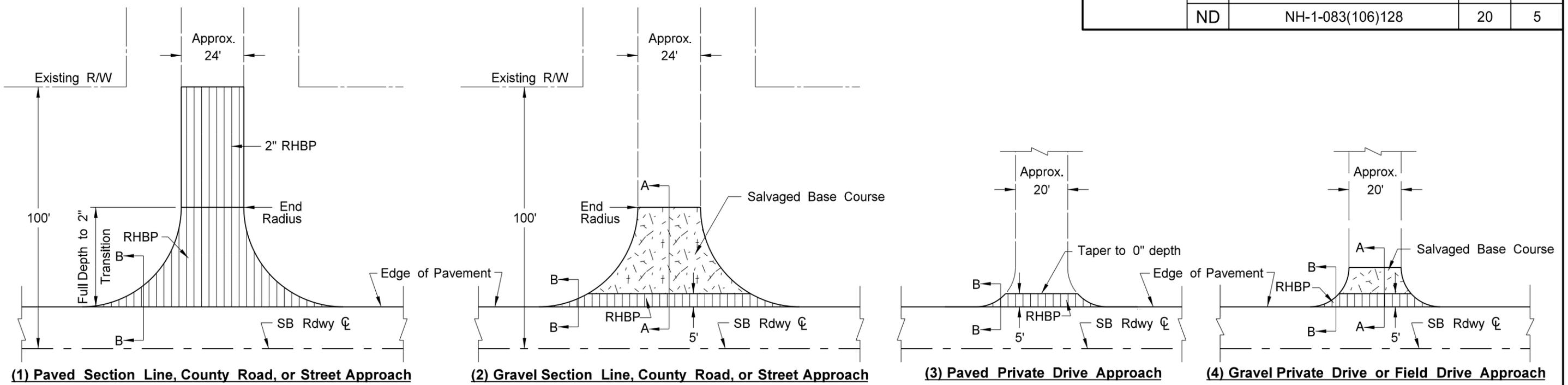


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Approach Paving Details

Hot Bituminous Overlay and Turn Lanes

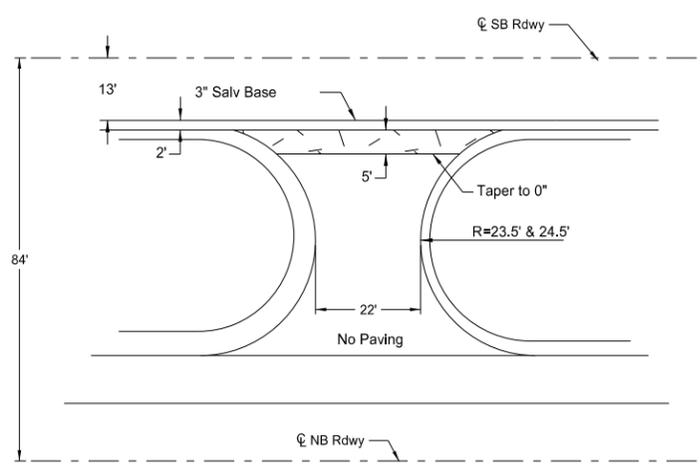
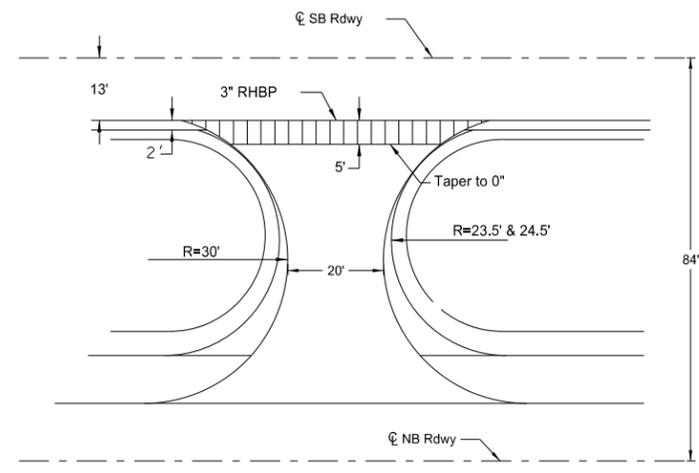
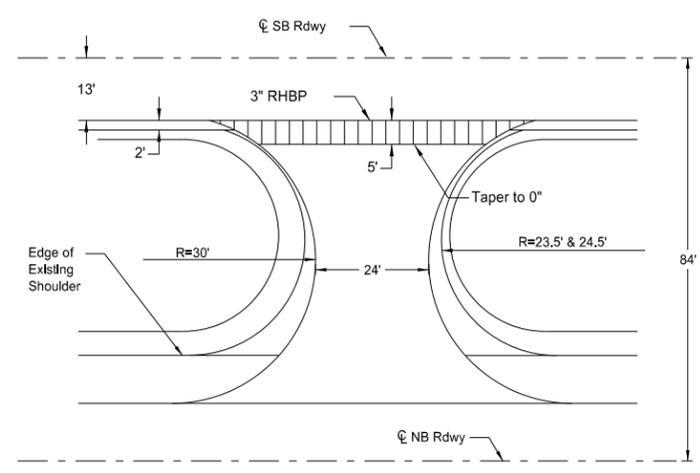
Washburn N to N Jct ND 200 - NB



Notes:

1. A longer HBP wedge may be needed if an existing elevation difference between the mainline and the approach exists. Actual RHPB paving and salvaged base locations may vary in the field for situations, as approved by the Engineer.
2. Quantity totals have been included in the bid items of the "Estimate of Quantities" of the plans.
3. Approximately 100 tons of additional salvaged base have been provided to fill in around the radii. This material will be required when sloughs are steeper than 4:1. See B-B.

BASIS OF ESTIMATE		(1)	(2)	(3)	(4)	(5)	(6)	(7)	TOTALS
ITEM	UNIT	Paved Section Line	Gravel Section Line	Paved Private Drive	Gravel Field/Private Drive	Section Line X-Over	Private Drive X-Over	Field Drive X-Over	
Number of Locations	#	11	2	14	4	19	14	15	79
Salvaged Base	TON	N/A	6.7	N/A	1.3	N/A	N/A	1.4	40
Tack Coat	GAL	23.2	4.1	17.3	1.9	3.2	3.0	N/A	616
Recycled Superpave FAA 45	TON	37.3	5.8	2.7	2.7	2.7	2.5	N/A	557
Asphalt Cement	TON	1.90	0.29	0.14	0.14	0.14	0.13	N/A	28.5



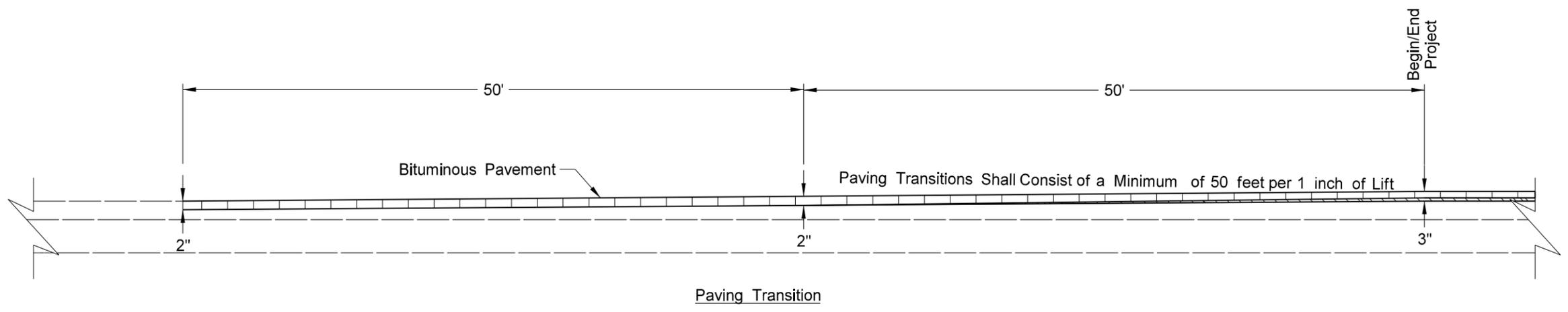
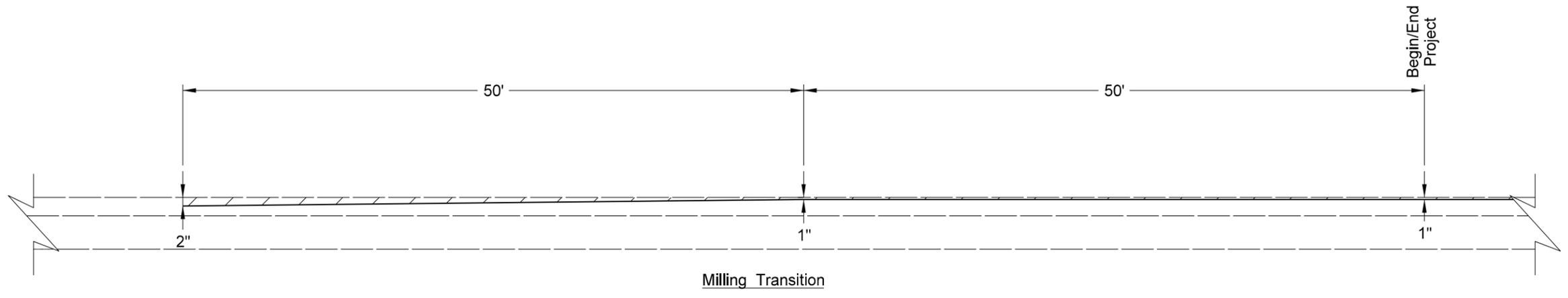
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Approach Paving Details

Hot Bituminous Overlay and Turn Lanes

Washburn N to N Jct ND 200 - SB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128 NH-SHE-1-083(106)128	20	6

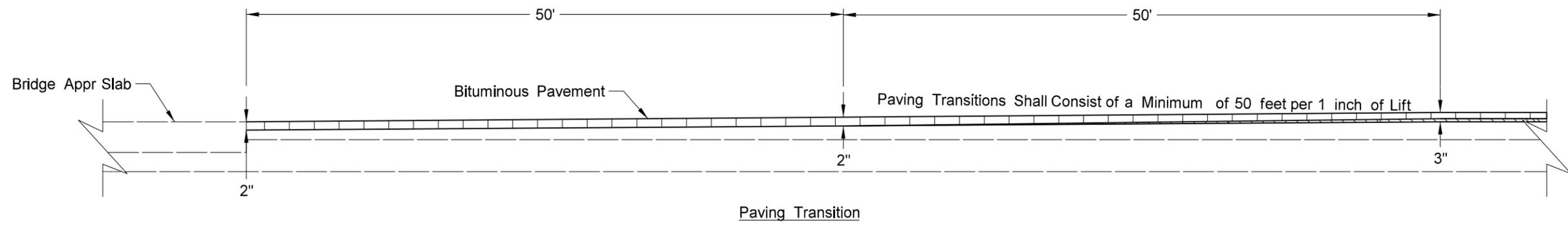
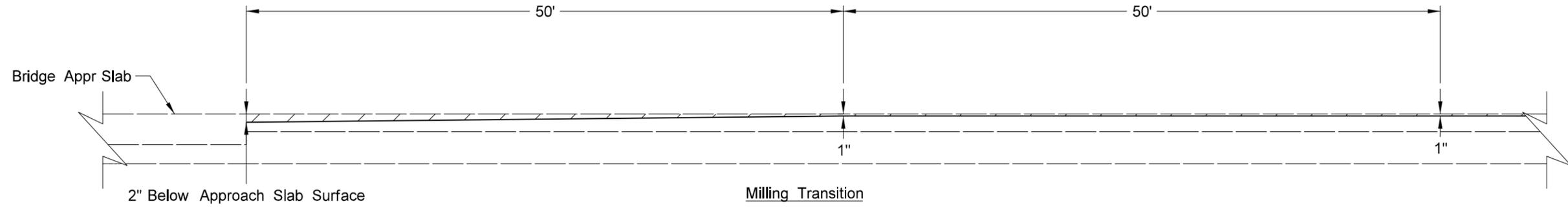


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Milling and Paving Transitions  
Hot Bituminous Overlay and Turn Lanes  
Washburn N to N Jct ND 200 - NB and SB

NOTE: Drawing is not to scale

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128 NH-SHE-1-083(106)128	20	7



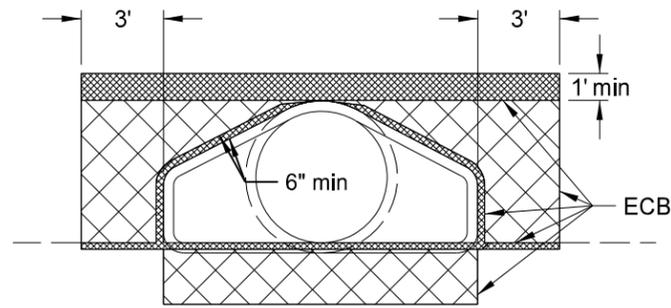
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Milling and Paving Transitions at Bridges  
  
Hot Bituminous Overlay and Turn Lanes  
Washburn N to N Jct ND 200 - NB and SB

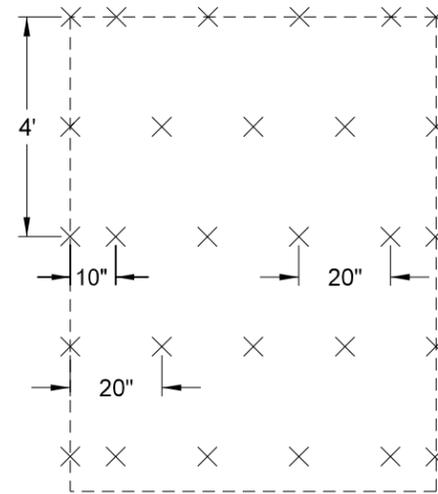
NOTE: Drawing is not to scale

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-SHE-1-083(104)128	20	8

NH-SHE-1-083(106)128

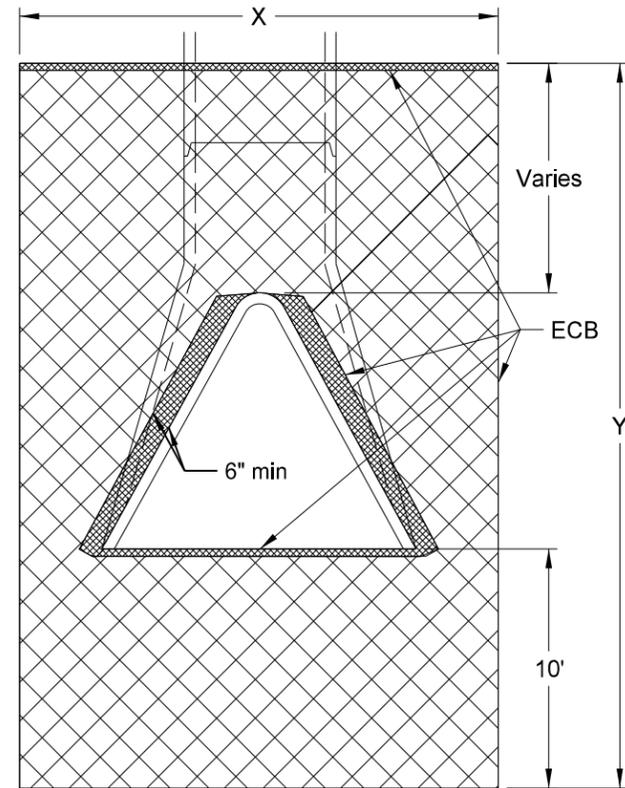


FRONT VIEW



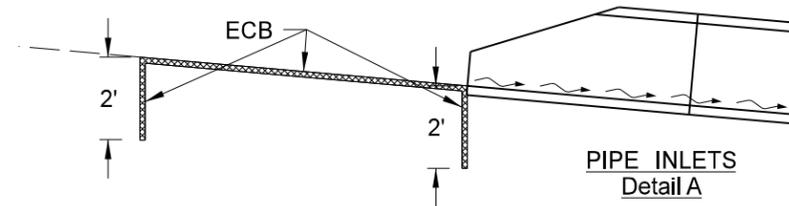
STAPLE PATTERN: 3.8 staples per square yard using 8-inch 11 gauge wire "u" staples

Location	Pipe Diameter (IN)	X (FT)	Y (FT)	Quantity (SY)
RP 132.9 SBR	30	11.0	20.5	25
RP 140.2 NBR	54	13.5	21.4	32
RP 144.0 NBR	18	9.0	18.3	18
Total				75

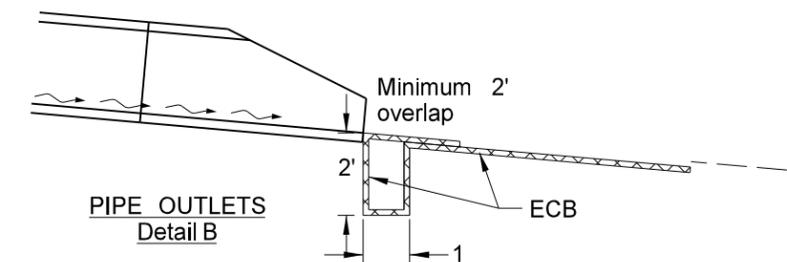


TOP VIEW

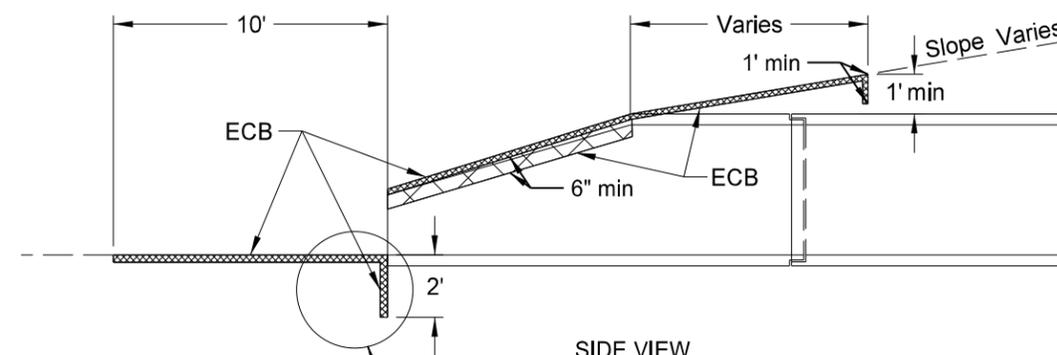
NOTE: The ECB shall be tucked a minimum of 1' into the embankment above the flared end section, a minimum of 6" into the embankment (against the flared end section) around the opening of the flared end section, and 2' into the ground at the end of the flared end section.



PIPE INLETS  
Detail A



PIPE OUTLETS  
Detail B



SIDE VIEW

See Details A & B

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Erosion Control at Culvert Flared End Sections

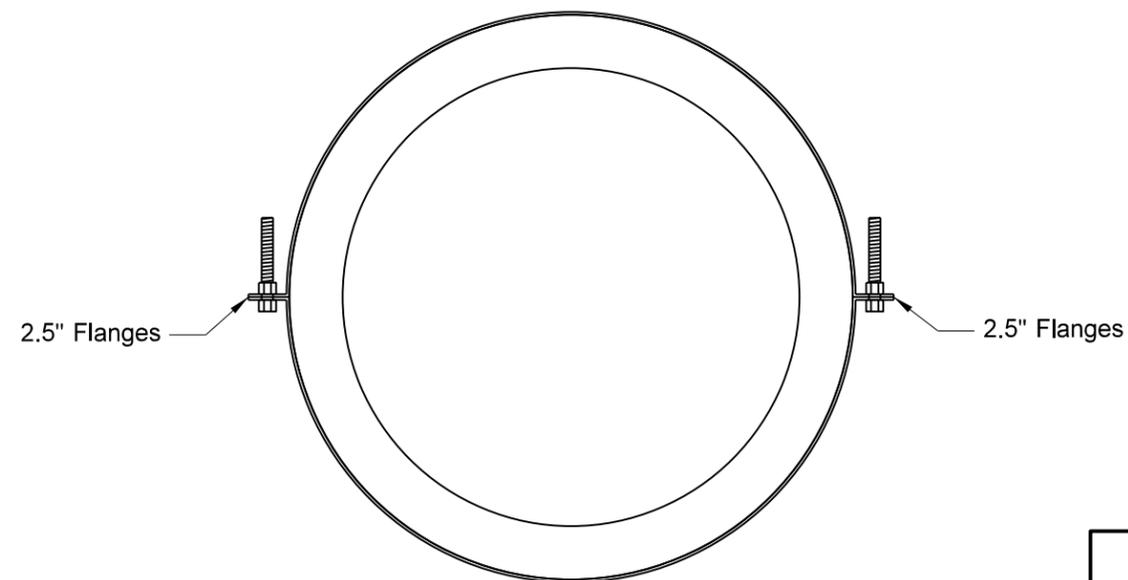
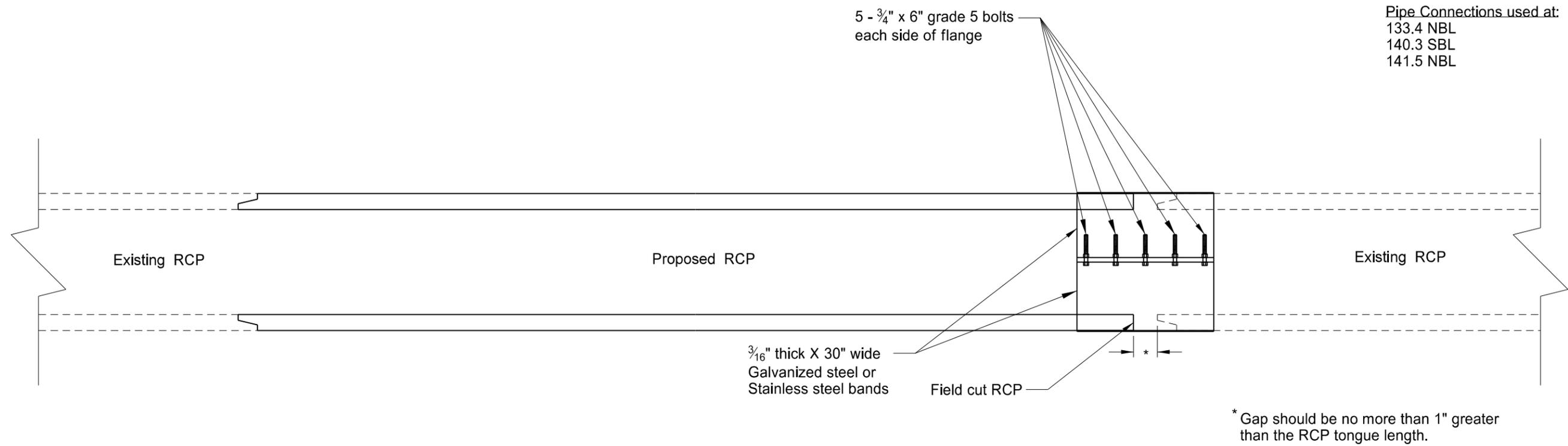
Hot Bituminous Overlay

Washburn N to N Jct. ND 200 - NB and SB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	20	9

NH-SHE-1-083(106)128

Pipe Connections used at:  
 133.4 NBL  
 140.3 SBL  
 141.5 NBL



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External Pipe Connection Band Detail

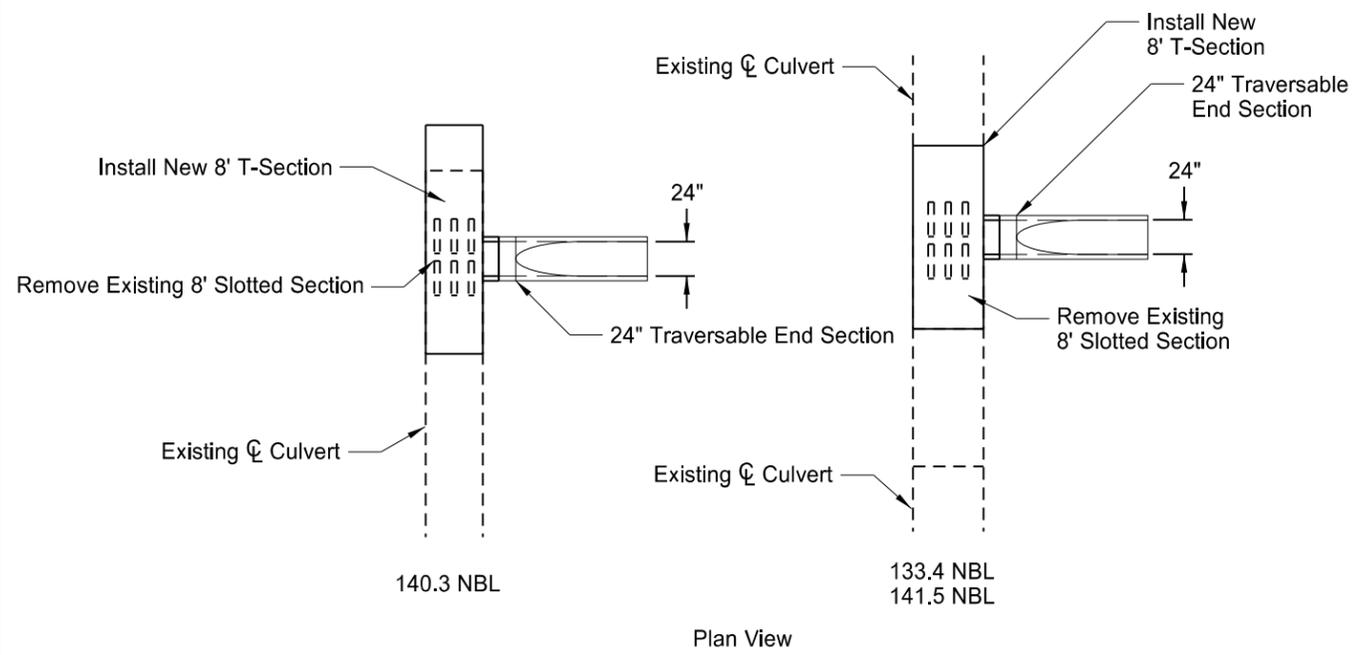
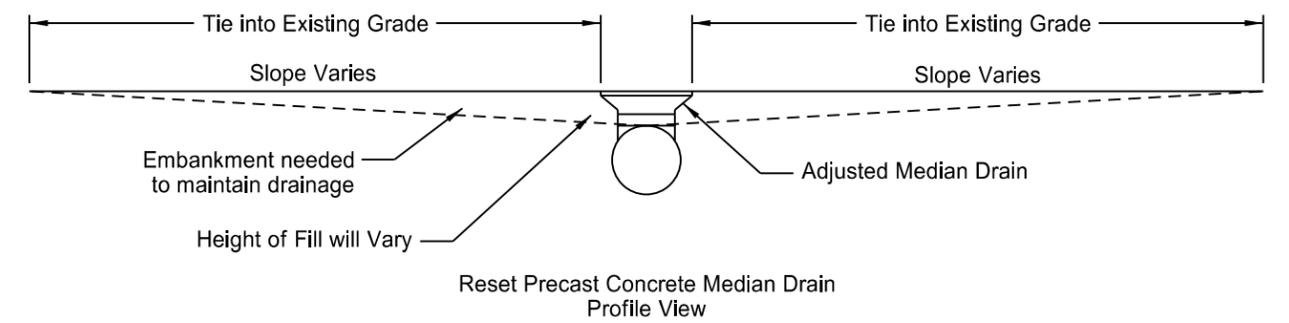
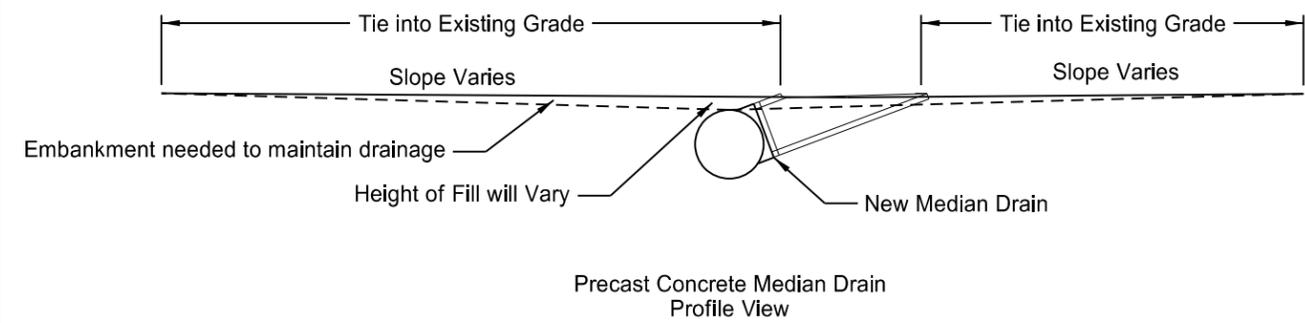
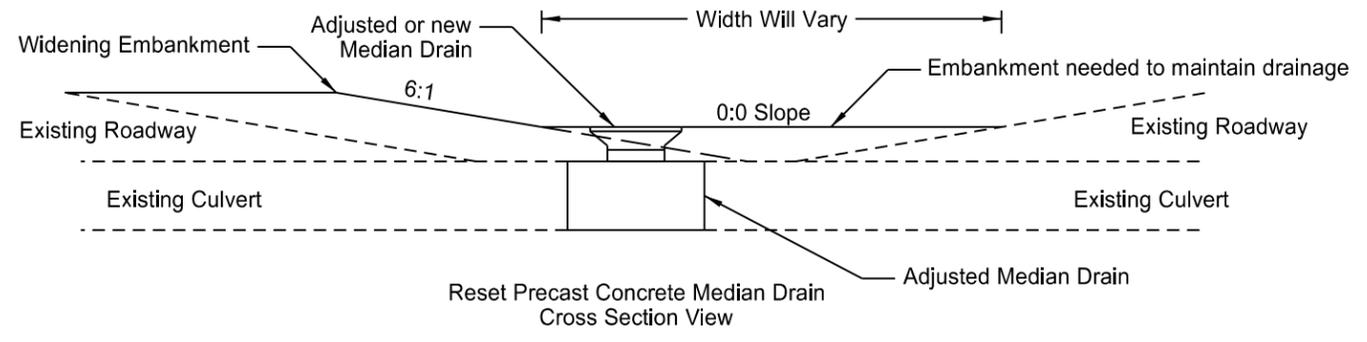
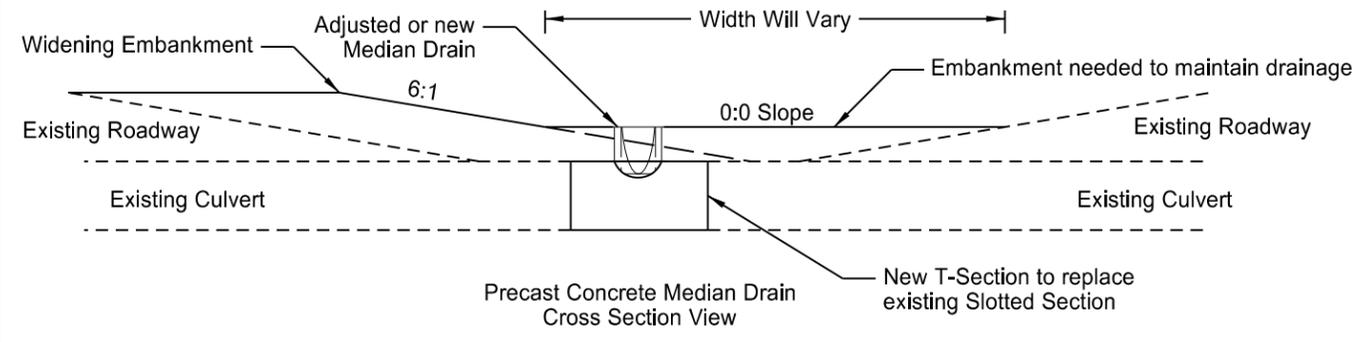
Hot Bituminous Overlay

Washburn N to N Jct. ND 200 - NB and SB

Notes:  
 A butyl joint material shall be used to seal the pipes to the band.  
 All joints shall be tied according to Standard D-714-22.

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	20	10

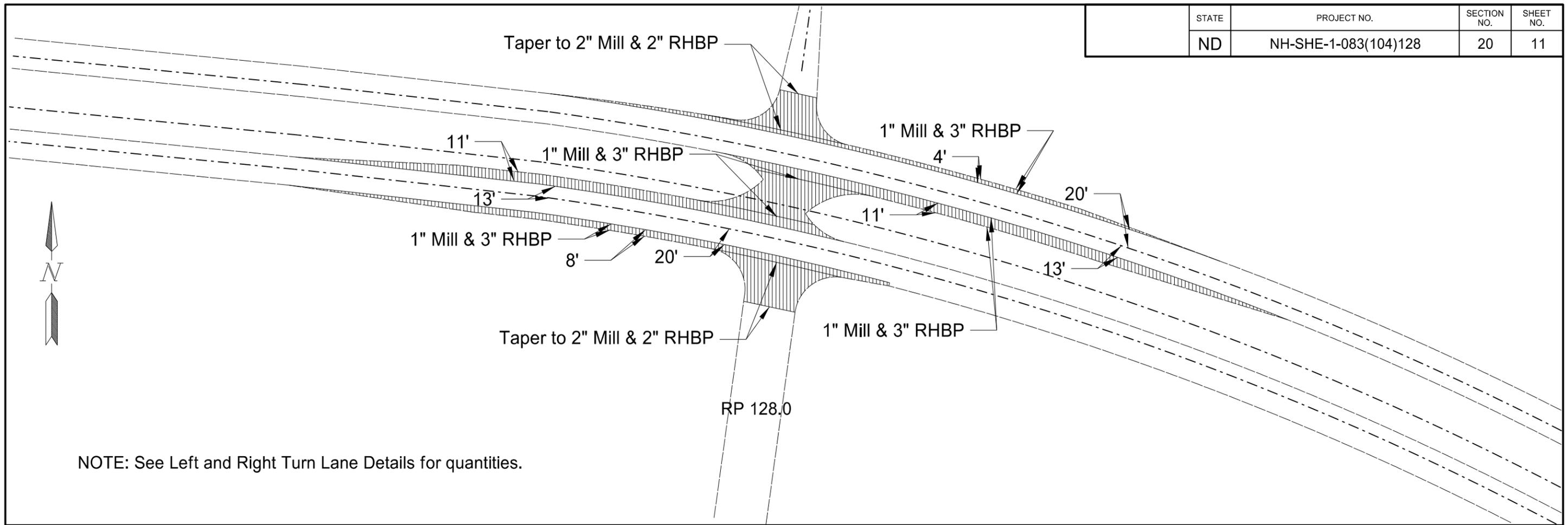
NH-SHE-1-083(106)128



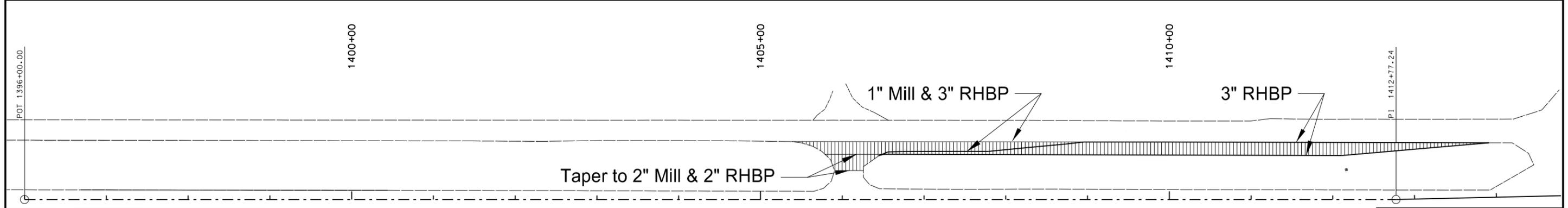
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Precast Concrete Median Drain and  
Reset Precast Concrete Median Drain  
  
Hot Bituminous Overlay  
Washburn N to N Jct. ND 200 - NB and SB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	20	11



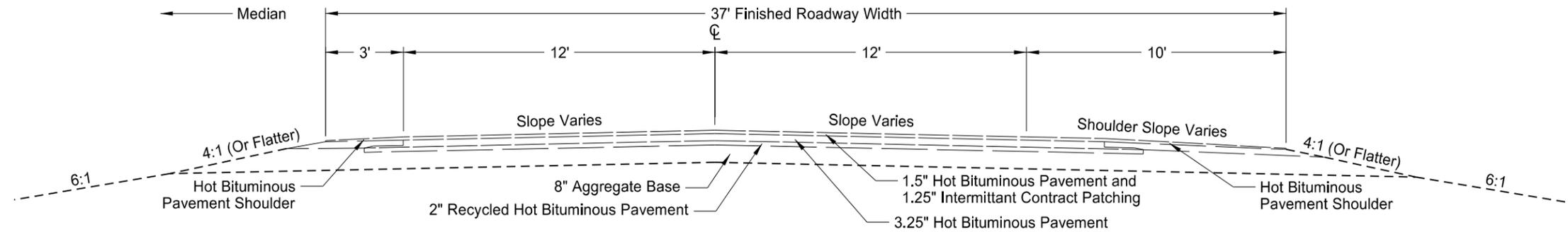
NOTE: See Left and Right Turn Lane Details for quantities.



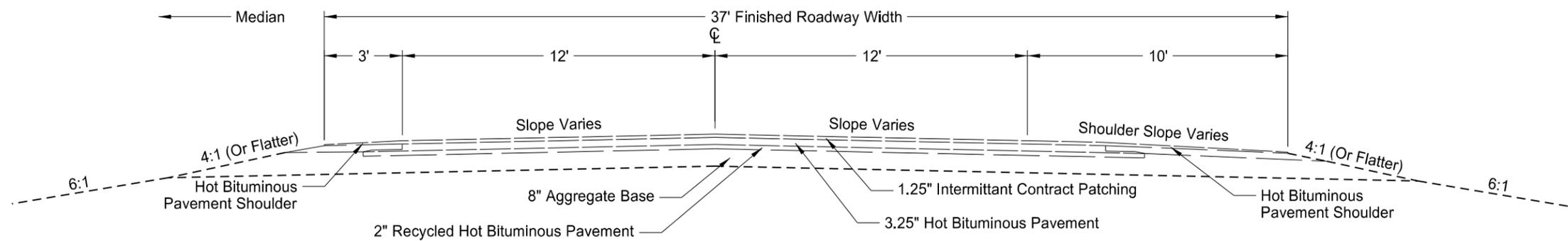
NOTE: See Left and Right Turn Lane Details for quantities.

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Flared Intersection Turn Lane Details  
Hot Bituminous Overlay and Turn Lanes  
Washburn N to N Jct ND 200 - NB and SB



Existing Typical Section 1 - NB Roadway  
RP 127.885 to RP 141.011



Existing Typical Section 2 - NB Roadway  
RP 141.011 to RP 144.288

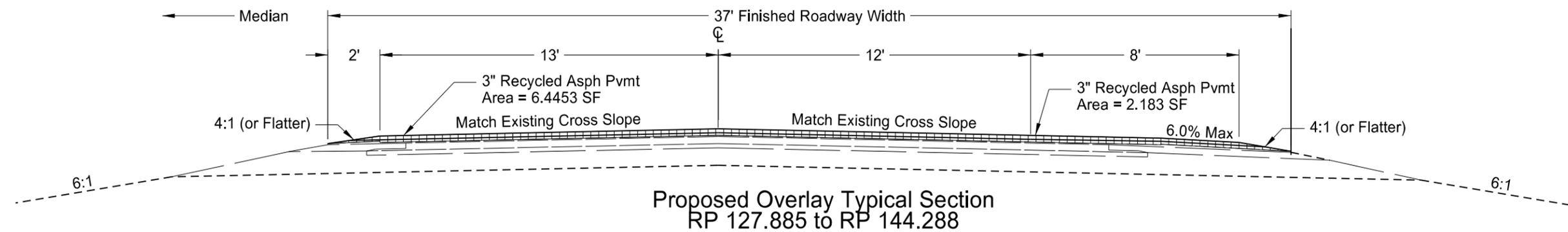
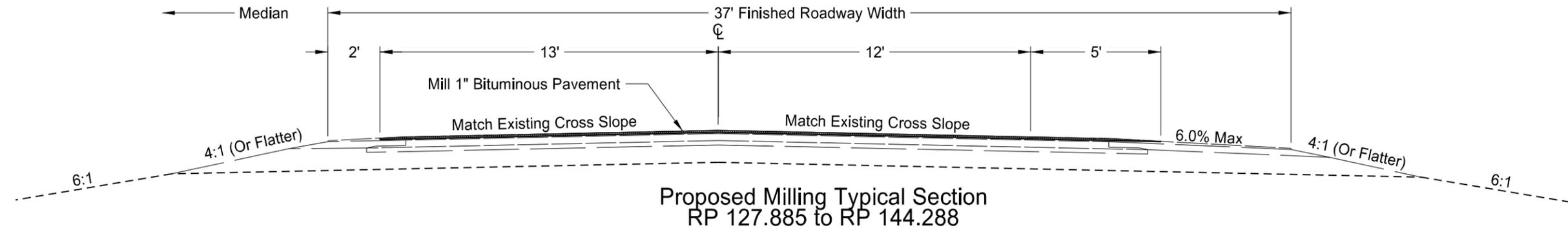
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Existing Typical Sections

Hot Bituminous Overlay and Turn Lanes

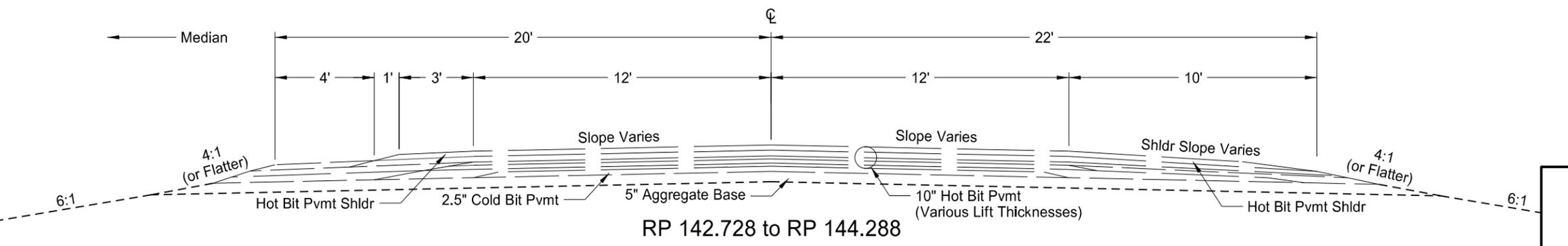
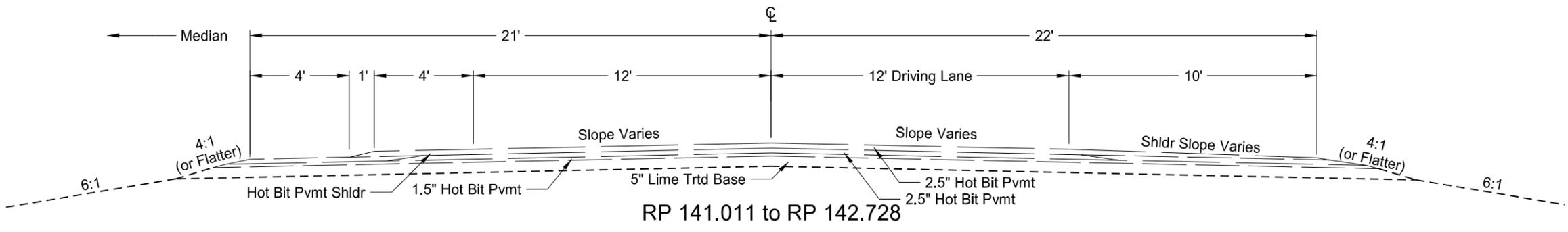
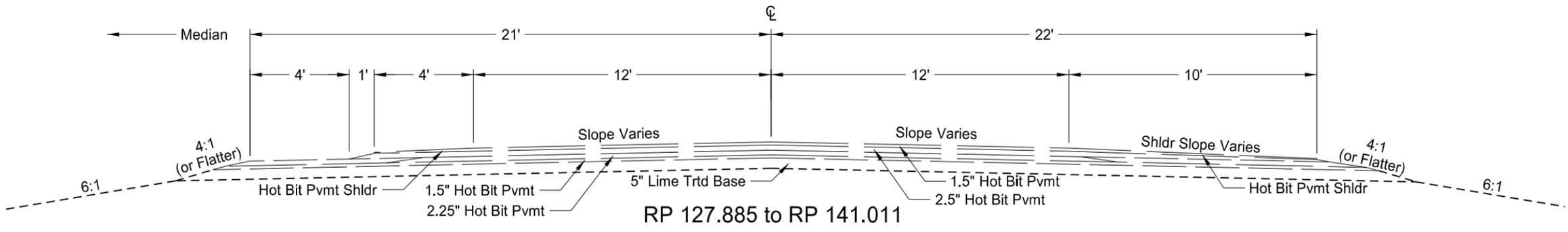
Washburn N to N Jct. ND 200 - NB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	30	2



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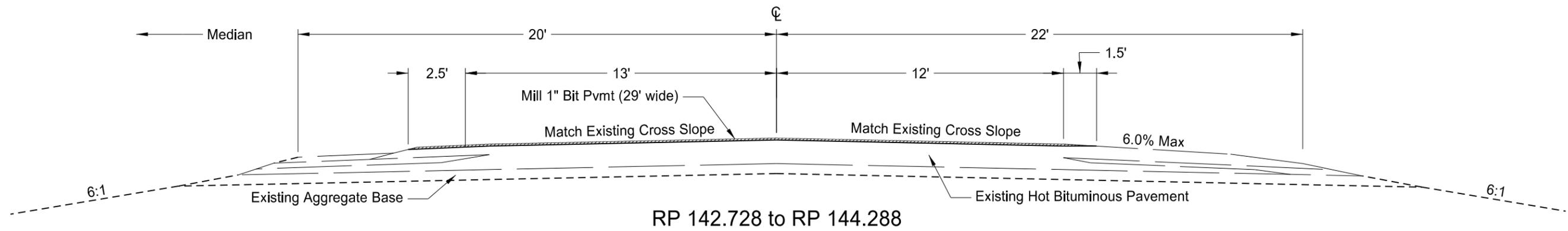
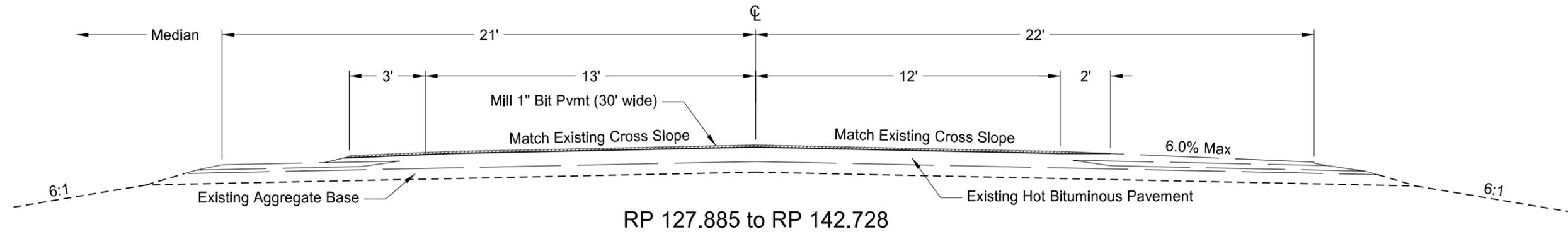
Proposed Typical Section  
Hot Bituminous Overlay and Turn Lanes  
Washburn N to N Jct. ND 200 - NB



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Existing Typical Sections  
Hot Bituminous Overlay and Turn Lanes  
Washburn N to N Jct. ND 200 - SB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(106)128	30	4

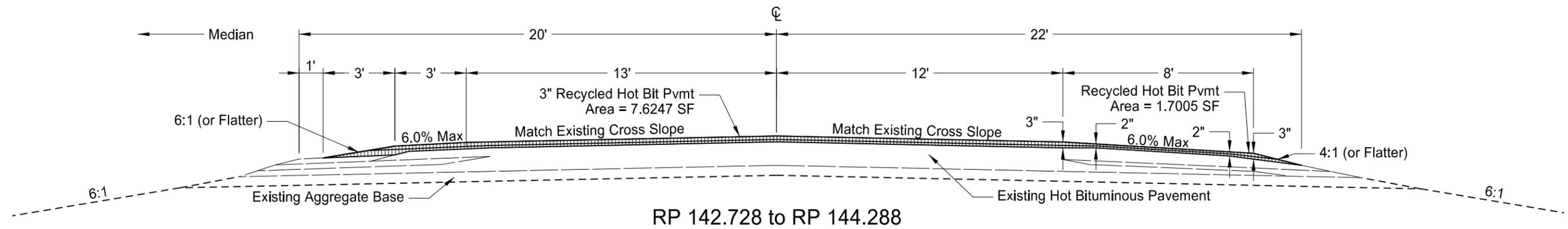
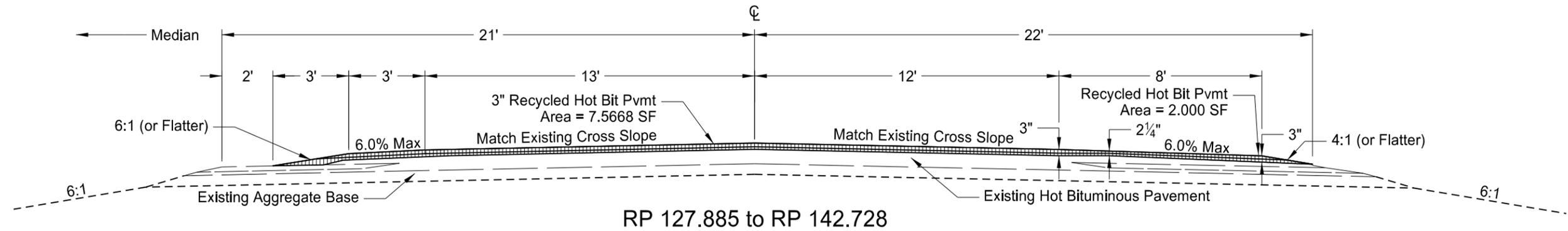


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Proposed Milling Typical Sections

Hot Bituminous Overlay and Turn Lanes

Washburn N to N Jct. ND 200 - SB



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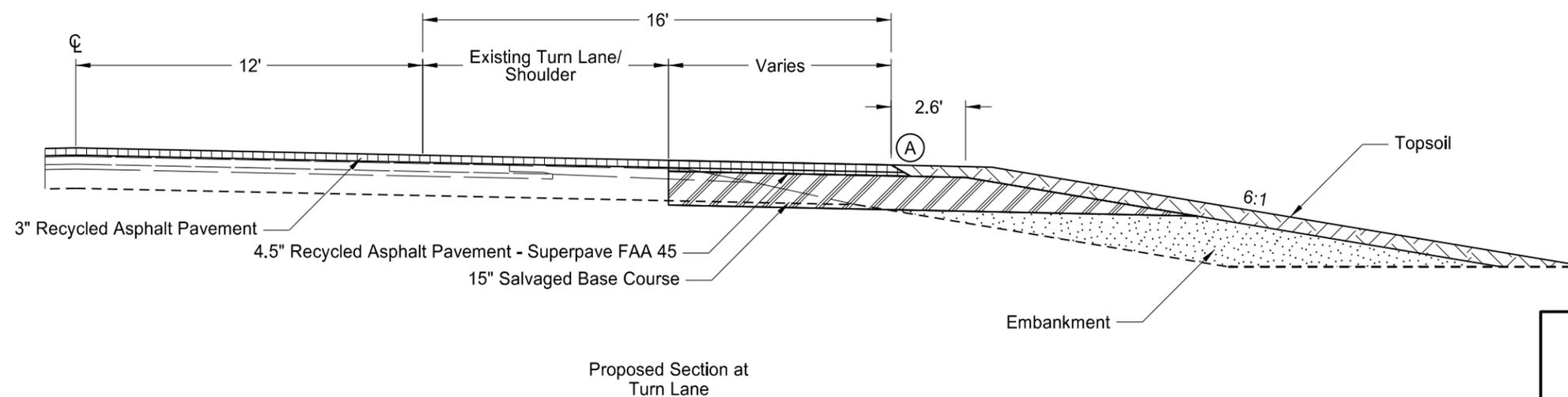
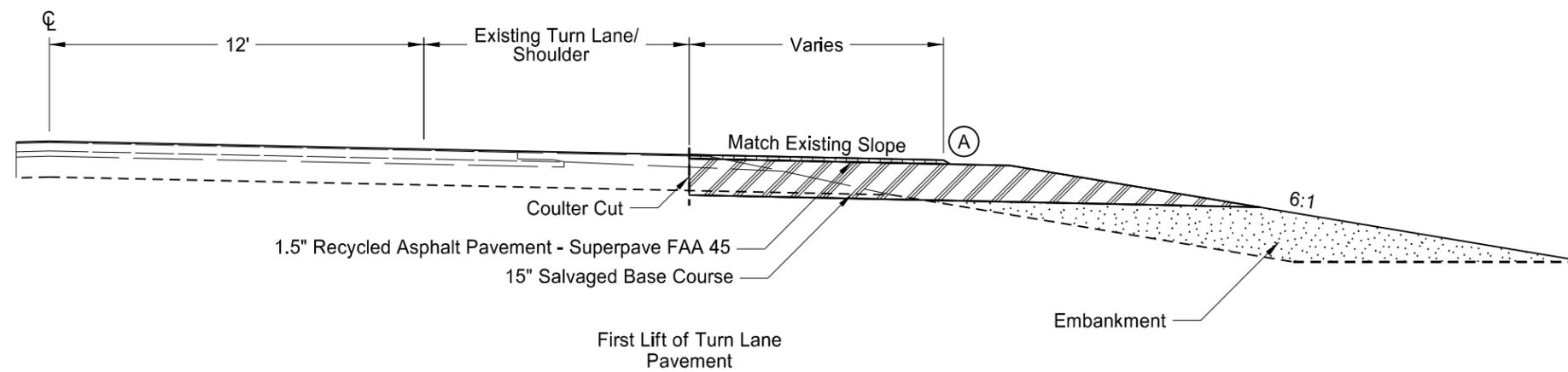
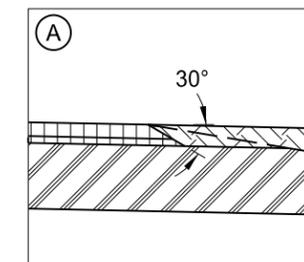
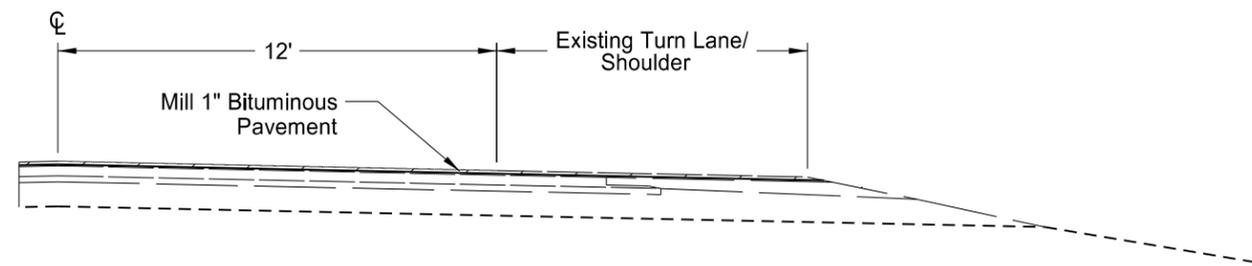
Proposed Paving Typical Sections

Hot Bituminous Overlay and Turn Lanes

Washburn N to N Jct. ND 200 - SB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	30	6

NH-SHE-1-083(106)128



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Turn Lane Phasing  
Right and Left Turn Lanes  
Hot Bituminous Overlay  
Washburn N to N Jct. ND 200 - NB and SB

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-SHE-1-083(104)128	50	1

NH-SHE-1-083(106)128

Intersection Location	RP 132.9
Turn Lane Impacting Inlet	NBL
Existing Inlet Elevation	1863.45
Proposed Inlet Elevation	1865.65

Intersection Location	RP 140.3
Turn Lane Impacting Inlet	SBL
Existing Inlet Elevation	2024.21
Proposed Inlet Elevation	2024.9

Intersection Location	RP 133.4
Turn Lane Impacting Inlet	NBL
Existing Inlet Elevation	1847.91
Proposed Inlet Elevation	1849.3

Intersection Location	RP 141.5
Turn Lane Impacting Inlet	NBL
Existing Inlet Elevation	2027.71
Proposed Inlet Elevation	2030.28

Intersection Location	RP 140.2
Turn Lane Impacting Inlet	NBL
Existing Inlet Elevation	2023.31
Proposed Inlet Elevation	2023.97

Intersection Location	RP 144.2
Turn Lane Impacting Inlet	NBL
Existing Inlet Elevation	2002.53
Proposed Inlet Elevation	2003.81

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Inlet Summary

Hot Bituminous Overlay

Washburn N to N Jct. ND 200 - NB and SB

## HYDRAULIC DATA FOR NH-SHE-1-083(104)128, NH-SHE-1-083(106)128 (A)

STATION	EXISTING PIPE	PROPOSED PIPE SIZE	DRAINAGE AREA (ACRES)	25-YEAR DATA				100-YEAR DATA	
				DESIGN DISCHARGE (CFS)	DESIGN HEADWATER (FT)	DESIGN VELOCITY (FPS)	DESIGN STAGE (NAVD 88)	100-YEAR DISCHARGE (CFS)	100-YEAR STAGE (NAVD 88)
483+98	36"	36"	2.3	3.0	0.72	6.52	1858.54	5.0	1858.76
480+69	30"	30"	11.4	10.8	1.58	7.35	1863.77	17.7	1864.33
458+00	30"	30"	1.8	2.8	0.74	4.53	1846.10	4.6	1846.33
94+98	54"	54"	34.5	22.5	2.18	5.61	2014.82	37.1	2015.46
94+99	54"	54"	2.7	4.0	0.95	3.53	2013.59	6.6	2013.84
89+03	18"	18"	2.9	3.3	1.00	5.02	2022.84	5.6	2023.23
66+04	36"	36"	2.3	3.2	0.84	3.55	2025.61	5.3	2025.87
1422+98	18"	18"	3.2	3.0	1.03	4.02	1993.38	5.2	1993.76
1412+17	18"	18"	1.7	1.6	0.65	3.69	1999.50	2.9	1999.78

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

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Hydraulic Data

Hot Bituminous Overlay

Washburn N to N Jct. ND 200 - NB and SB

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-SHE-1-083(104)128	51	1

NH-SHE-1-083(106)128

Intersection Location/ Conflicting Turn Lane	*Offset	Pay Length	Pipe Diameter	(A) End Sections	Allowable Material	Required Diameter
	LF	LF	IN	EA		IN
RP 132.9/ SBR	15.9	8	30"	Y	PIPE CONC REINF 30IN CL II	30"
RP 140.3/ NBR	37.5	12	54"	Y	PIPE CONC REINF 54IN CL II	54"
RP 144.0/ NBR	25.5	4	18"	Y	PIPE CONC REINF 18IN CL II	18"

(A) Existing end sections will be removed and relaid  
 \* Offset is from the edge of existing roadway

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Allowable Pipe List

Hot Bituminous Overlay

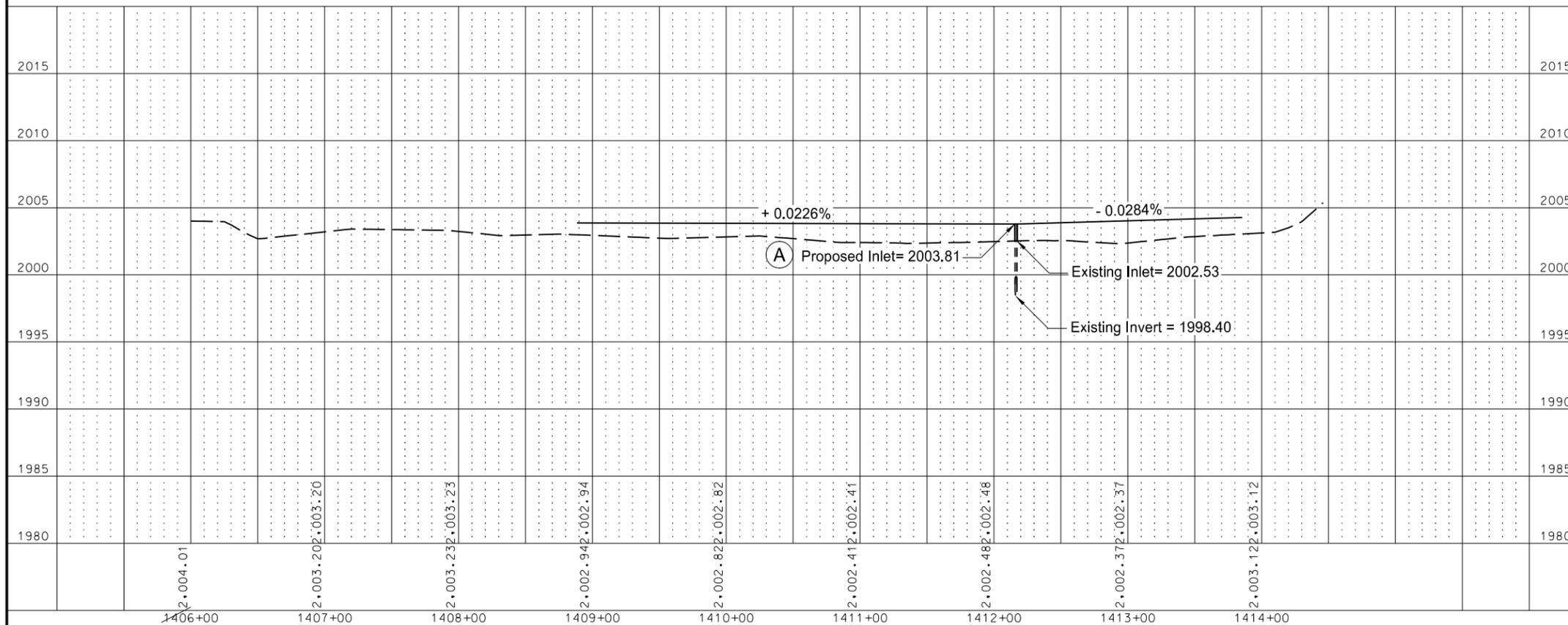
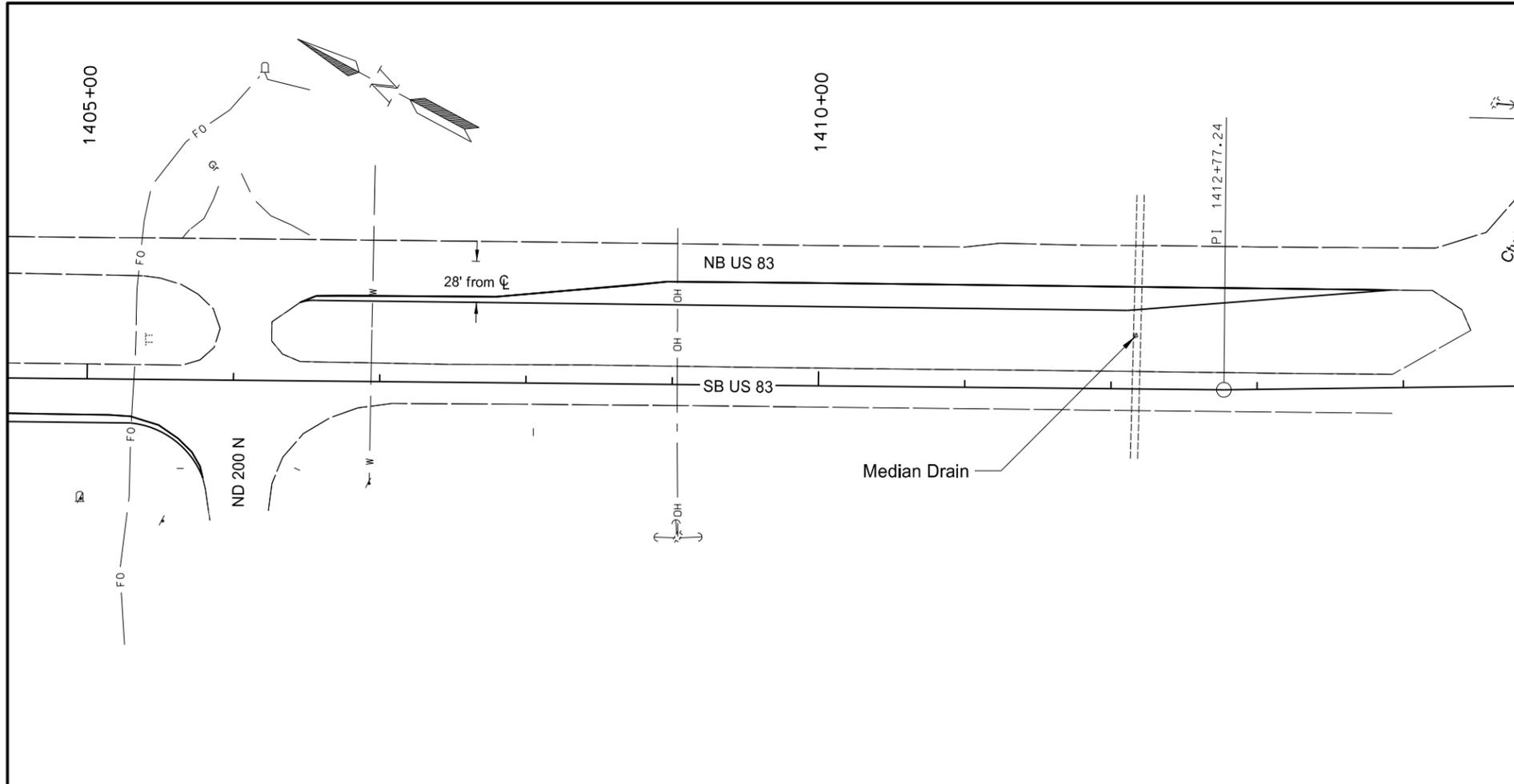
Washburn N to N Jct. ND 200 - NB and SB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	60	1

NH-SHE-1-083(106)128

RP 144.2 Northbound Left

Spec	Code	Description	Quantity
722	4580	Reset Precast Concrete Median Drain (Sta 1412+16.51 - 144.05_SBCL)	1EA



(A) See detail in Section 20.

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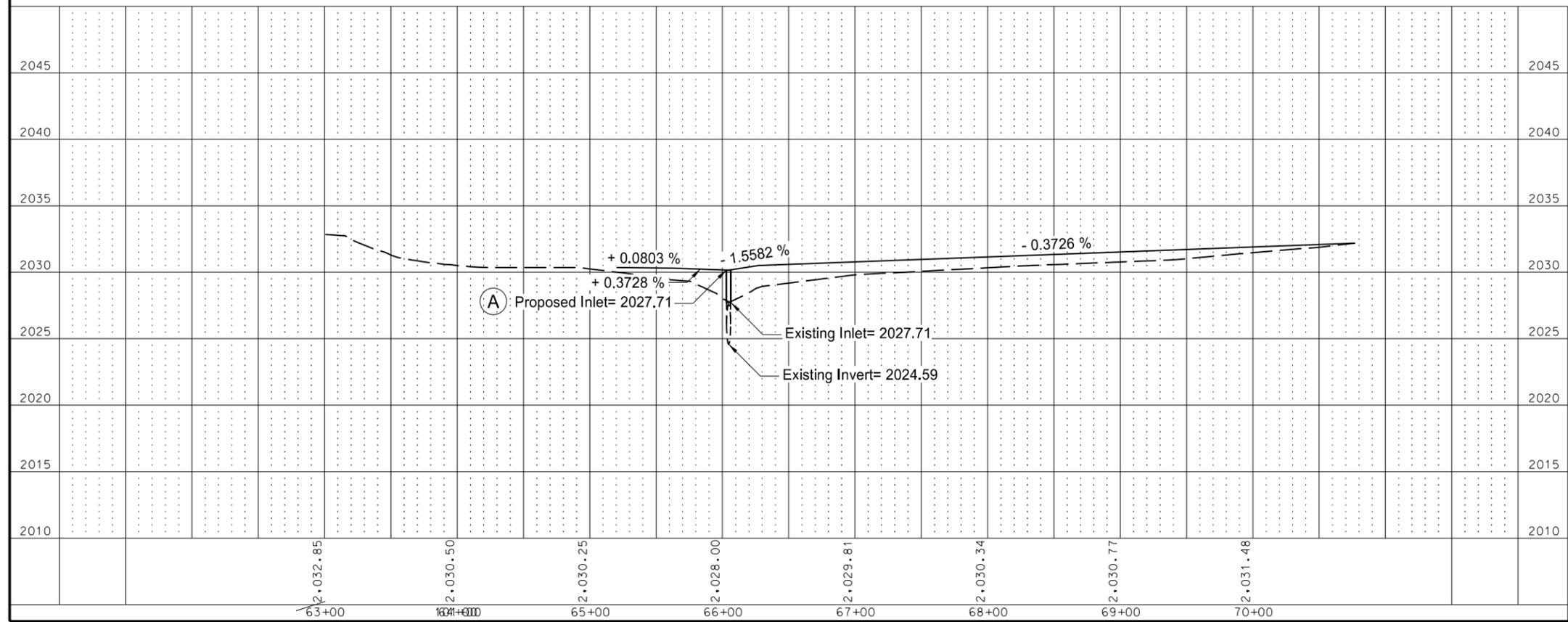
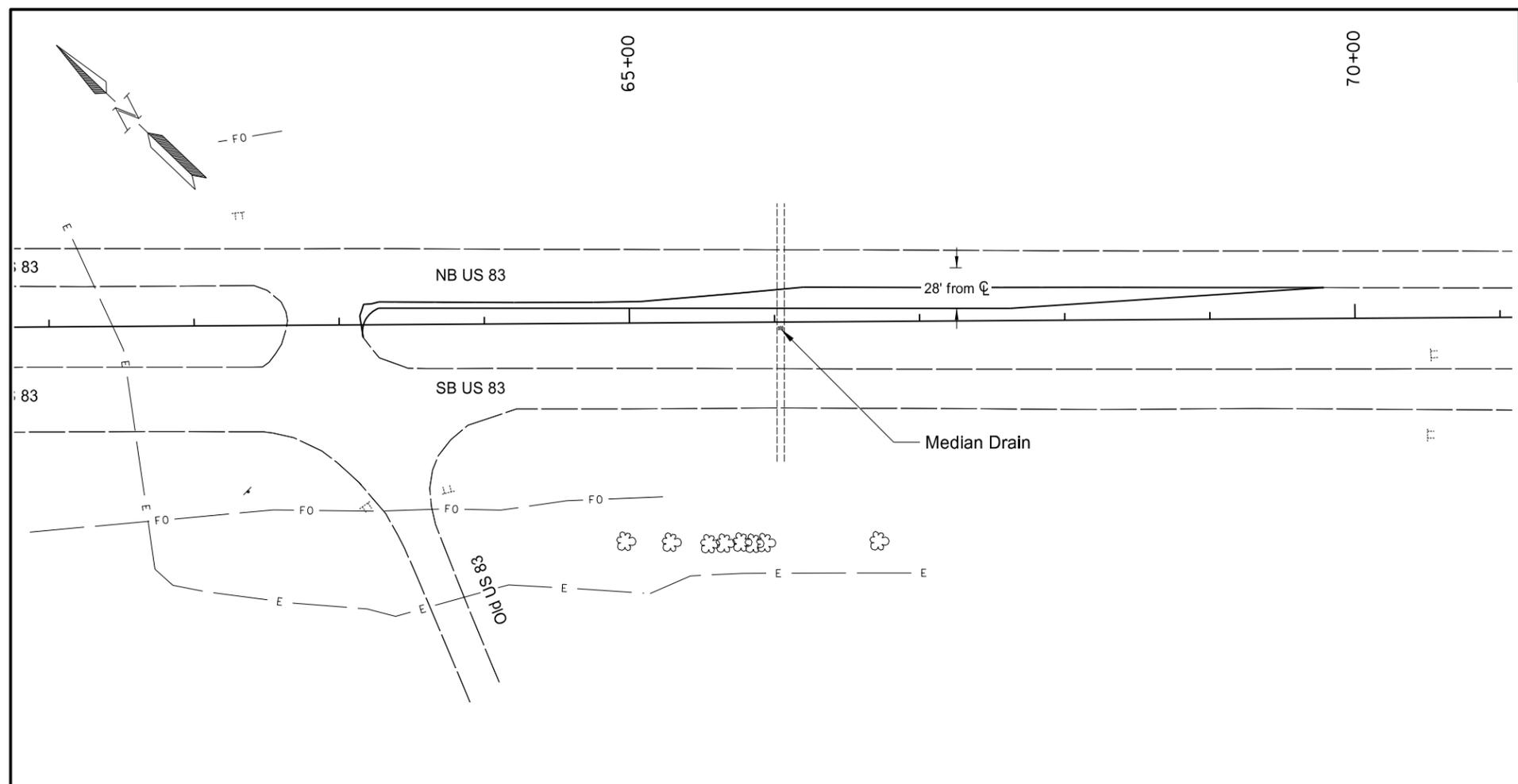
Plan and Profile  
 RP 144.2 N  
 Hot Bituminous Overlay  
 Washburn N to N Jct. ND 200 - NB and SB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	60	2

NH-SHE-1-083(106)128

RP 141.5 Northbound Left

Spec	Code	Description	Quantity
722	4580	Reset Precast Concrete Median Drain (Sta 66+04.19 - 141.5_MEDCL)	1EA



(A) See detail in Section 20.

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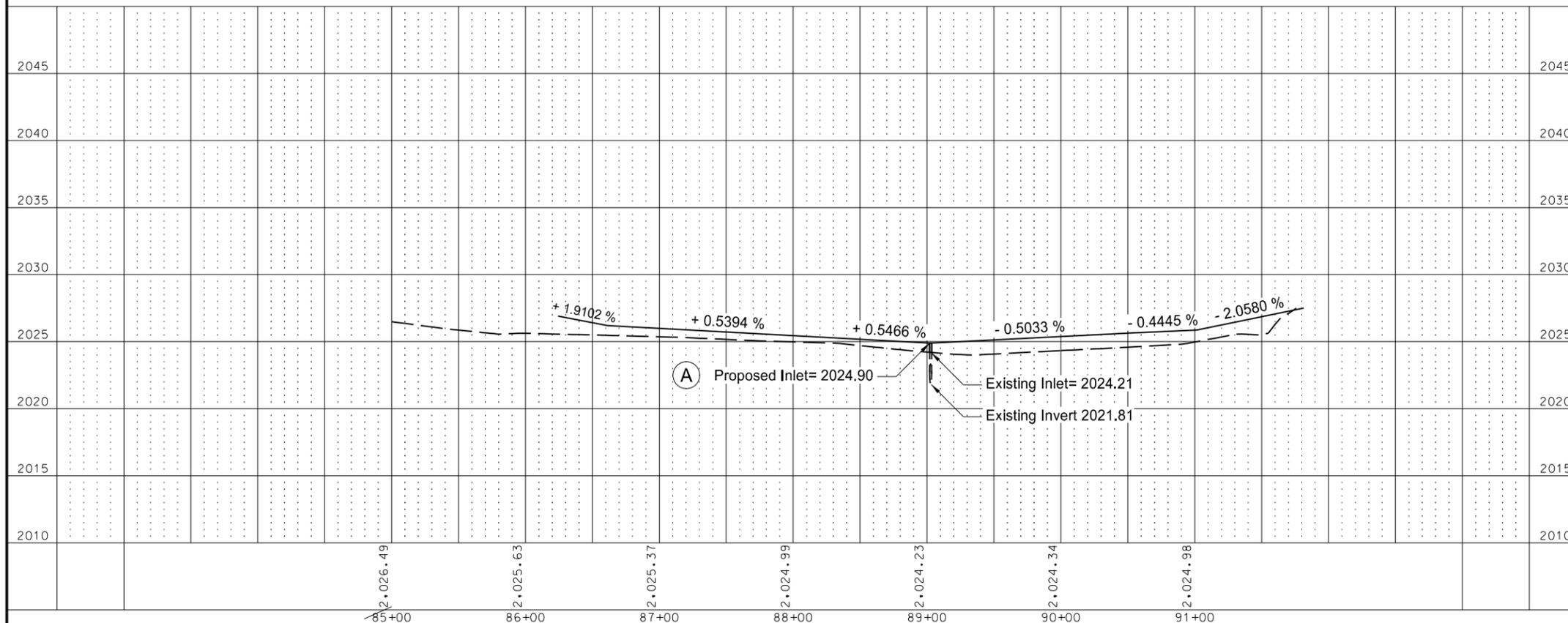
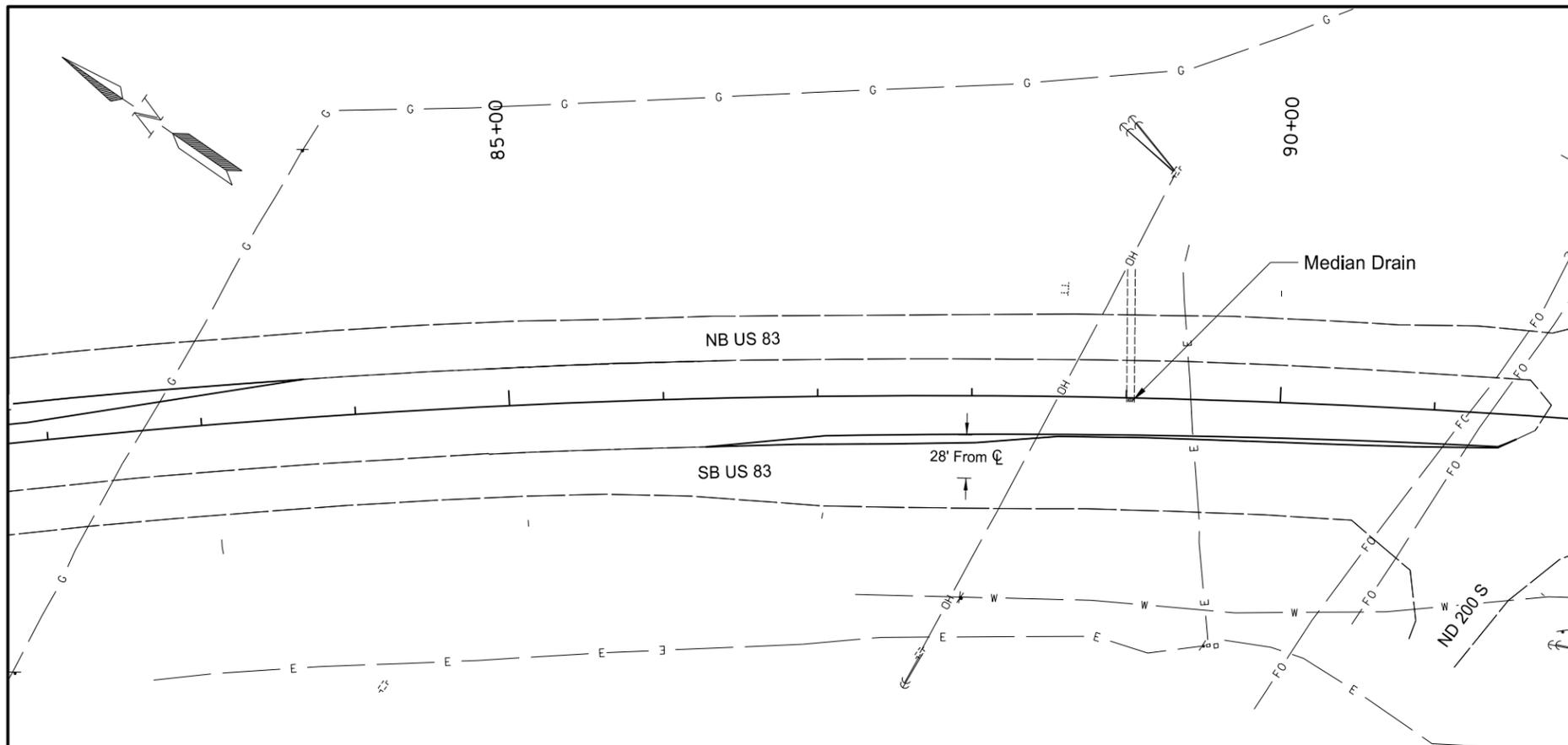
Plan and Profile  
 RP 141.5 N  
 Hot Bituminous Overlay  
 Washburn N to N Jct. ND 200 - NB and SB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	60	3

NH-SHE-1-083(106)128

RP 140.3 Southbound Left

Spec	Code	Description	Quantity
722	4565	Median Drain Precast Concrete - Type A (Sta 89+02.72 - 140.2_MEDCL)	1EA
202	170	Removal of Culverts - All Types and Size	8 LF



(A) See detail in Section 20.

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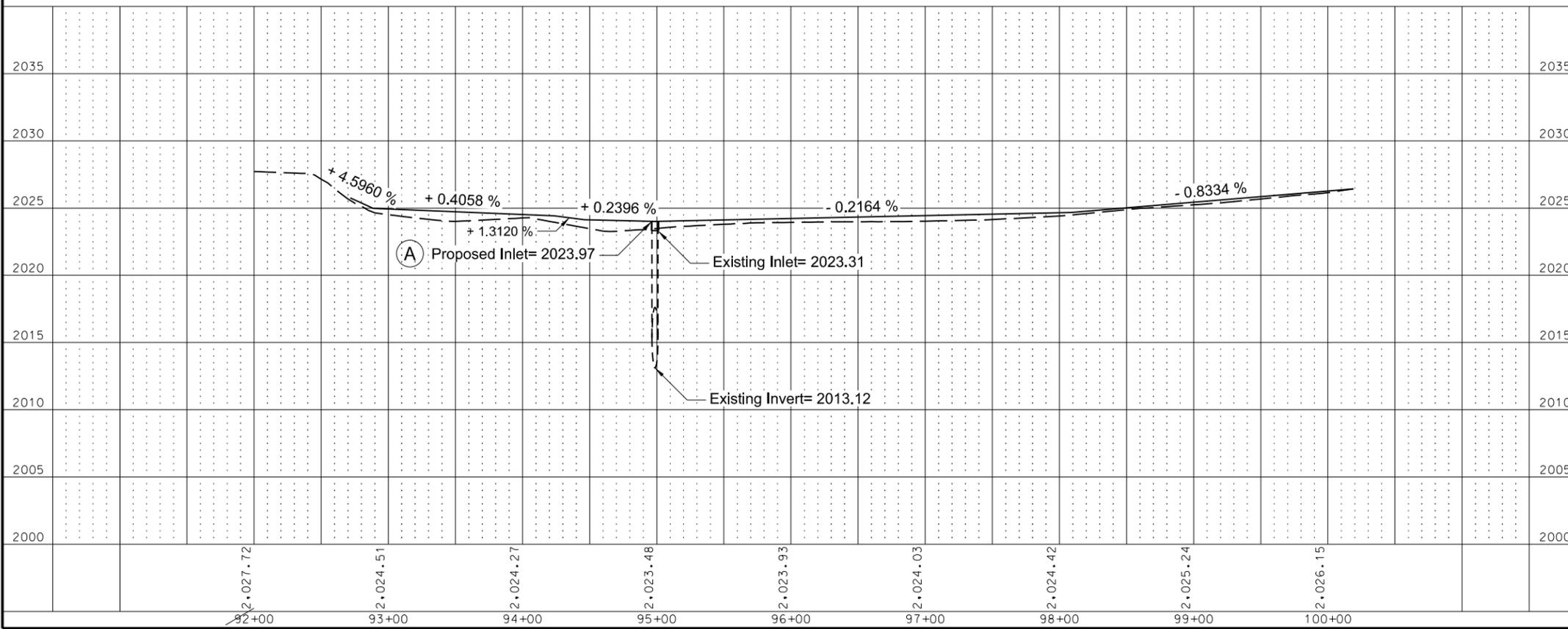
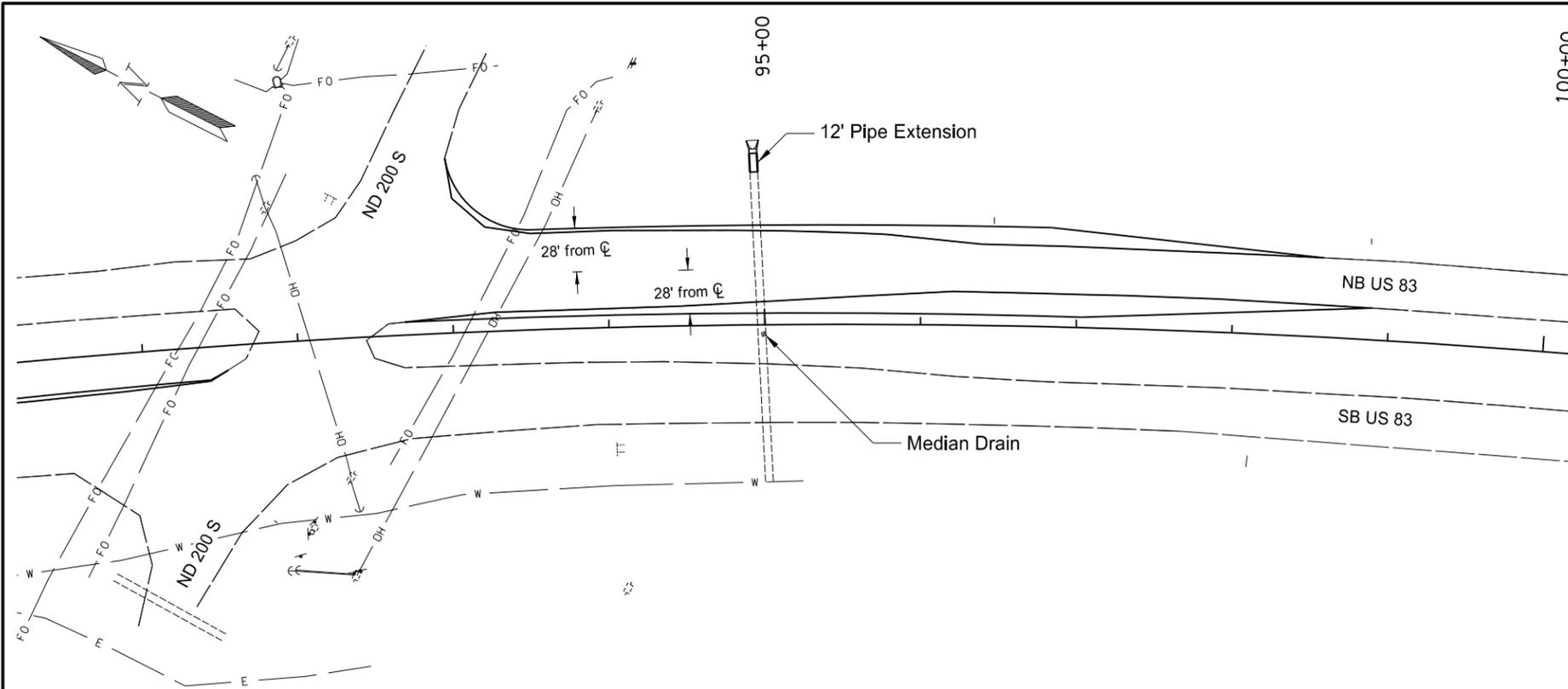
Plan and Profile  
 RP 140.3 S  
 Hot Bituminous Overlay  
 Washburn N to N Jct. ND 200 - NB and SB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	60	4

NH-SHE-1-083(106)128

RP 140.2 Northbound Left

Spec	Code	Description	Quantity
722	4580	Reset Precast Concrete Median Drain (Sta 94+99.32 - 140.2_MEDCL)	1EA



(A) See detail in Section 20.

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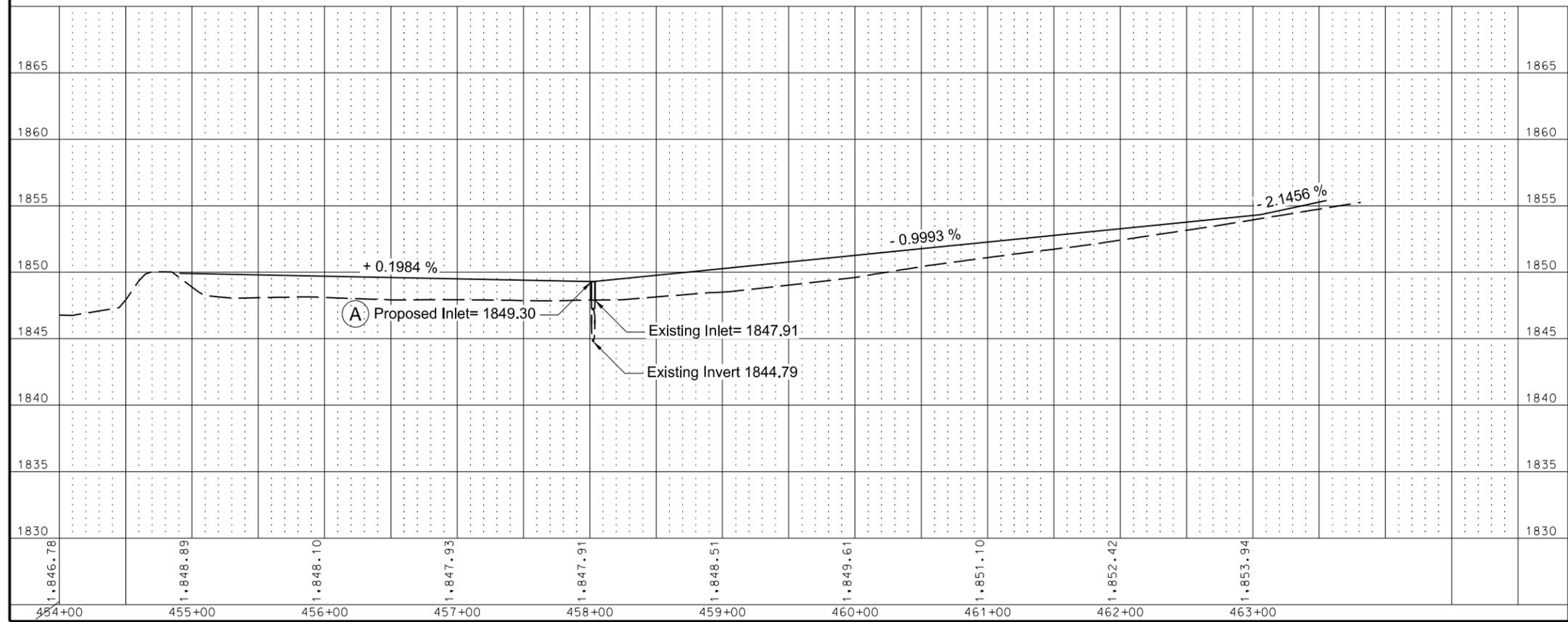
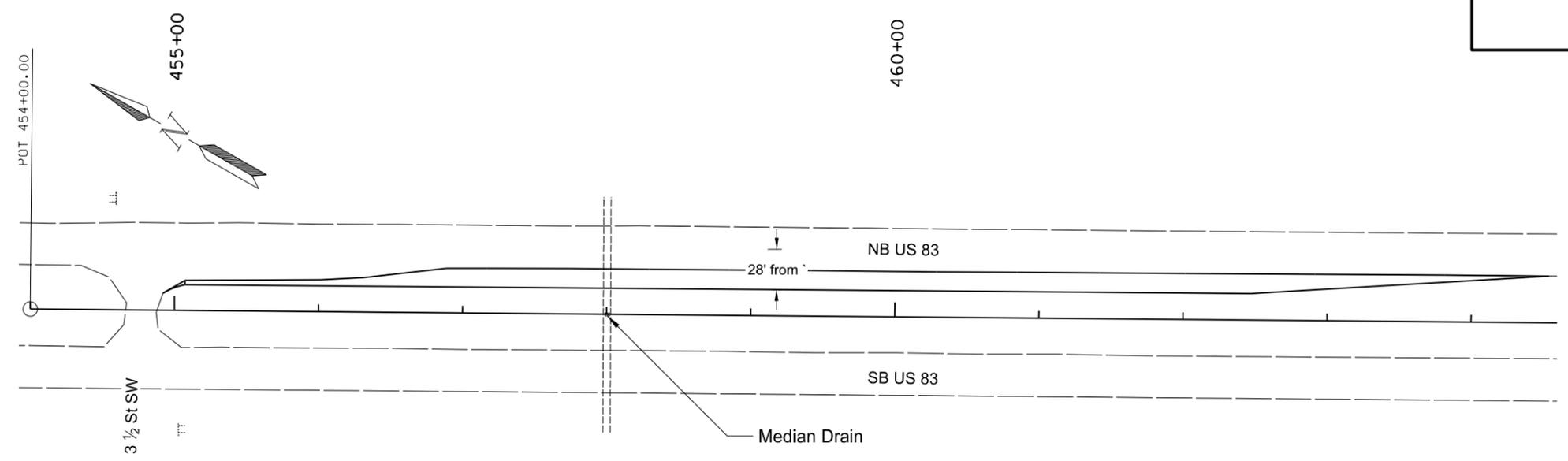
Plan and Profile  
 RP 140.2 N  
 Hot Bituminous Overlay  
 Washburn N to N Jct. ND 200 - NB and SB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	60	5

NH-SHE-1-083(106)128

RP 133.4 Northbound Left

Spec	Code	Description	Quantity
722	4565	Median Drain Precast Concrete - Type A (Sta 458+00.52 - 133.4_MEDCL)	1 EA
202	170	Removal of Culverts - All Types and Size	8 LF



(A) See detail in Section 20.

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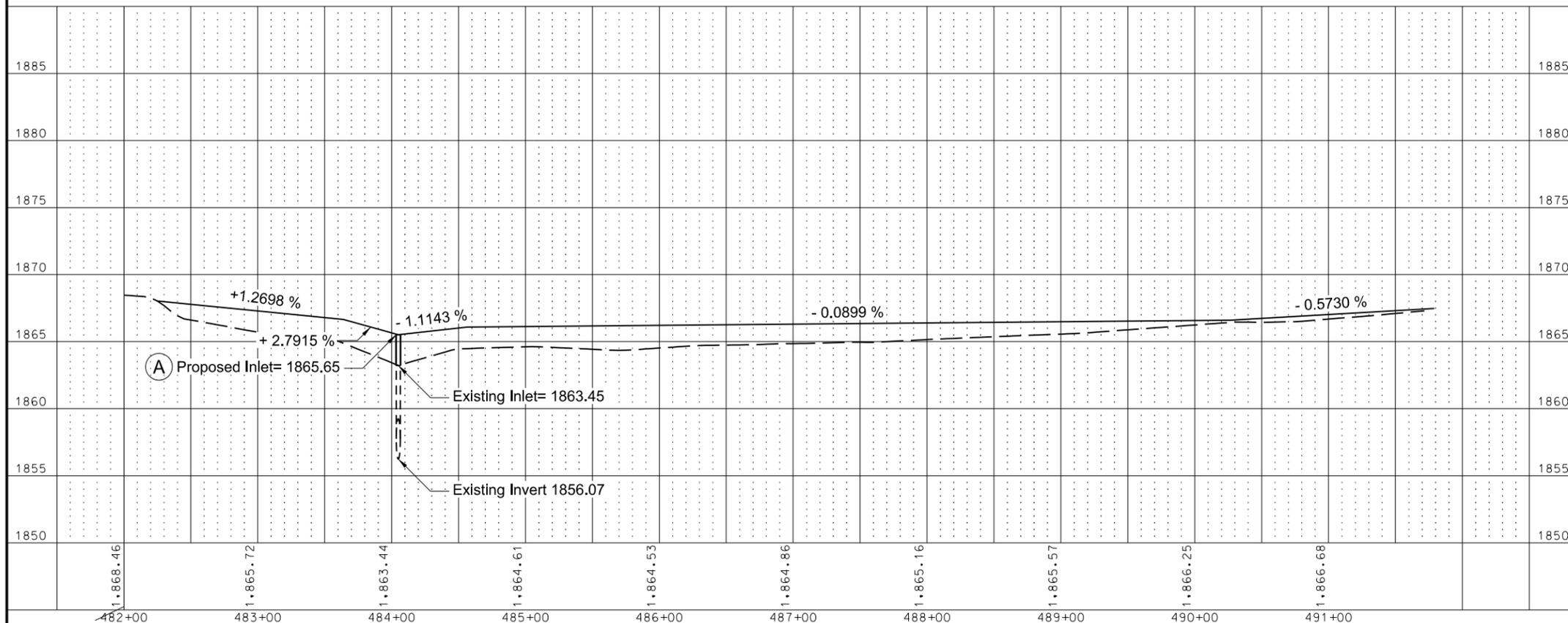
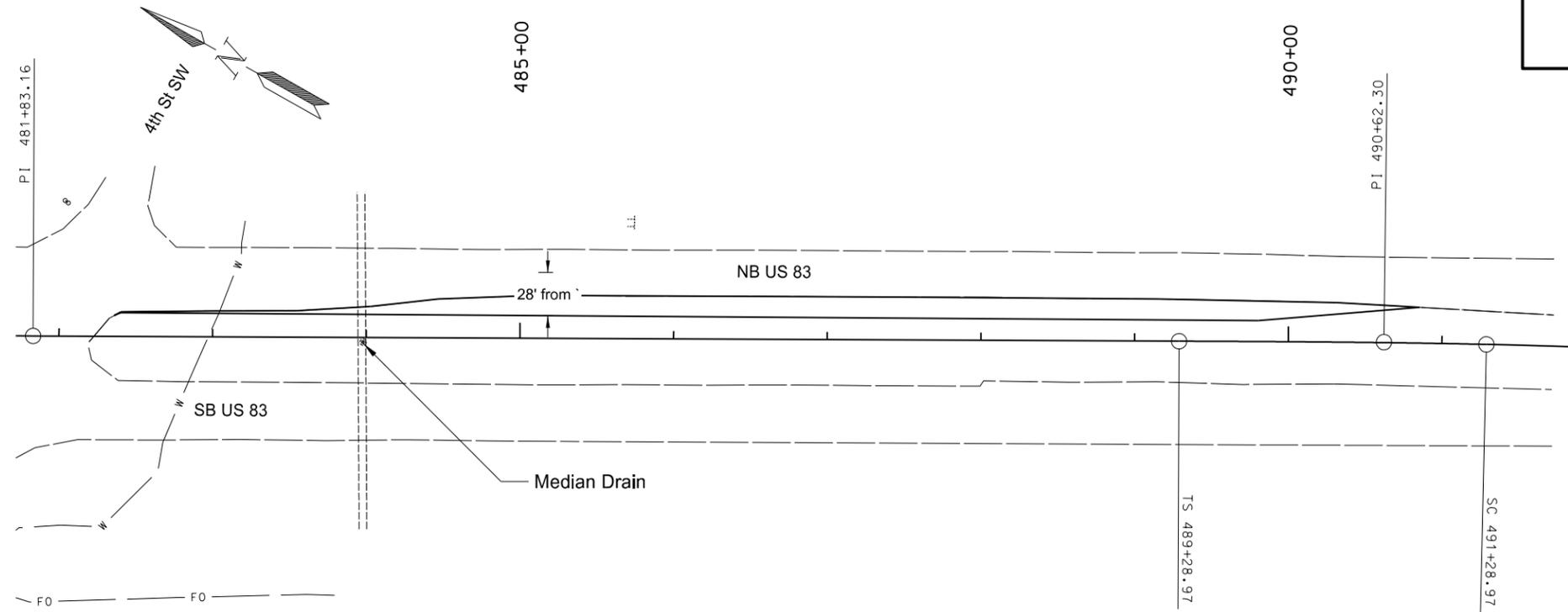
Plan and Profile  
 RP 133.4 N  
 Hot Bituminous Overlay  
 Washburn N to N Jct. ND 200 - NB and SB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	60	6

NH-SHE-1-083(106)128

RP 132.9 Northbound Left

Spec	Code	Description	Quantity
722	4565	Median Drain Precast Concrete - Type A (Sta 483+97.93 - 132.9_MEDCL)	1 EA
202	170	Removal of Culverts - All Types and Size	8 LF

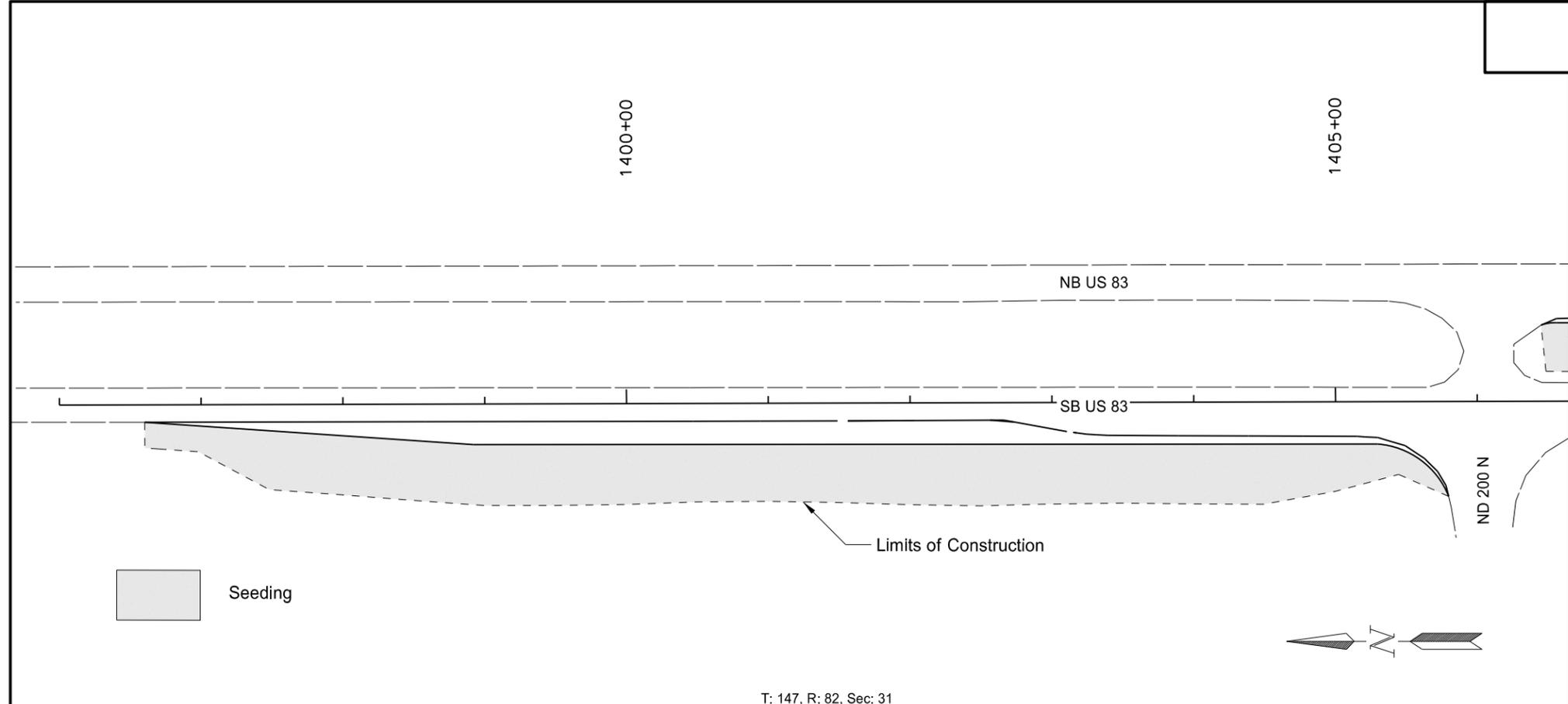


(A) See detail in Section 20.

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Plan and Profile  
 RP 132.9 N  
 Hot Bituminous Overlay  
 Washburn N to N Jct. ND 200 - NB and SB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	75	1



NH-SHE-1-083(106)128

RP 144.2 Southbound Right  
Temporary Erosion Control

Spec	Code	Description	Quantity
708	2260	Seeding Type B - CL IV	0.805 ACRE
708	5500	Mulching	0.805 ACRE

Permanent Erosion Control

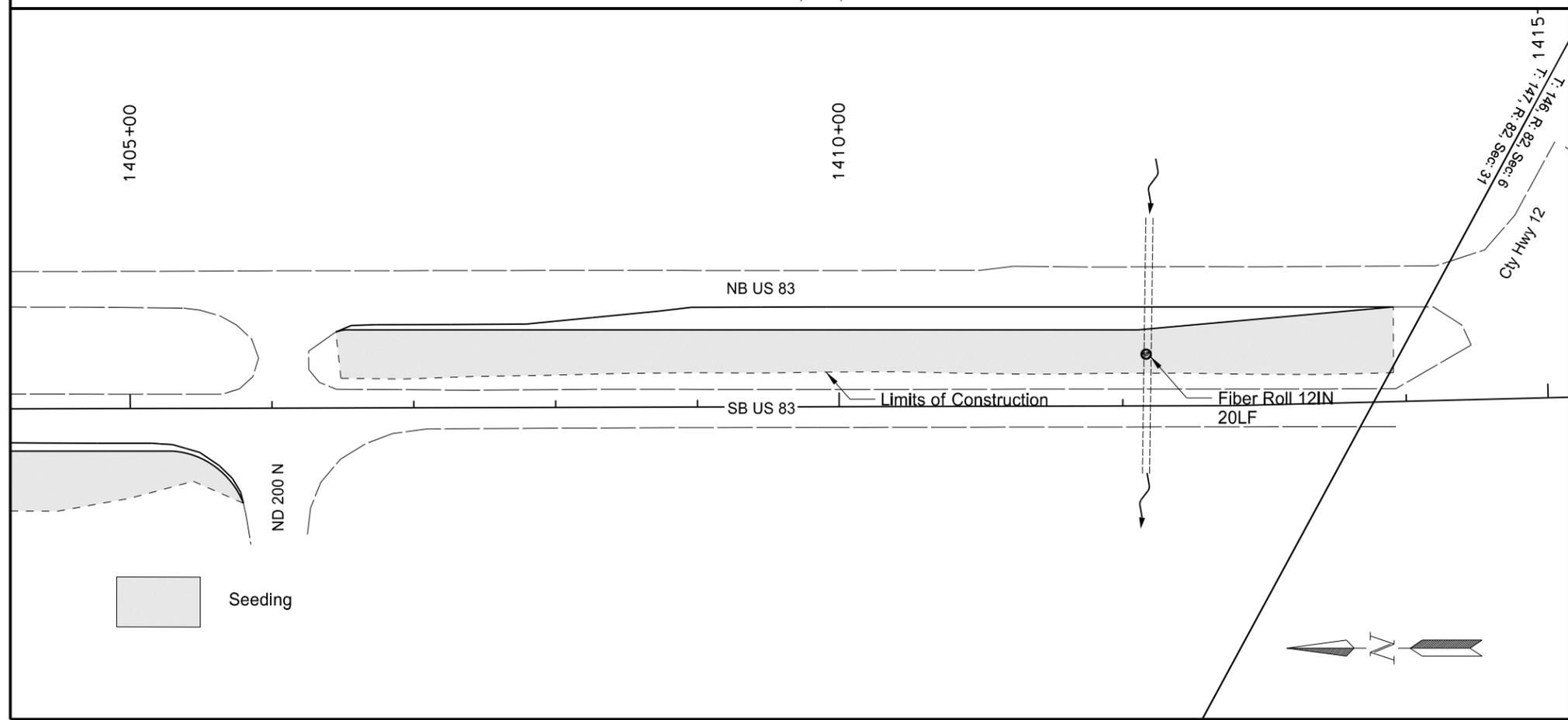
Spec	Code	Description	Quantity
708	2240	Seeding Type B - CL II	0.805 ACRE
708	5500	Mulching	0.805 ACRE

RP 144.2 Northbound Left  
Temporary Erosion Control

Spec	Code	Description	Quantity
708	1430	Fiber Rolls 12IN	20 LF
708	1431	Removal Fiber Rolls 12IN	20 LF
708	2260	Seeding Type B - CL IV	0.566 ACRE
708	5500	Mulching	0.566 ACRE

Permanent Erosion Control

Spec	Code	Description	Quantity
708	2240	Seeding Type B - CL II	0.566 ACRE
708	5500	Mulching	0.566 ACRE



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Wetlands, Seeding, and Mulching

RP 144.2 Turn Lanes

Hot Bituminous Overlay

Washburn N to N Jct. ND 200 - NB and SB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	75	2

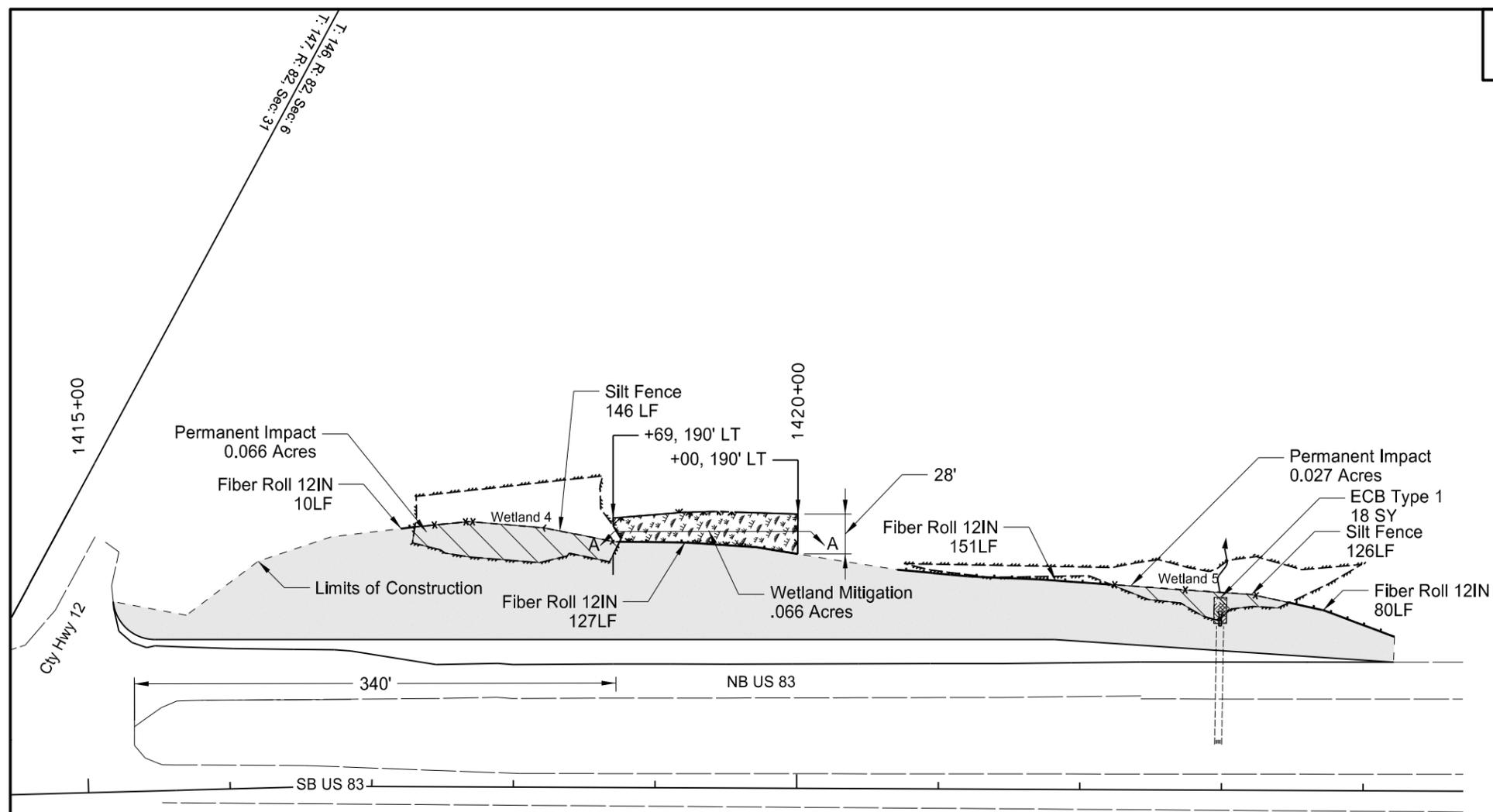
NH-SHE-1-083(106)128

RP 144.0 Northbound Right  
Temporary Erosion Control

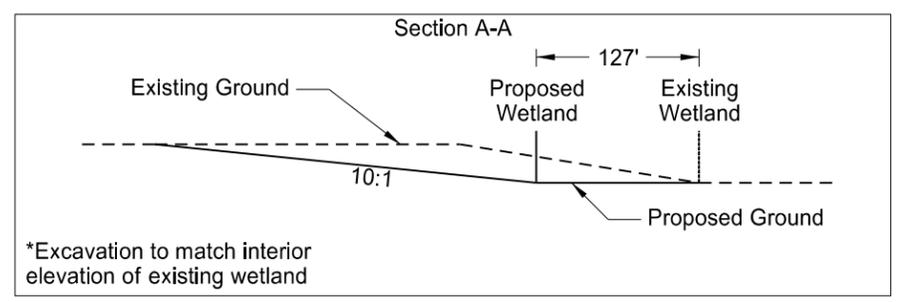
Spec	Code	Description	Quantity
708	1325	Silt Fence Supported	272 LF
708	1335	Removal of Silt Fence Supported	272 LF
708	1430	Fiber Rolls 12IN	368 LF
708	1431	Removal of Fiber Rolls 12IN	368 LF
708	2260	Seeding Type B - CL IV	1.101 ACRE
708	5500	Mulching	1.101 ACRE

Permanent Erosion Control

Spec	Code	Description	Quantity
708	2240	Seeding Type B - CL II	1.101 ACRE
708	5500	Mulching	1.101 ACRE
708	5650	ECB Type 1	18 SY



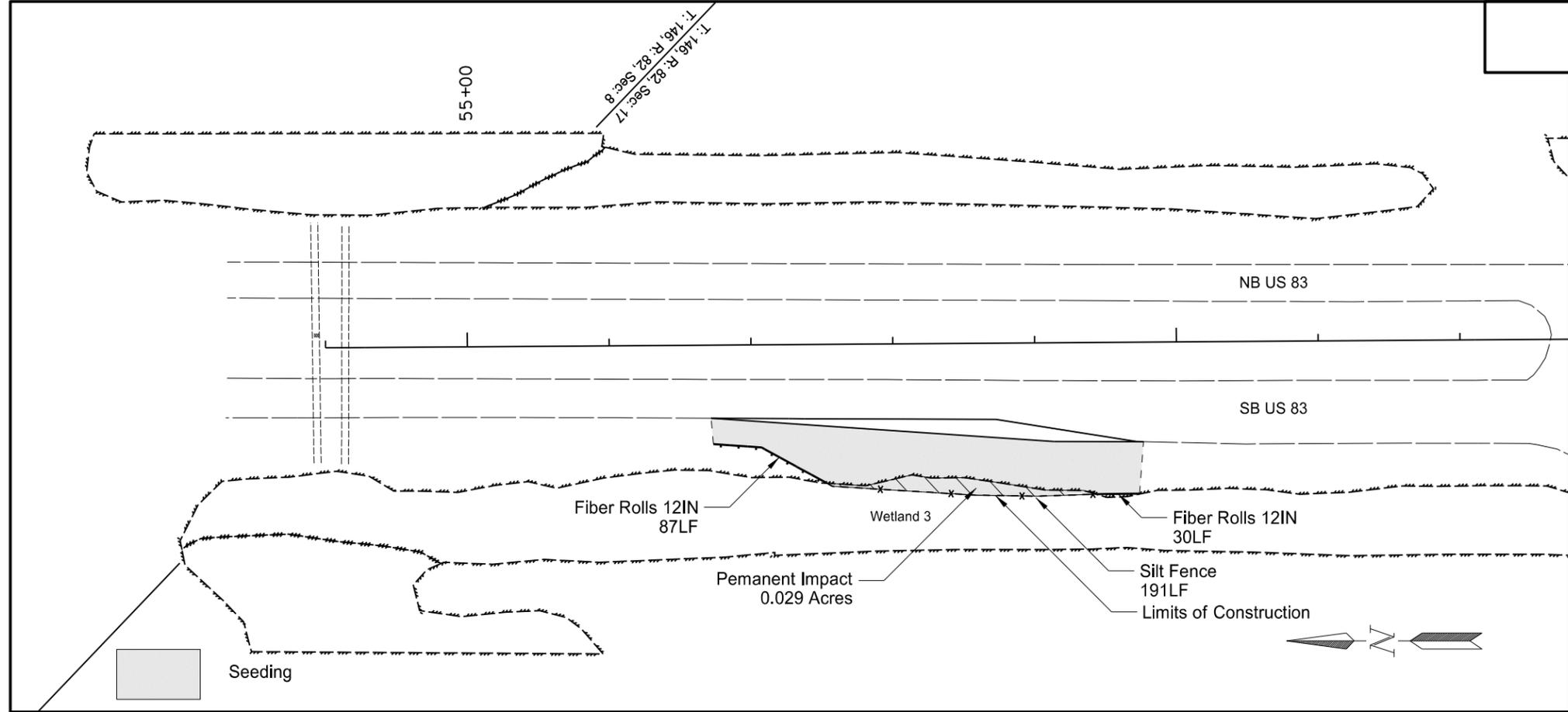
\*Distance measured from the centerline of the roadway.



-  Seeding
-  Wetland Mitigation
-  Permanent Wetland Impact

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Wetlands, Seeding, and Mulching  
  
RP 144.0 Turn Lane  
  
Hot Bituminous Overlay  
  
Washburn N to N Jct. ND 200 - NB and SB



NH-SHE-1-083(106)128

RP 141.5 Southbound Right  
Temporary Erosion Control

Spec	Code	Description	Quantity
708	1325	Silt Fence Supported	191 LF
708	1335	Removal of Silt Fence Supported	191 LF
708	1430	Fiber Rolls 12IN	117 LF
708	1431	Removal of Fiber Rolls 12IN	117 LF
708	2260	Seeding Type B - CL IV	0.249 ACRE
708	5500	Mulching	0.249 ACRE

Permanent Erosion Control

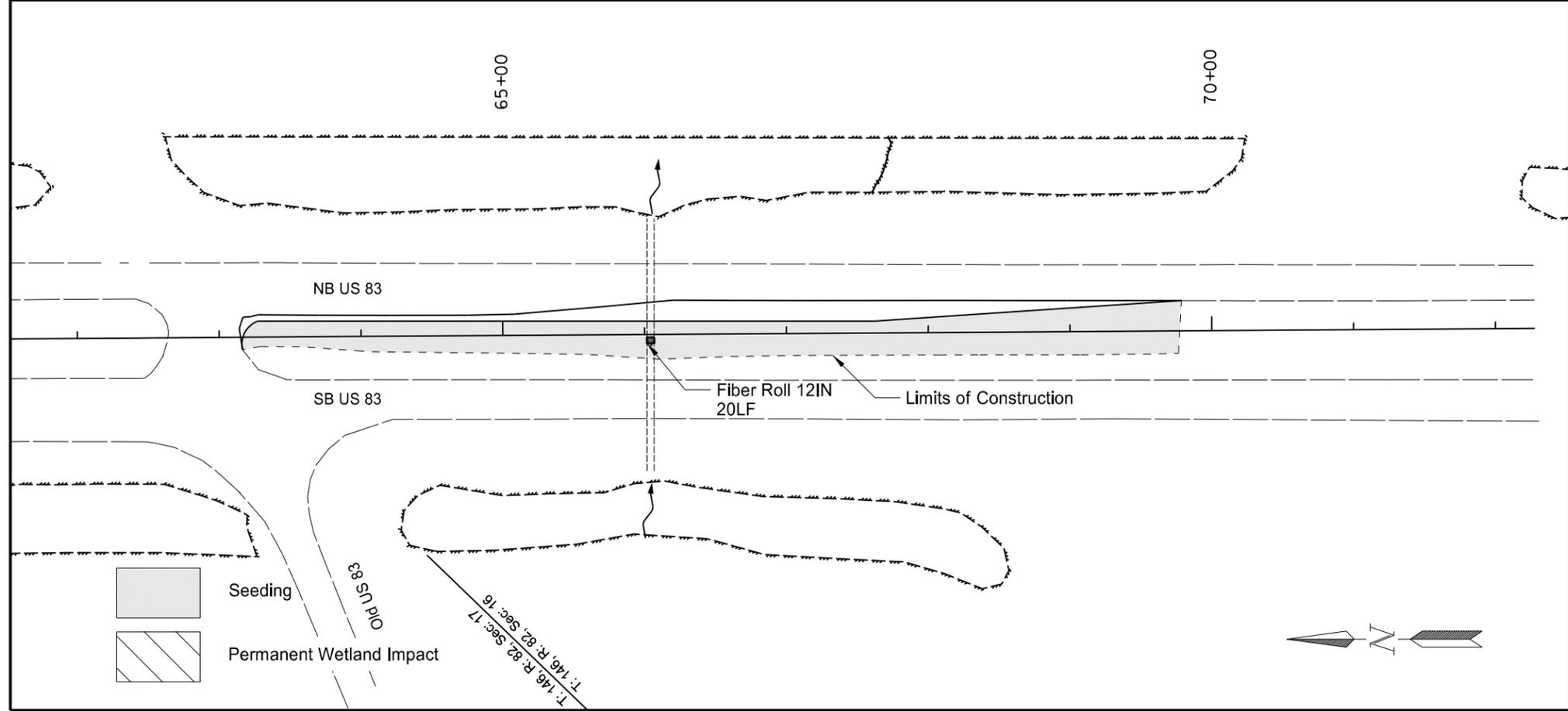
Spec	Code	Description	Quantity
708	2240	Seeding Type B - CL II	0.249 ACRE
708	5500	Mulching	0.249 ACRE

RP 141.5 Northbound Left  
Temporary Erosion Control

Spec	Code	Description	Quantity
708	1430	Fiber Rolls 12IN	20 LF
708	1431	Removal of Fiber Rolls 12IN	20 LF
708	2260	Seeding Type B - CL IV	0.386 ACRE
708	5500	Mulching	0.386 ACRE

Permanent Erosion Control

Spec	Code	Description	Quantity
708	2240	Seeding Type B - CL II	0.386 ACRE
708	5500	Mulching	0.386 ACRE



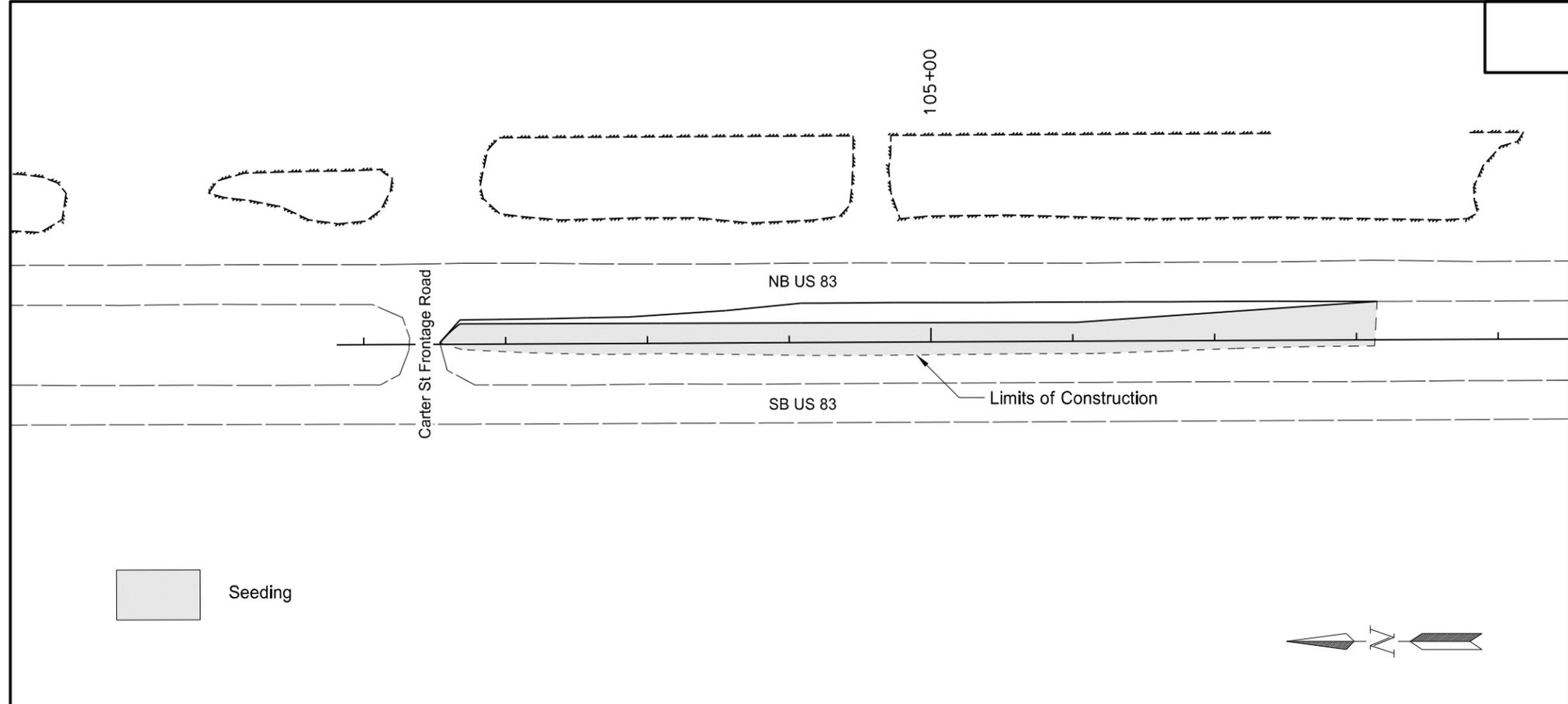
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Wetlands, Seeding, and Mulching

RP 141.5 Turn Lanes

Hot Bituminous Overlay

Washburn N to N Jct. ND 200 - NB and SB



NH-SHE-1-083(106)128

RP 140.7 Northbound Left  
Temporary Erosion Control

Spec	Code	Description	Quantity
708	2260	Seeding Type B - CL IV	0.348 ACRE
708	5500	Mulching	0.348 ACRE

Permanent Erosion Control

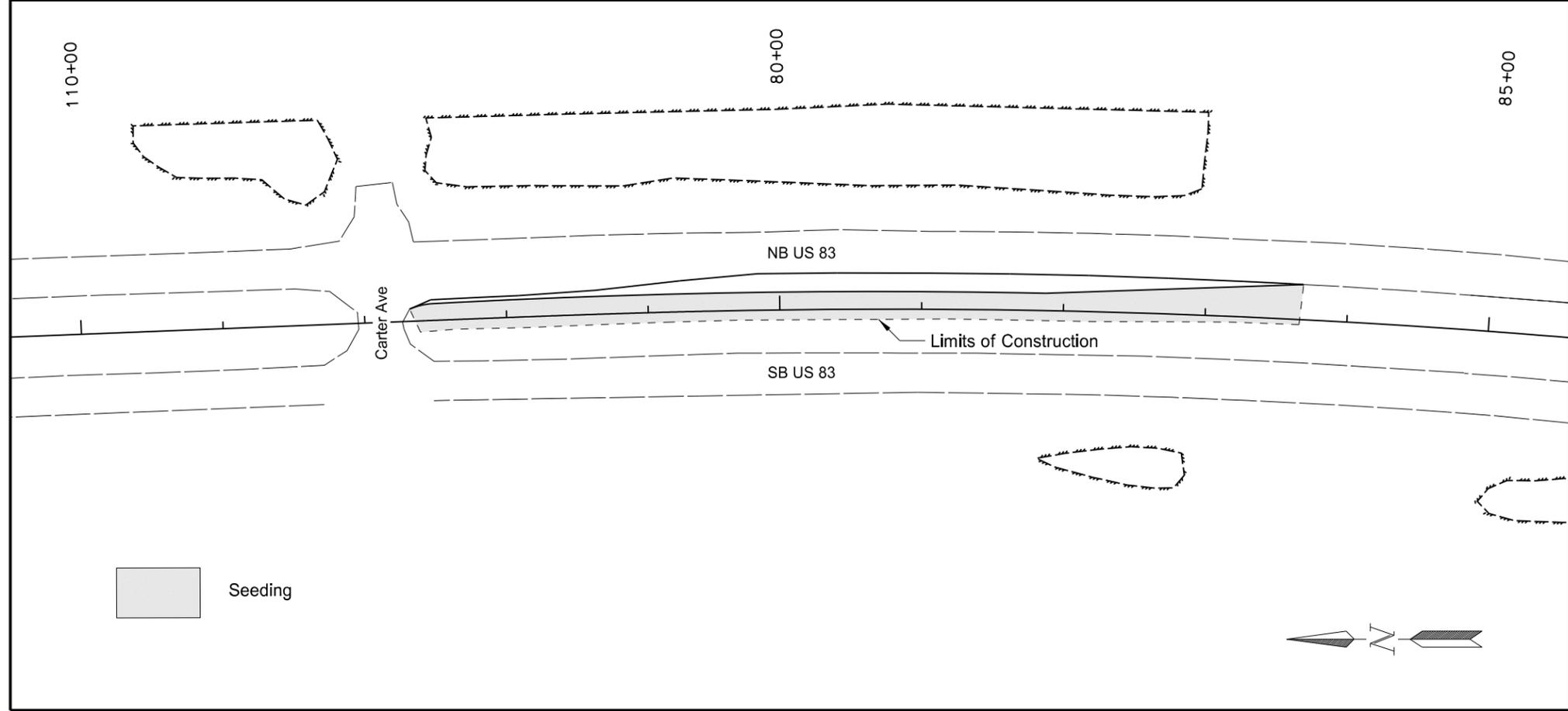
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708	2240	Seeding Type B - CL II	0.348 ACRE
708	5500	Mulching	0.348 ACRE

RP 140.5 Northbound Left  
Temporary Erosion Control

Spec	Code	Description	Quantity
708	2260	Seeding Type B - CL IV	0.296 ACRE
708	5500	Mulching	0.296 ACRE

Permanent Erosion Control

Spec	Code	Description	Quantity
708	2240	Seeding Type B - CL II	0.296 ACRE
708	5500	Mulching	0.296 ACRE



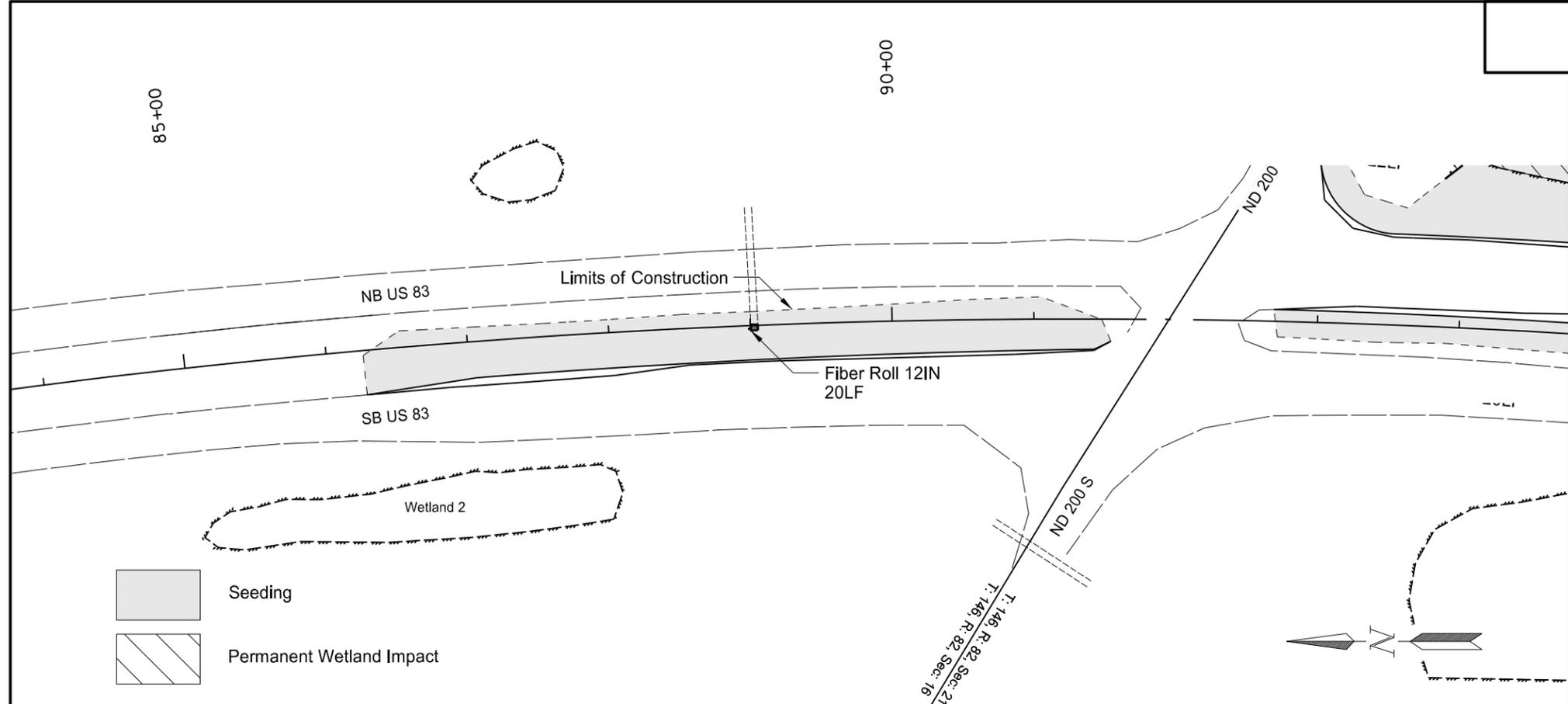
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Wetlands, Seeding, and Mulching

RP 140.5 and RP 140.7 Turn Lanes

Hot Bituminous Overlay

Washburn N to N Jct. ND 200 - NB and SB



NH-SHE-1-083(106)128

RP 140.3 Southbound Left  
Temporary Erosion Control

Spec	Code	Description	Quantity
708	1430	Fiber Rolls 12IN	20 LF
708	1431	Removal of Fiber Rolls 12IN	20 LF
708	2260	Seeding Type B - CL IV	0.418 ACRE
708	5500	Mulching	0.418 ACRE

Permanent Erosion Control

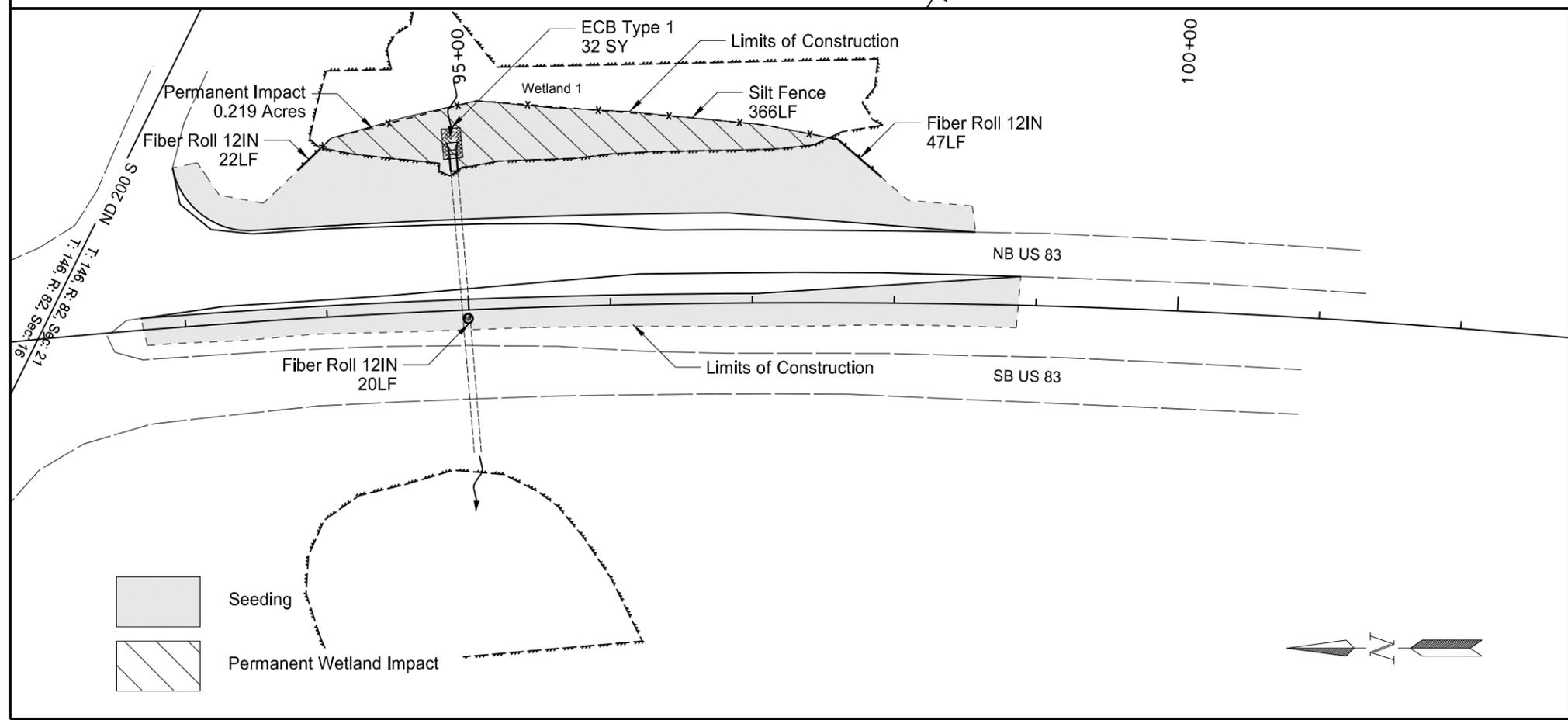
Spec	Code	Description	Quantity
708	2240	Seeding Type B - CL II	0.418 ACRE
708	5500	Mulching	0.418 ACRE

RP 140.2 Northbound Right  
Temporary Erosion Control

Spec	Code	Description	Quantity
708	1325	Silt Fence Supported	366 LF
708	1335	Removal of Silt Fence Supported	366 LF
708	1430	Fiber Rolls 12IN	69 LF
708	1431	Removal of Fiber Rolls 12IN	69 LF
708	2260	Seeding Type B - CL IV	0.721 ACRE
708	5500	Mulching	0.721 ACRE

Permanent Erosion Control

Spec	Code	Description	Quantity
708	2240	Seeding Type B - CL II	0.721 ACRE
708	5500	Mulching	0.721 ACRE
708	5650	ECB Type 1	32 SY



RP 140.2 Northbound Left  
Temporary Erosion Control

Spec	Code	Description	Quantity
708	1430	Fiber Rolls 12IN	20 LF
708	1431	Removal of Fiber Rolls 12IN	20 LF
708	2260	Seeding Type B - CL IV	0.332 ACRE
708	5500	Mulching	0.332 ACRE

Permanent Erosion Control

Spec	Code	Description	Quantity
708	2240	Seeding Type B - CL II	0.332 ACRE
708	5500	Mulching	0.332 ACRE

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Wetlands, Seeding, and Mulching

RP 140.2 and RP 140.3 Turn Lanes

Hot Bituminous Overlay

Washburn N to N Jct. ND 200 - NB and SB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	75	6

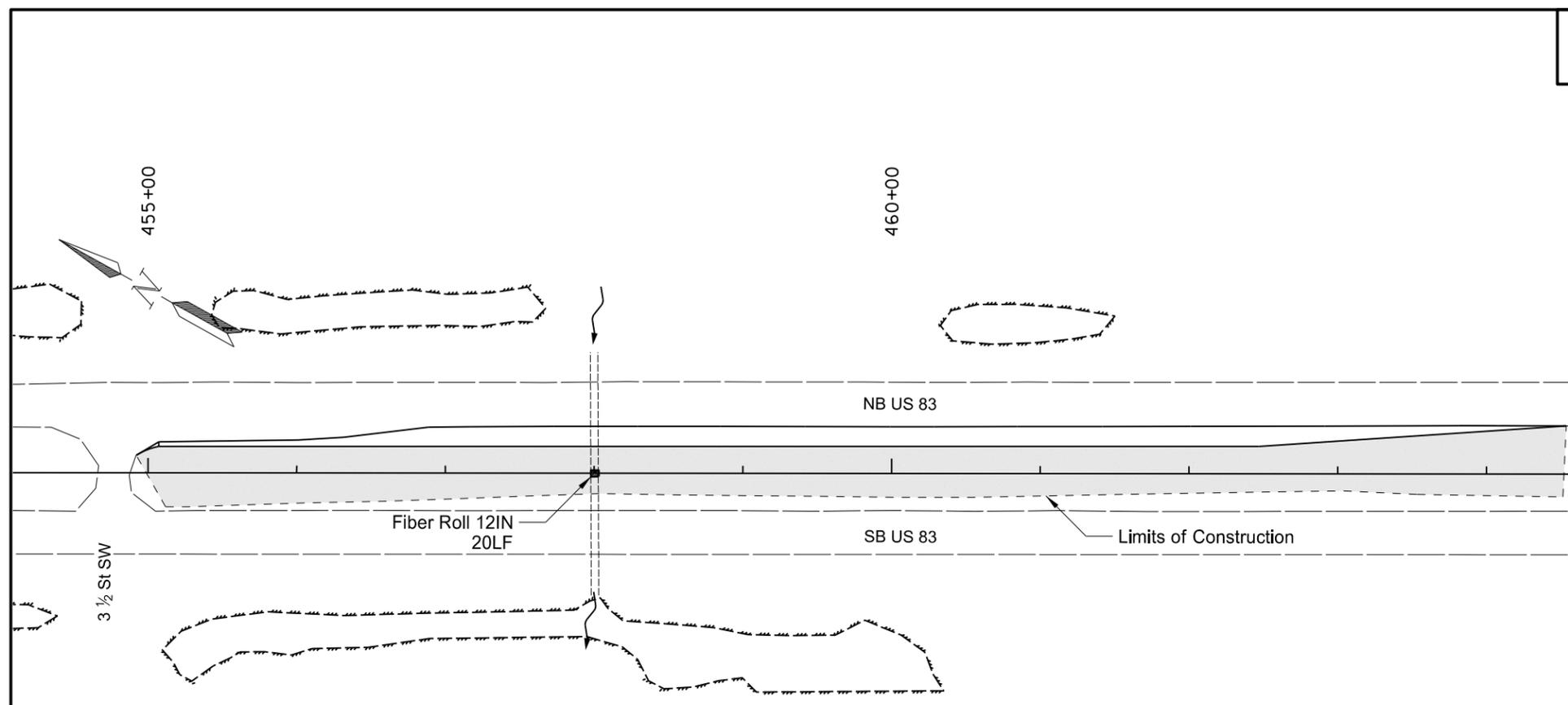
NH-SHE-1-083(106)128

RP 133.4 Northbound Left  
Temporary Erosion Control

Spec	Code	Description	Quantity
708	1430	Fiber Rolls 12IN	20 LF
708	1431	Removal Fiber Rolls 12IN	20 LF
708	2260	Seeding Type B - CL IV	0.771 ACRE
708	5500	Mulching	0.771 ACRE

Permanent Erosion Control

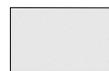
Spec	Code	Description	Quantity
708	2240	Seeding Type B - CL II	0.771 ACRE
708	5500	Mulching	0.771 ACRE

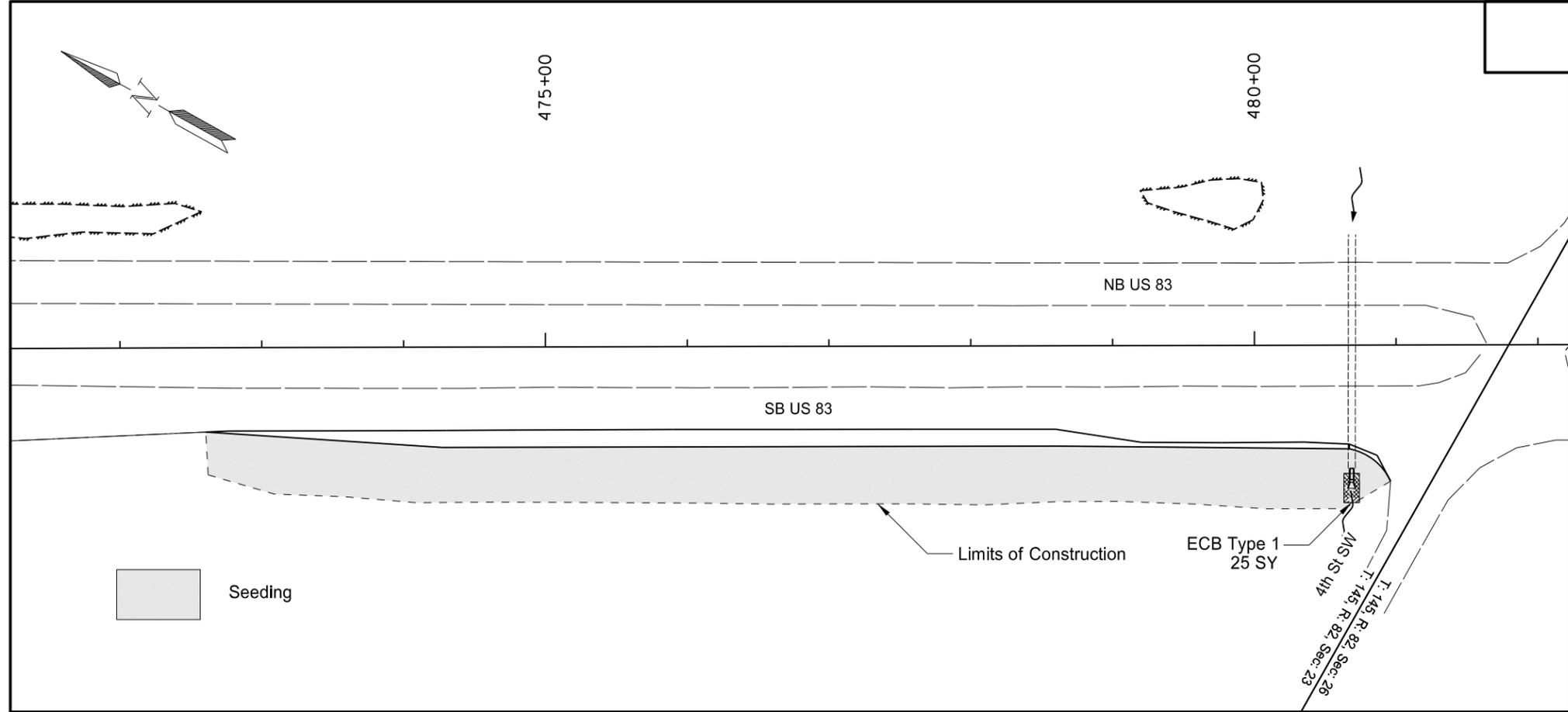


T: 145, R: 82, Sec: 23

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Wetlands, Seeding, and Mulching  
  
RP 133.4 Turn Lanes  
  
Hot Bituminous Overlay  
  
Washburn N to N Jct. ND 200 - NB and SB

 Seeding



NH-SHE-1-083(106)128

RP 132.9 Southbound Right  
Temporary Erosion Control

Spec	Code	Description	Quantity
708	2260	Seeding Type B - CL IV	0.750 ACRE
708	5500	Mulching	0.750 ACRE

Permanent Erosion Control

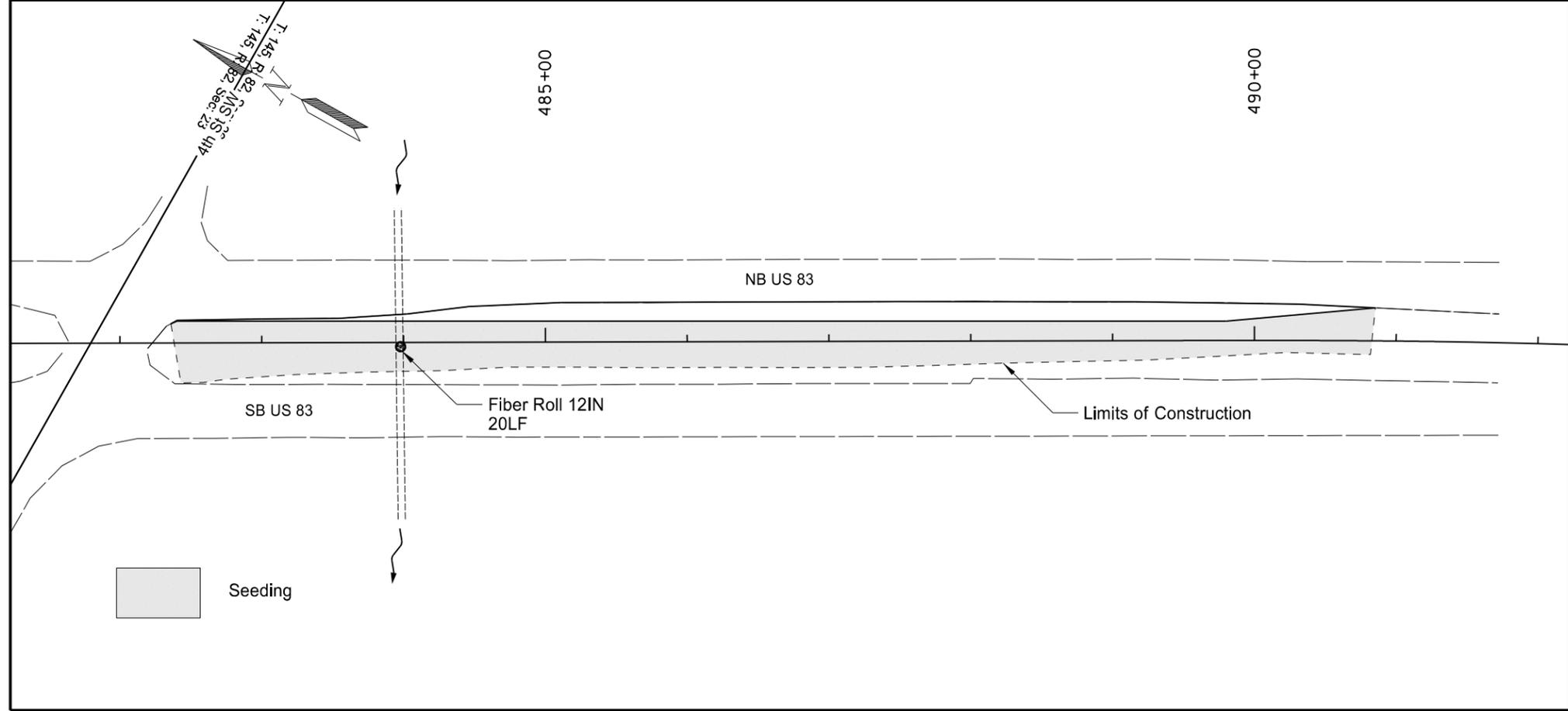
Spec	Code	Description	Quantity
708	2240	Seeding Type B - CL II	0.750 ACRE
708	5500	Mulching	0.750 ACRE
708	5650	ECB Type 1	25 SY

RP 132.9 Northbound Left  
Temporary Erosion Control

Spec	Code	Description	Quantity
708	1430	Fiber Rolls 12IN	20 LF
708	1431	Removal Fiber Rolls 12IN	20 LF
708	2260	Seeding Type B - CL IV	0.632 ACRE
708	5500	Mulching	0.632 ACRE

Permanent Erosion Control

Spec	Code	Description	Quantity
708	2240	Seeding Type B - CL II	0.632 ACRE
708	5500	Mulching	0.632 ACRE



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Wetlands, Seeding, and Mulching

RP 132.9 Turn Lanes

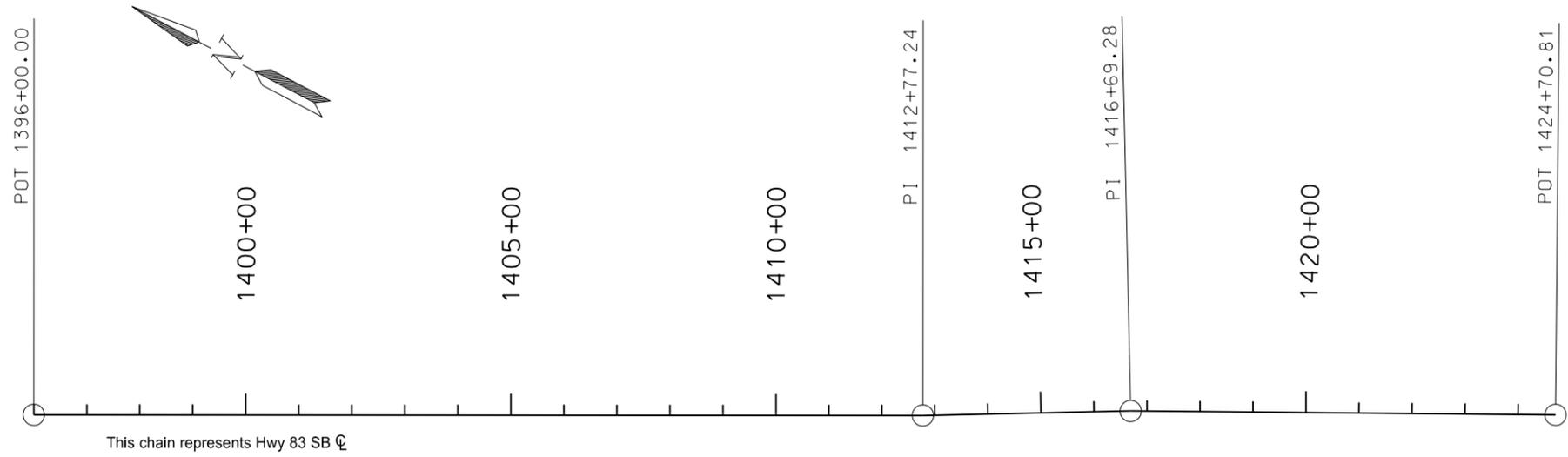
Hot Bituminous Overlay

Washburn N to N Jct. ND 200 - NB and SB



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	82	1

NH-SHE-1-083(106)128

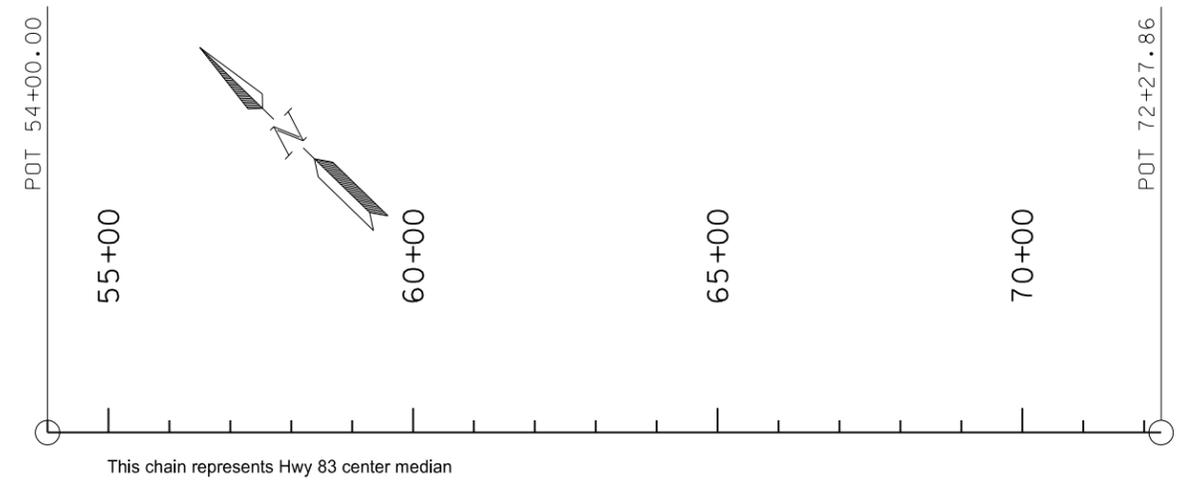


Chain 144.05 SBCL contains:  
8218 8219 8220 8221

Beginning chain 144.05 SBCL description  
=====

Point 8218	N	185,425.0562 E	1,801,393.4898 Sta	1396+00.00
Course from 8218 to 8219 S 27° 40' 37.03" E Dist 1,677.2446				
Point 8219	N	183,939.7210 E	1,802,172.5462 Sta	1412+77.24
Course from 8219 to 8220 S 28° 57' 20.86" E Dist 392.0340				
Point 8220	N	183,596.6938 E	1,802,362.3434 Sta	1416+69.28
Course from 8220 to 8221 S 27° 11' 40.51" E Dist 801.5304				
Point 8221	N	182,883.7649 E	1,802,728.6540 Sta	1424+70.81

Ending chain 144.05 SBCL description  
=====



Chain 141.5 MEDCL contains:  
8301 8302

Beginning chain 141.5 MEDCL description  
=====

Point 8301	N	173,249.8915 E	1,809,197.6615 Sta	54+00.00
Course from 8301 to 8302 S 44° 05' 42.00" E Dist 1,827.8586				
Point 8302	N	171,937.1472 E	1,810,469.5772 Sta	72+27.86

Ending chain 141.5 MEDCL description  
=====

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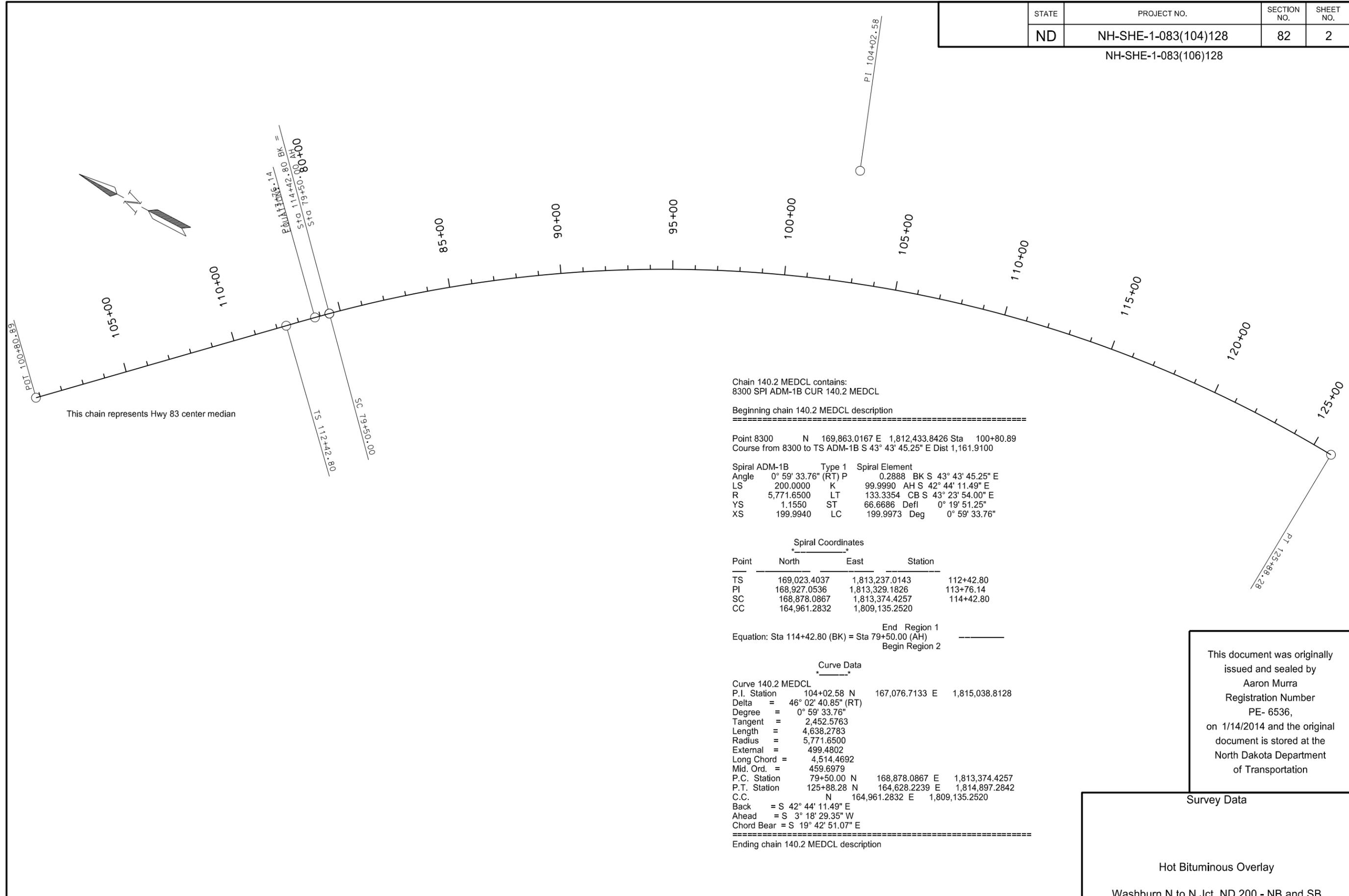
Survey Data

Hot Bituminous Overlay

Washburn N to N Jct. ND 200 - NB and SB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	82	2

NH-SHE-1-083(106)128



Chain 140.2 MEDCL contains:  
8300 SPI ADM-1B CUR 140.2 MEDCL

Beginning chain 140.2 MEDCL description

Point 8300 N 169,863.0167 E 1,812,433.8426 Sta 100+80.89  
Course from 8300 to TS ADM-1B S 43° 43' 45.25" E Dist 1,161.9100

Spiral ADM-1B	Type 1	Spiral Element
Angle	0° 59' 33.76" (RT) P	0.2888 BK S 43° 43' 45.25" E
LS	200.0000 K	99.9990 AH S 42° 44' 11.49" E
R	5,771.6500 LT	133.3354 CB S 43° 23' 54.00" E
YS	1.1550 ST	66.6686 Defl 0° 19' 51.25"
XS	199.9940 LC	199.9973 Deg 0° 59' 33.76"

Spiral Coordinates			
Point	North	East	Station
TS	169,023.4037	1,813,237.0143	112+42.80
PI	168,927.0536	1,813,329.1826	113+76.14
SC	168,878.0867	1,813,374.4257	114+42.80
CC	164,961.2832	1,809,135.2520	

Equation: Sta 114+42.80 (BK) = Sta 79+50.00 (AH)  
End Region 1  
Begin Region 2

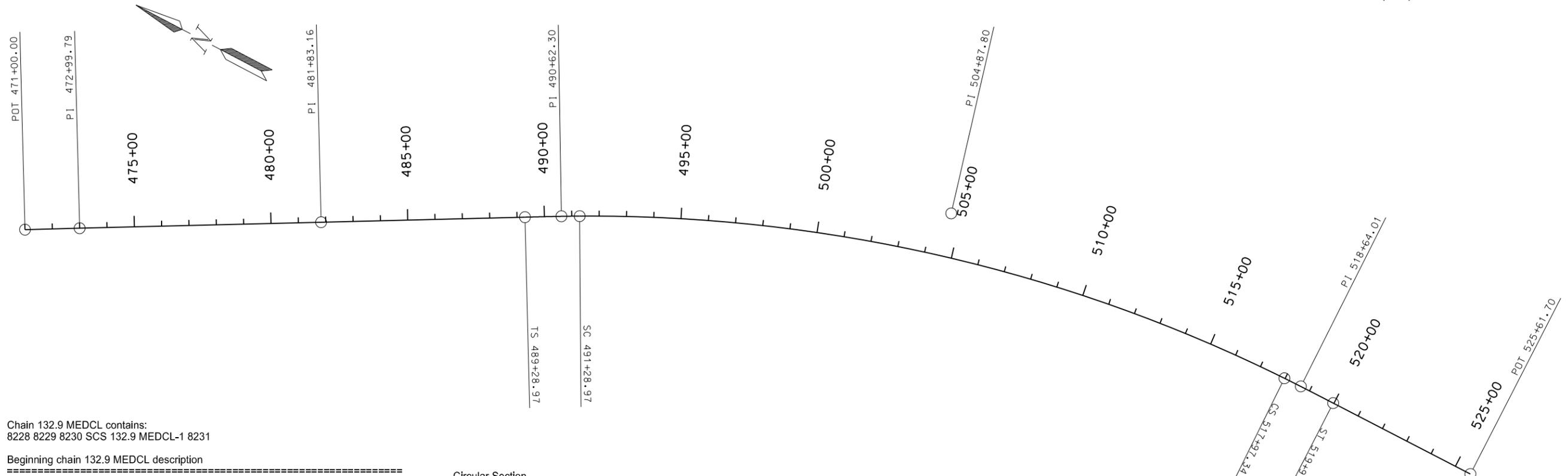
Curve Data			
Curve 140.2 MEDCL			
P.I. Station	104+02.58 N	167,076.7133 E	1,815,038.8128
Delta	= 46° 02' 40.85" (RT)		
Degree	= 0° 59' 33.76"		
Tangent	= 2,452.5763		
Length	= 4,638.2783		
Radius	= 5,771.6500		
External	= 499.4802		
Long Chord	= 4,514.4692		
Mid. Ord.	= 459.6979		
P.C. Station	79+50.00 N	168,878.0867 E	1,813,374.4257
P.T. Station	125+88.28 N	164,628.2239 E	1,814,897.2842
C.C.	N 164,961.2832 E	1,809,135.2520	
Back	= S 42° 44' 11.49" E		
Ahead	= S 3° 18' 29.35" W		
Chord Bear	= S 19° 42' 51.07" E		

Ending chain 140.2 MEDCL description

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Survey Data  
  
Hot Bituminous Overlay  
  
Washburn N to N Jct. ND 200 - NB and SB

NH-SHE-1-083(106)128



Chain 132.9 MEDCL contains:  
8228 8229 8230 SCS 132.9 MEDCL-1 8231

Beginning chain 132.9 MEDCL description

Point 8228 N 131,697.1945 E 1,823,725.7445 Sta 471+00.00  
Course from 8228 to 8229 S 29° 12' 15.92" E Dist 199.7907

Point 8229 N 131,522.8003 E 1,823,823.2278 Sta 472+99.79  
Course from 8229 to 8230 S 29° 07' 49.87" E Dist 883.3737

Point 8230 N 130,751.1618 E 1,824,253.2548 Sta 481+83.16  
Course from 8230 to TS 132.9 MEDCL-1B S 29° 08' 17.16" E Dist 745.8009

SCS 132.9 MEDCL-1 found within chain 132.9 MEDCL, contains:  
SPI 132.9 MEDCL-1B CUR 132.9 MEDCL-1 SPI 132.9 MEDCL-1A

PISCS 132.9 MEDCL-1 N 128,732.8122 E 1,825,378.4124 STA 504+93.95  
Total Back Tangent = 1,564.9813  
Total Ahead Tangent = 1,564.9764  
Total Length = 3,068.3649  
Total Delta = 28° 41' 00.02" (RT)  
Back Tangent = S 29° 08' 17.16" E  
Ahead Tangent = S 0° 27' 17.14" E

Beginning SCS 132.9 MEDCL-1 description

Spiral Back  
Spiral 132.9 MEDCL-1B Type 1 Spiral Element

Angle 0° 59' 59.95" (RT) P 0.2909 BK S 29° 08' 17.16" E  
LS 200.0000 K 99.9990 AH S 28° 08' 17.21" E  
R 5,729.6500 LT 133.3355 CB S 28° 48' 17.18" E  
YS 1.1635 ST 66.6686 Defl 0° 19' 59.98"  
XS 199.9939 LC 199.9973 Deg 0° 59' 59.95"

Spiral Coordinates			
Point	North	East	Station
TS	130,099.7430	1,824,616.3975	489+28.97
PI	129,983.2813	1,824,681.3207	490+62.30
SC	129,924.4920	1,824,712.7615	491+28.97
CC	127,222.3973	1,819,660.2796	

Circular Section

Curve Data  
Curve 132.9 MEDCL-1  
P.I. Station 504+87.80 N 128,726.2519 E 1,825,353.5868  
Delta = 26° 41' 00.29" (RT)  
Degree = 0° 59' 59.95"  
Tangent = 1,358.8364  
Length = 2,668.3749  
Radius = 5,729.6500  
External = 158.9259  
Long Chord = 2,644.3260  
Mid. Ord. = 154.6366  
P.C. Station 491+28.97 N 129,924.4920 E 1,824,712.7615  
P.T. Station 517+97.34 N 127,367.8534 E 1,825,388.0830  
C.C. N 127,222.3973 E 1,819,660.2796  
Back = S 28° 08' 17.21" E  
Ahead = S 1° 27' 16.92" E  
Chord Bear = S 14° 47' 47.06" E

Spiral Ahead  
Spiral 132.9 MEDCL-1A Type 2 Spiral Element

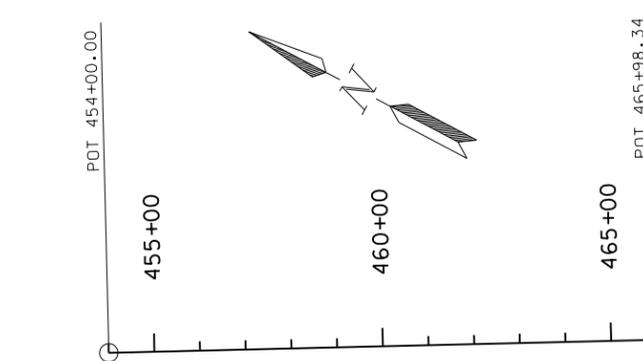
Angle 0° 59' 59.77" (RT) P 0.2909 BK S 1° 27' 16.92" E  
LS 199.9900 K 99.9940 AH S 0° 27' 17.14" E  
R 5,729.6500 LT 133.3288 CB S 0° 47' 17.06" E  
YS 1.1634 ST 66.6653 Defl 0° 19' 59.92"  
XS 199.9839 LC 199.9873 Deg 0° 59' 59.95"

Spiral Coordinates			
Point	North	East	Station
CS	127,367.8534	1,825,388.0830	517+97.34
PI	127,301.2096	1,825,389.7754	518+64.01
ST	127,167.8850	1,825,390.8336	519+97.33
CC	127,222.3973	1,819,660.2796	

Ending SCS 132.9 MEDCL-1 description

Course from ST 132.9 MEDCL-1A to 8231 S 0° 27' 12.07" E Dist 564.3696  
Point 8231 N 126,603.5331 E 1,825,395.2991 Sta 525+61.70

Ending chain 132.9 MEDCL description



Chain 133.4 MEDCL contains:  
8232 8233

Beginning chain 133.4 MEDCL description

Point 8232 N 133,183.3093 E 1,822,894.6896 Sta 454+00.00  
Course from 8232 to 8233 S 29° 05' 03.37" E Dist 1,198.3384  
Point 8233 N 132,136.0746 E 1,823,477.1964 Sta 465+98.34

Ending chain 133.4 MEDCL description

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Survey Data

Hot Bituminous Overlay

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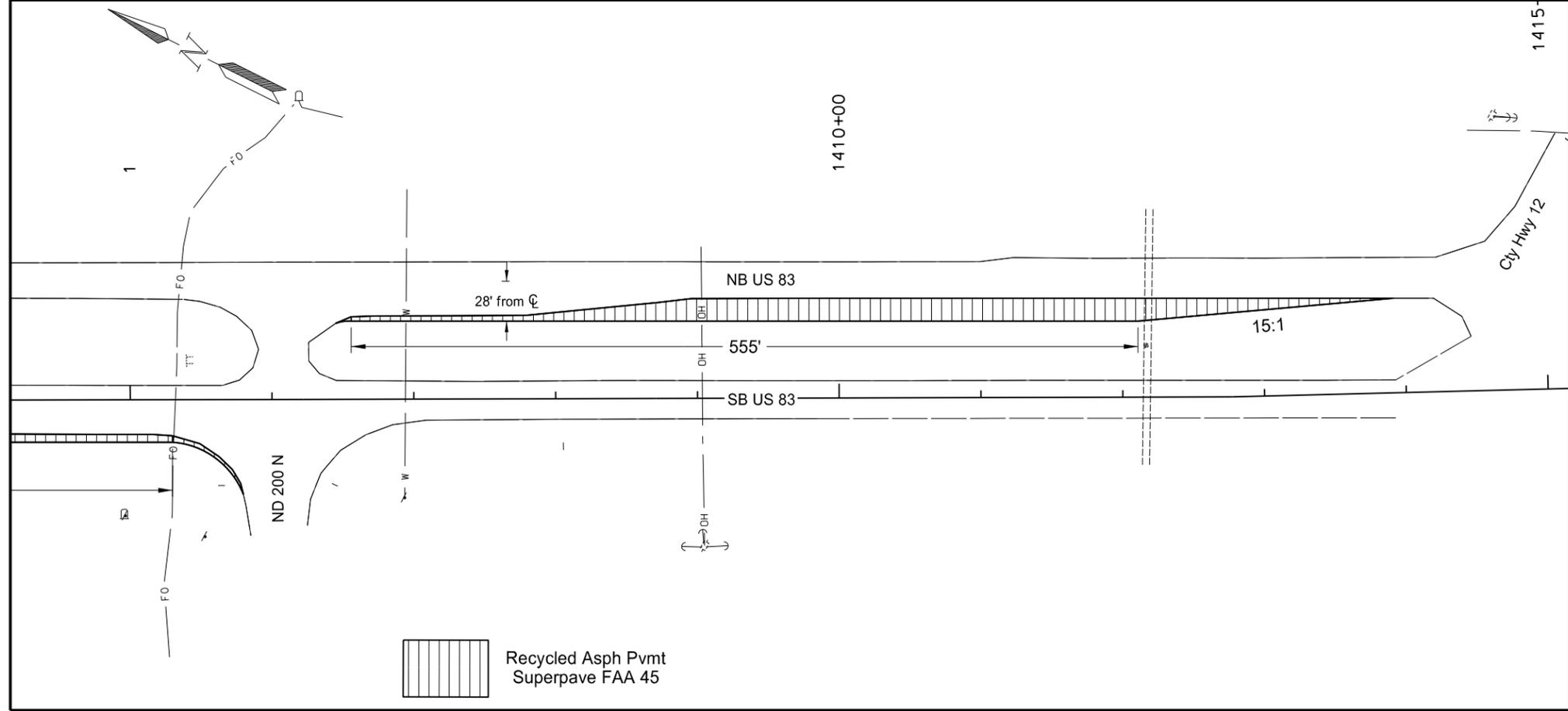
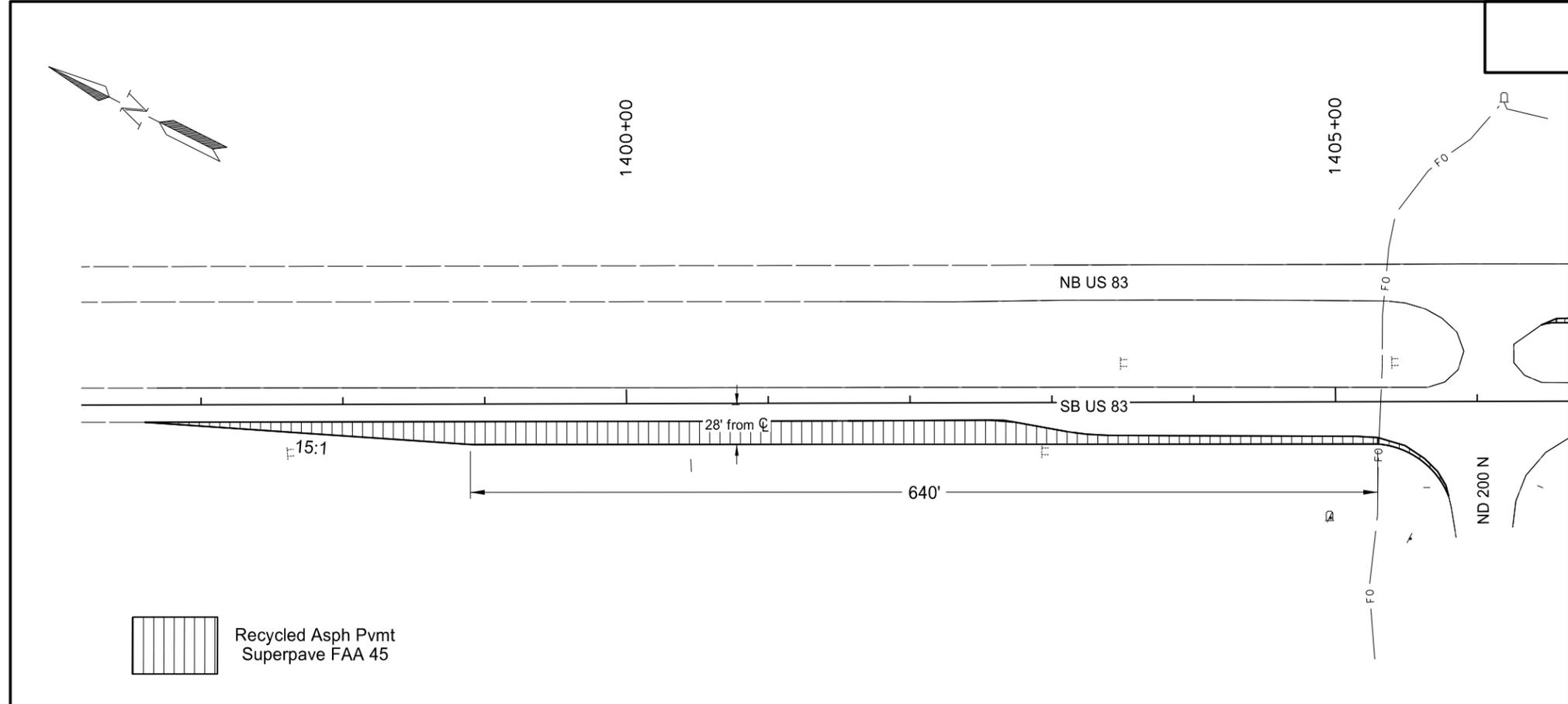
RP 144.2 Southbound Right

Spec	Code	Description	Quantity
302	100	Salvaged Base Course	1087 TON
401	100	MC70 or 250 Liquid Asphalt	298 GAL
410	250	Rcy Asph Pvmt - Superpave FAA 45	98 TON
410	460	PG 64-28 Asphalt Cement	5.0 TON

RP 144.2 Northbound Left

Spec	Code	Description	Quantity
302	100	Salvaged Base Course	865 TON
401	100	MC70 or 250 Liquid Asphalt	238 GAL
410	250	Rcy Asph Pvmt - Superpave FAA 45	79 TON
410	460	PG 64-28 Asphalt Cement	4.0 TON



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Paving Layouts

RP 144.2 Turn Lanes

Hot Bituminous Overlay

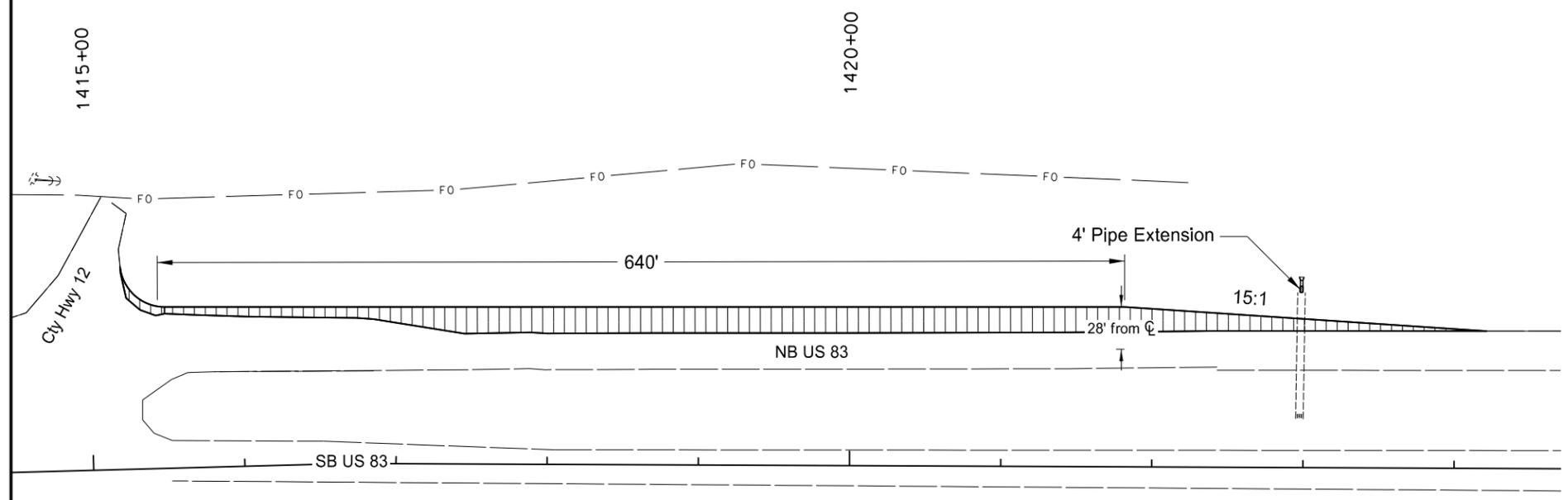
Washburn N to N Jct. ND 200 - NB and SB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	90	2

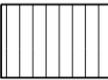
NH-SHE-1-083(106)128

RP 144.0 Northbound Right

Spec	Code	Description	Quantity
302	100	Salvaged Base Course	1072 TON
401	100	MC70 or 250 Liquid Asphalt	329 GAL
410	250	Rcy Asph Pvmt - Superpave FAA 45	109 TON
410	460	PG 64-28 Asphalt Cement	5.6 TON
714	300	Pipe Conc Reinf 18IN CL II	4 LF
714	9660	Remove & Relay End Section-All Types	1EA



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 Recycled Asph Pvmt  
 Superpave FAA 45

Paving Layouts  
 RP 144.0 Turn Lane  
 Hot Bituminous Overlay  
 Washburn N to N Jct. ND 200 - NB and SB

NH-SHE-1-083(106)128

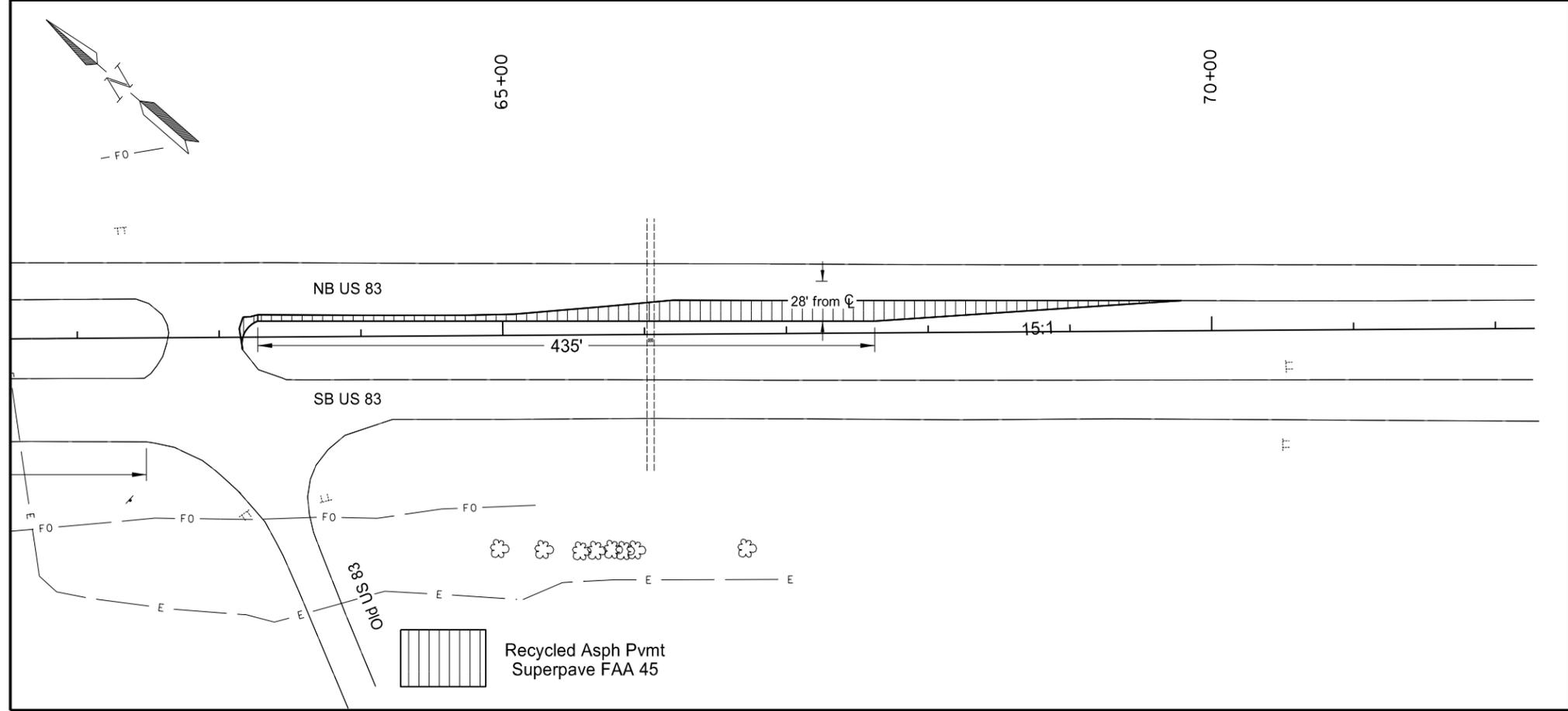
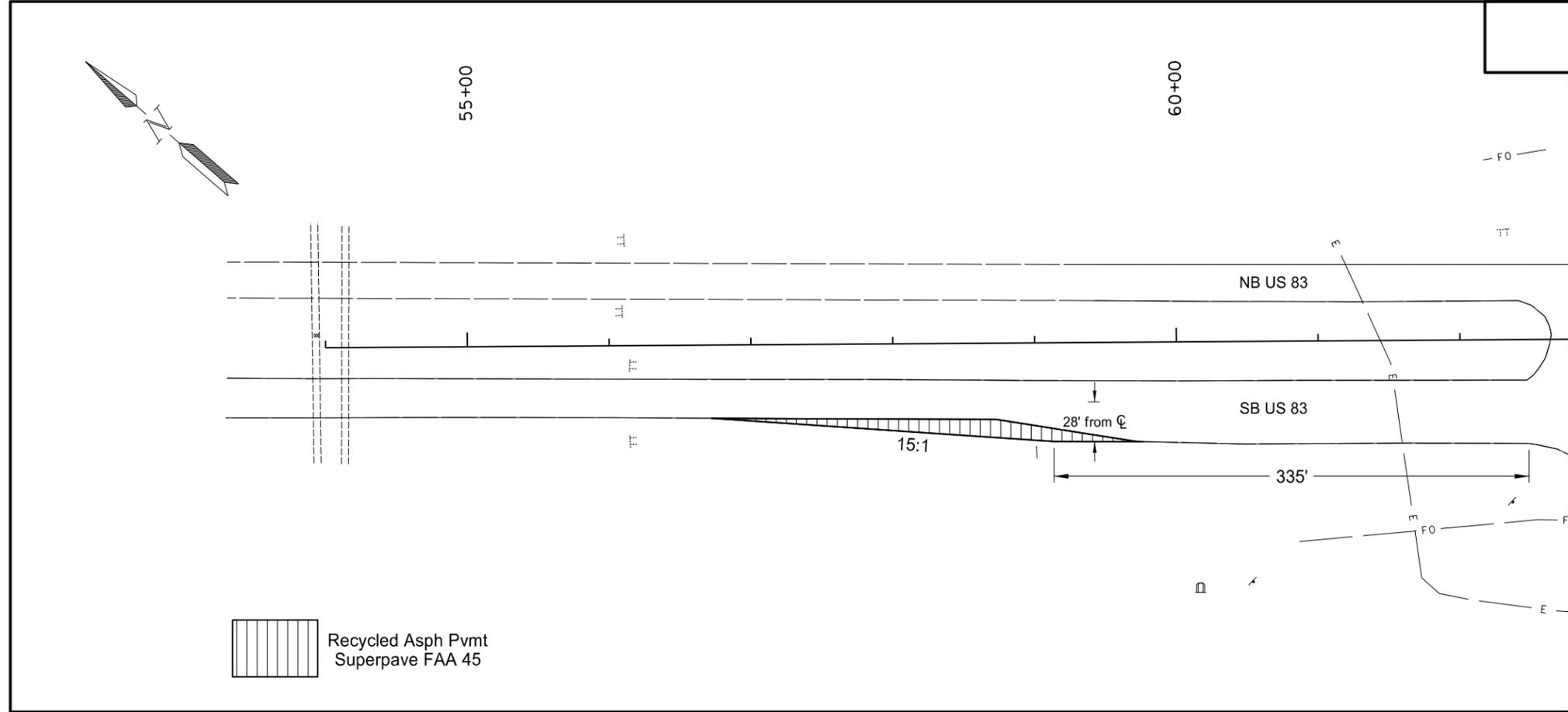
RP 141.5 Southbound Right

Spec	Code	Description	Quantity
302	100	Salvaged Base Course	354 TON
401	100	MC70 or 250 Liquid Asphalt	61 GAL
410	250	Rcy Asph Pvmt - Superpave FAA 45	20 TON
410	460	PG 64-28 Asphalt Cement	1.0 TON

RP 141.5 Northbound Left

Spec	Code	Description	Quantity
302	100	Salvaged Base Course	794 TON
401	100	MC70 or 250 Liquid Asphalt	168 GAL
410	250	Rcy Asph Pvmt - Superpave FAA 45	56 TON
410	460	PG 64-28 Asphalt Cement	2.9 TON



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Paving Layouts

RP 141.5 Turn Lanes

Hot Bituminous Overlay

Washburn N to N Jct. ND 200 - NB and SB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	90	4

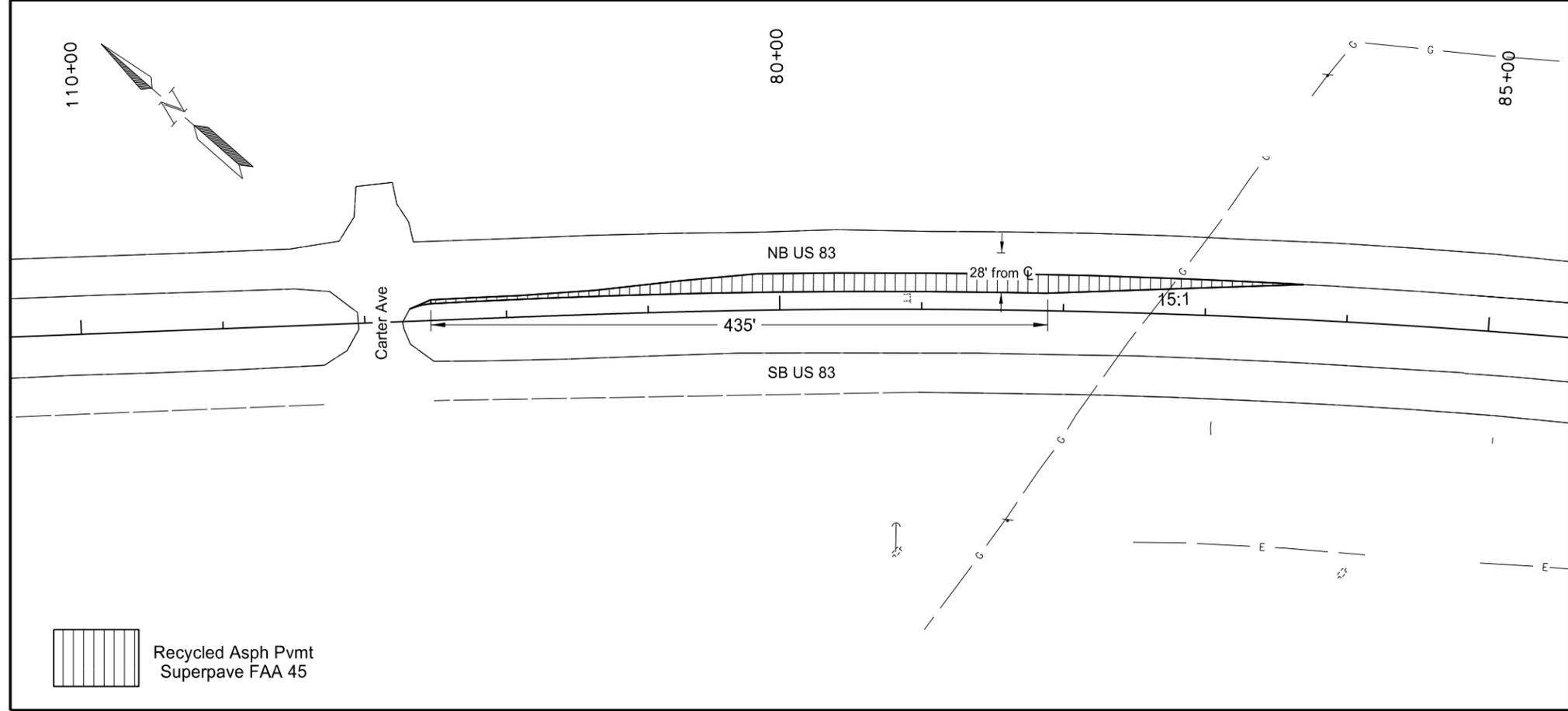
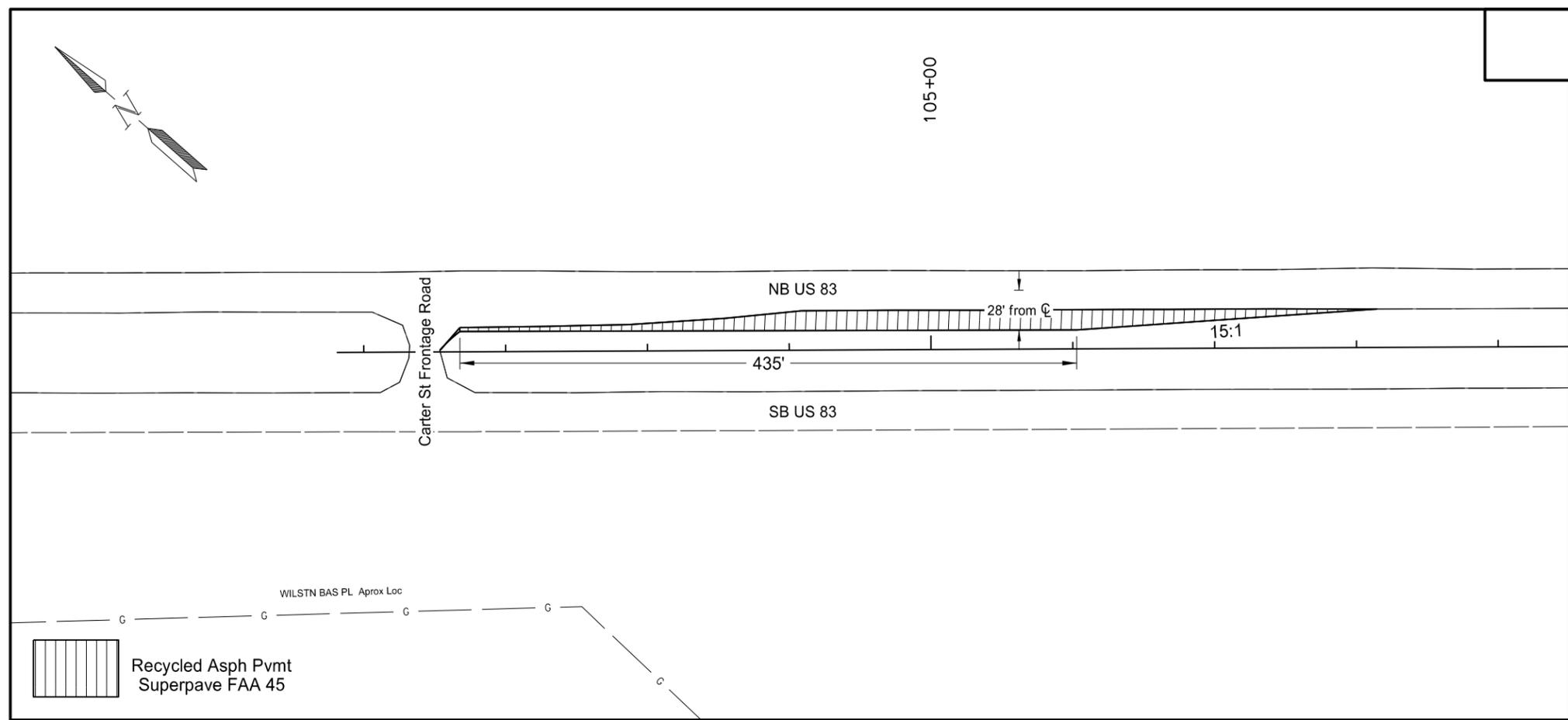
NH-SHE-1-083(106)128

RP 140.7 Northbound Left

Spec	Code	Description	Quantity
302	100	Salvaged Base Course	774 TON
401	100	MC70 or 250 Liquid Asphalt	174 GAL
410	250	Rcy Asph Pvmt - Superpave FAA 45	59 TON
410	460	PG 64-28 Asphalt Cement	3.0 TON

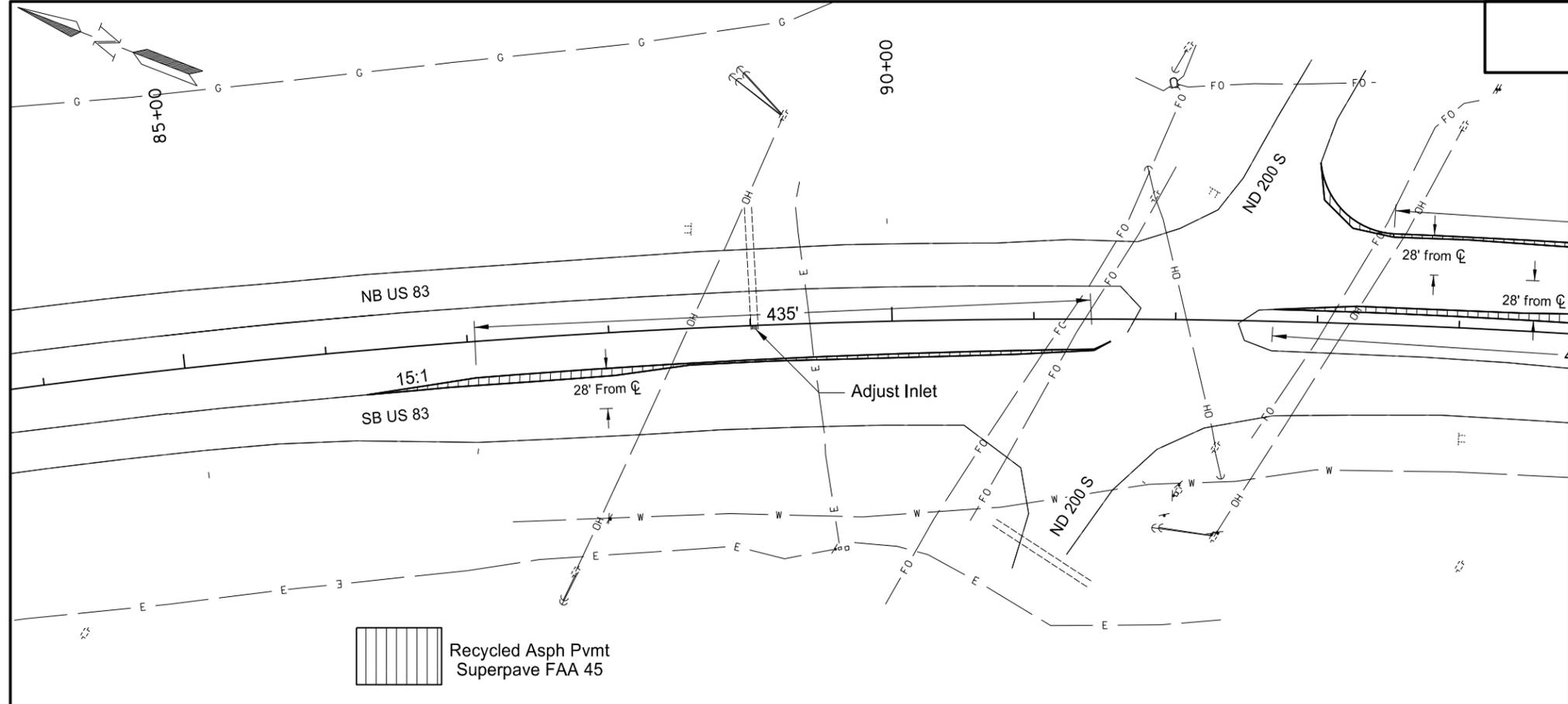
RP 140.5 Northbound Left

Spec	Code	Description	Quantity
302	100	Salvaged Base Course	733 TON
401	100	MC70 or 250 Liquid Asphalt	159 GAL
410	250	Rcy Asph Pvmt - Superpave FAA 45	52 TON
410	460	PG 64-28 Asphalt Cement	2.6 TON



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Paving Layouts  
 RP 140.5 and RP 140.7 Turn Lanes  
 Hot Bituminous Overlay  
 Washburn N to N Jct. ND 200 - NB and SB



NH-SHE-1-083(106)128

RP 140.3 Southbound Left

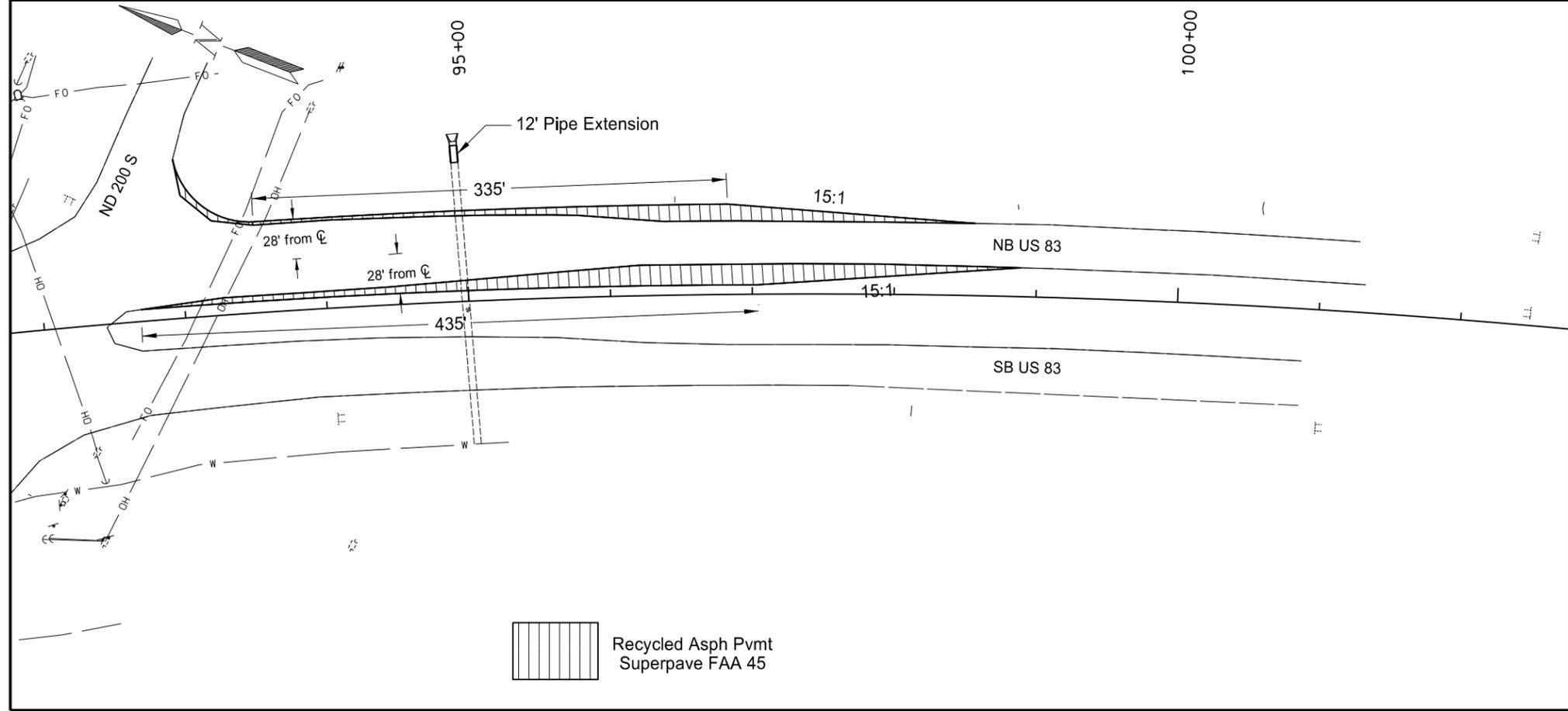
Spec	Code	Description	Quantity
302	100	Salvaged Base Course	610 TON
401	100	MC70 or 250 Liquid Asphalt	53 GAL
410	250	Rcy Asph Pvm - Superpave FAA 45	17 TON
410	460	PG 64-28 Asphalt Cement	0.9 TON

RP 140.2 Northbound Right

Spec	Code	Description	Quantity
302	100	Salvaged Base Course	688 TON
401	100	MC70 or 250 Liquid Asphalt	96 GAL
410	250	Rcy Asph Pvm - Superpave FAA 45	31 TON
410	460	PG 64-28 Asphalt Cement	1.6 TON
714	1200	Pipe Conc Reinf 54IN CL II	12 LF
714	9660	Remove & Relay End Section-All Types	1 EA

RP 140.2 Northbound Left

Spec	Code	Description	Quantity
302	100	Salvaged Base Course	720 TON
401	100	MC70 or 250 Liquid Asphalt	57 GAL
410	250	Rcy Asph Pvm - Superpave FAA 45	49 TON
410	460	PG 64-28 Asphalt Cement	2.5 TON



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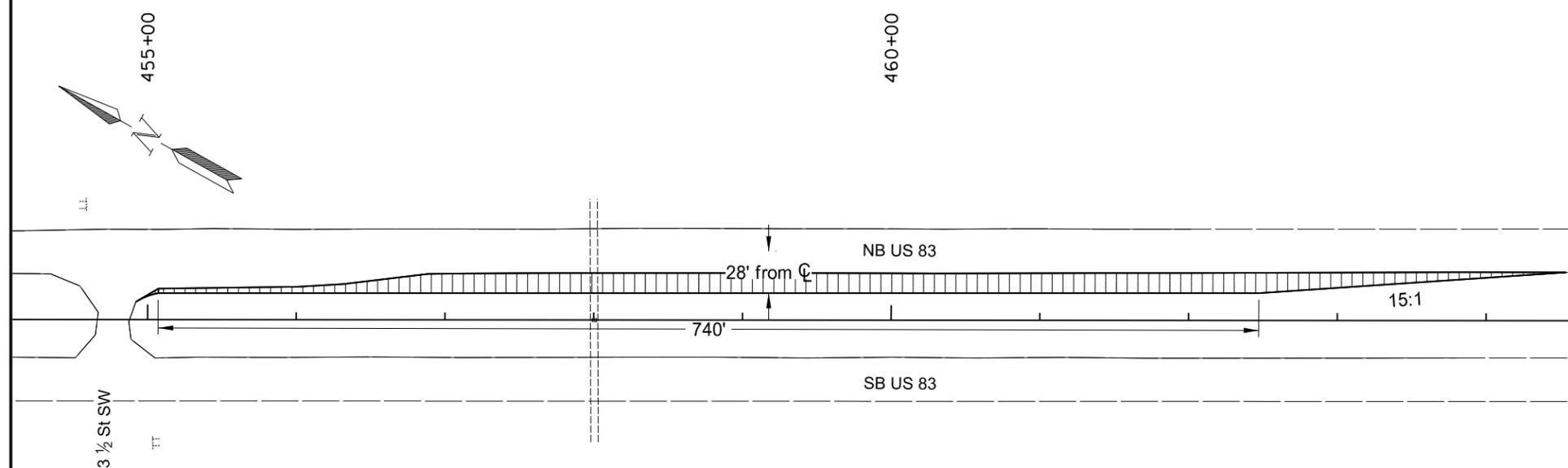
Paving Layouts  
 RP 140.2 and RP 140.3 Turn Lanes  
 Hot Bituminous Overlay  
 Washburn N to N Jct. ND 200 - NB and SB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	90	6

NH-SHE-1-083(106)128

RP 133.4 Northbound Left

Spec	Code	Description	Quantity
302	100	Salvaged Base Course	1117 TON
401	100	MC70 or 250 Liquid Asphalt	294 GAL
410	250	Rcy Asph Pvmt - Superpave FAA 45	96 TON
410	460	PG 64-28 Asphalt Cement	4.9 TON



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 Recycled Asph Pvmt  
 Superpave FAA 45

Paving Layouts  
 RP 133.4 Turn Lane  
 Hot Bituminous Overlay  
 Washburn N to N Jct. ND 200 - NB and SB

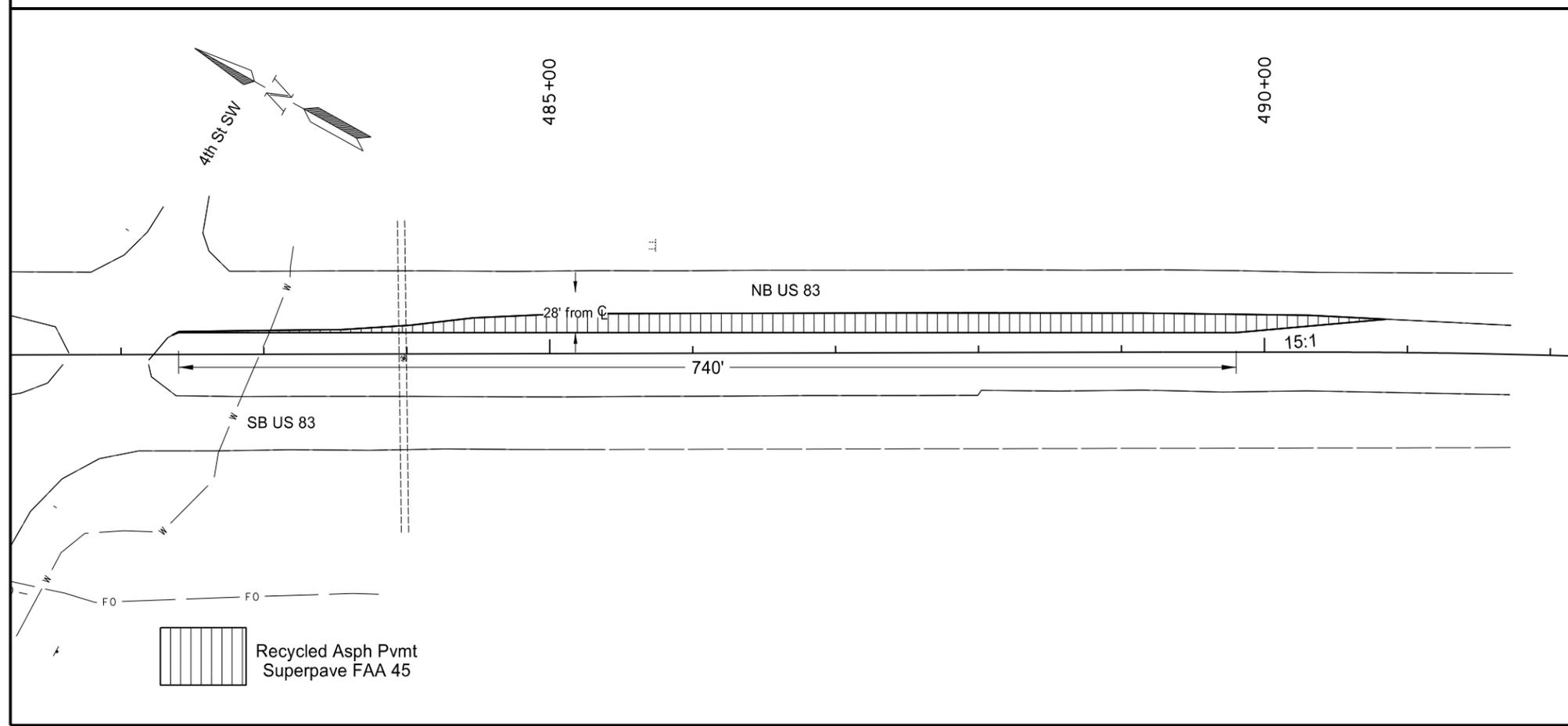
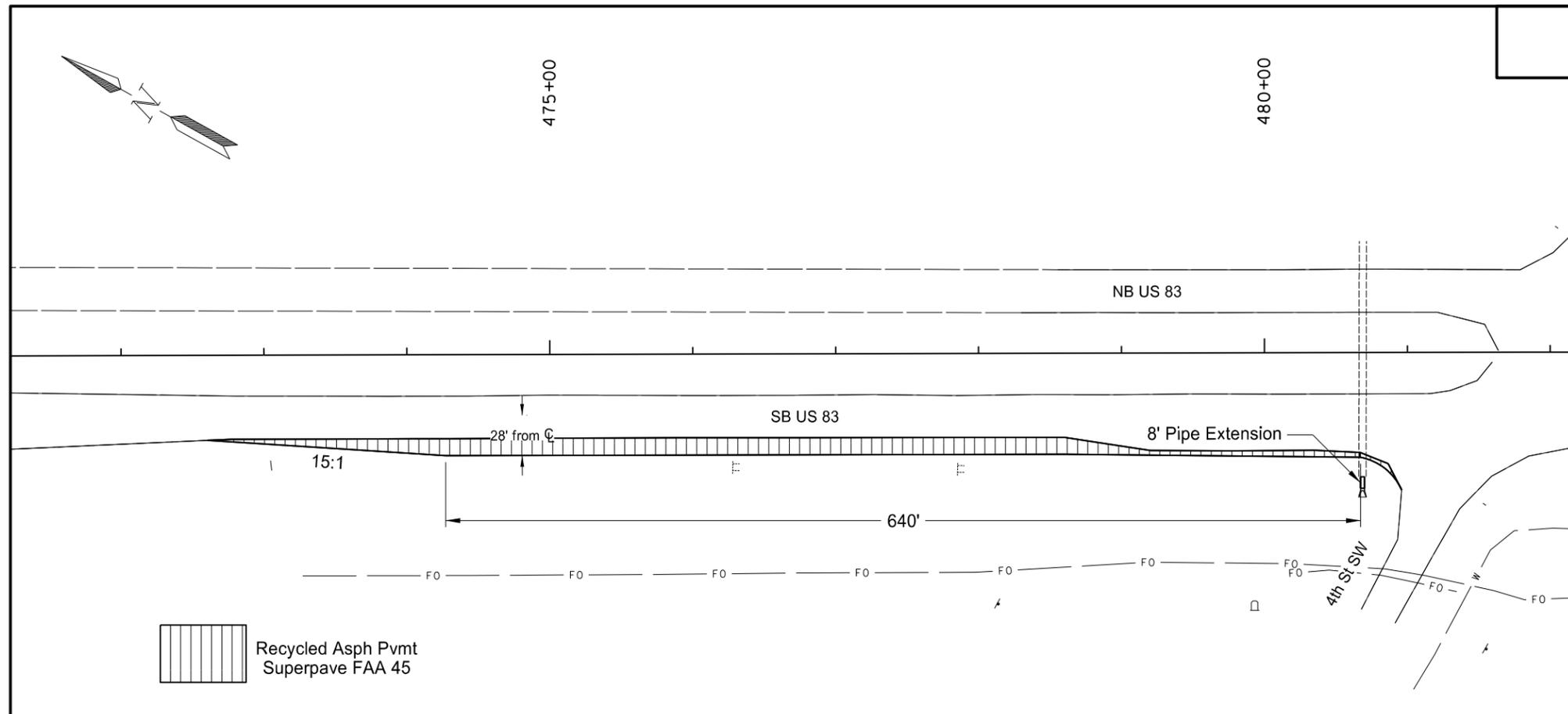
NH-SHE-1-083(106)128

RP 132.9 Southbound Right

Spec	Code	Description	Quantity
302	100	Salvaged Base Course	983 TON
401	100	MC70 or 250 Liquid Asphalt	219 GAL
410	250	Rcy Asph Pvmt - Superpave FAA 45	72 TON
410	460	PG 64-28 Asphalt Cement	3.7 TON
714	815	Pipe Conc Reinf 30IN CL II	8 LF
714	9660	Remove & Relay End Section-All Types	1EA

RP 132.9 Northbound Left

Spec	Code	Description	Quantity
302	100	Salvaged Base Course	989 TON
401	100	MC70 or 250 Liquid Asphalt	251 GAL
410	250	Rcy Asph Pvmt - Superpave FAA 45	83 TON
410	460	PG 64-28 Asphalt Cement	4.2 TON



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Paving Layouts

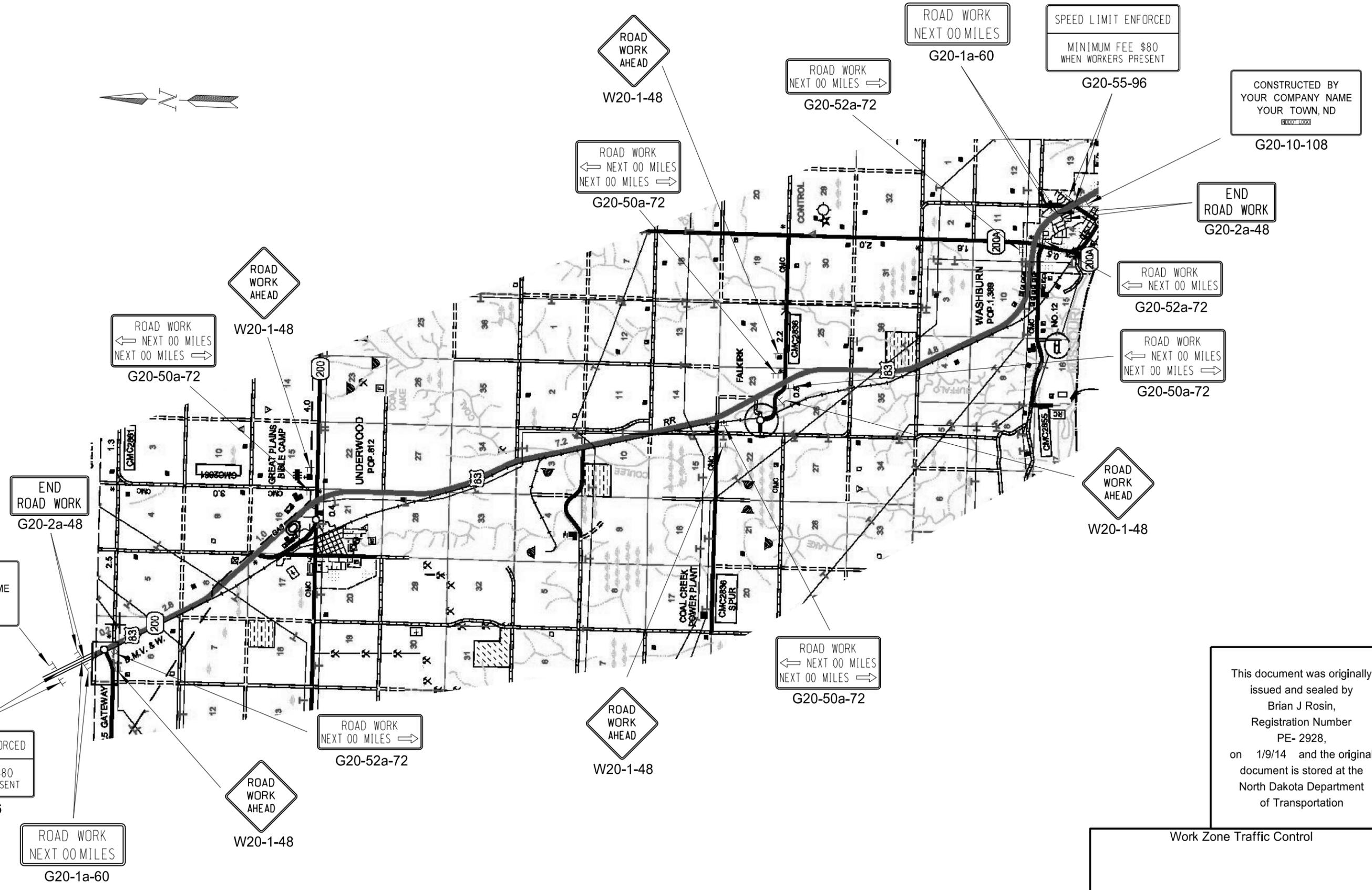
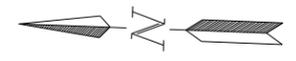
RP 132.9 Turn Lanes

Hot Bituminous Overlay

Washburn N to N Jct. ND 200 - NB and SB



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128 NH-SHE-1-083(106)128	100	2



CONSTRUCTED BY  
YOUR COMPANY NAME  
YOUR TOWN, ND  
ND DOT LOGO

G20-10-108

SPEED LIMIT ENFORCED  
MINIMUM FEE \$80  
WHEN WORKERS PRESENT

G20-55-96

ROAD WORK  
NEXT 00 MILES

G20-1a-60

ROAD WORK  
AHEAD

W20-1-48

ROAD WORK  
NEXT 00 MILES

G20-52a-72

ROAD WORK  
AHEAD

W20-1-48

ROAD WORK  
NEXT 00 MILES  
NEXT 00 MILES

G20-50a-72

ROAD WORK  
NEXT 00 MILES

G20-1a-60

ROAD WORK  
NEXT 00 MILES

G20-52a-72

SPEED LIMIT ENFORCED  
MINIMUM FEE \$80  
WHEN WORKERS PRESENT

G20-55-96

CONSTRUCTED BY  
YOUR COMPANY NAME  
YOUR TOWN, ND  
ND DOT LOGO

G20-10-108

END  
ROAD WORK

G20-2a-48

ROAD WORK  
NEXT 00 MILES

G20-52a-72

ROAD WORK  
NEXT 00 MILES  
NEXT 00 MILES

G20-50a-72

ROAD WORK  
AHEAD

W20-1-48

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Brian J Rosin,  
Registration Number  
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Work Zone Traffic Control

Hot Bituminous Overlay and Turn Lanes

Washburn N to N Jct. 200 - NB and SB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
N.D.	NH-SHE-1-083(104)128	110	1

Sta/RP	Sign No.	Assembly No.	Flat Sheet For Signs		Sign Support Length				Support Size	Max Post Len LF	Sleeve Length				Sleeve Size	Anchor EA	Anchor LF	Anchor Size	Reset Sign Panel EA	Reset Sign Support EA	Break-Away EA	Comments	
			IV SF	XI SF	1st LF	2nd LF	3rd LF	4th LF			1st LF	2nd LF	3rd LF	4th LF									
128.083 Rt	S.A.A		18.5		17.0	17.1	17.3		2.5 x 2.5 10 ga	20.7						3	4	3 x 3 7 ga			3		
128.441 Rt		11		12.0	13.4				2.5 x 2.5 12 ga	14.3	4.8			2.25 x 2.25 12 ga	1	4	3 x 3 7 ga				1		
128.441 Rt mdn		11		12.0	13.9				2.5 x 2.5 12 ga	14.3	5.3			2.25 x 2.25 12 ga	1	4	3 x 3 7 ga				1		
132.003 Rt	S.A.B		3.8		14.1				2.5 x 2.5 12 ga	16.3	4.1			2.25 x 2.25 12 ga	1	4	3 x 3 7 ga				1		
132.811 Rt	S.A.C		17.8		16.5	16.6	16.8		2.5 x 2.5 12 ga	18.2					3	4	3 x 3 7 ga				3		
133.952 Rt	S.A.C		17.8		16.5	16.6	16.8		2.5 x 2.5 12 ga	18.2					3	4	3 x 3 7 ga				3		
134.979 Rt	S.A.C		17.8		16.5	16.6	16.8		2.5 x 2.5 12 ga	18.2					3	4	3 x 3 7 ga				3		
135.939 Rt	SN 2		27.5		12.3	12.8	13.3	13.8	2.5 x 2.5 10 ga	15.6					4	4	3 x 3 7 ga				4		
137.058 Rt	S.A.C		17.8		16.5	16.6	16.8		2.5 x 2.5 12 ga	18.2					3	4	3 x 3 7 ga				3		
139.468 Rt	S.A.D		35.8		15.9	16.3	16.6		2.5 x 2.5 10 ga	17.6	4.8	5.1	5.4	2.19 x 2.19 10 ga	3	4	3 x 3 7 ga				3		
139.875 Rt		21		16.0	14.6	14.9			2.25 x 2.25 12 ga	15.7	4.9	5.3		2 x 2 12 ga	2	4	3 x 3 7 ga				2		
139.875 Rt mdn		21		16.0	15.1	15.4			2.5 x 2.5 12 ga	20.0	3.1	3.4		2.25 x 2.25 12 ga	2	4	3 x 3 7 ga				2		
140.027 Rt	S.A.E		15.6		14.8	15.1			2.5 x 2.5 10 ga	16.2					2	4	3 x 3 7 ga				2		
140.139 Rt		399	6.2		14.3				2.5 x 2.5 12 ga	15.9					1	4	3 x 3 7 ga						
140.181 Rt	S.A.F		33.5		15.7	16.1	16.5		2.5 x 2.5 10 ga	17.5	4.6	5.0	5.4	2.19 x 2.19 10 ga	3	4	3 x 3 7 ga					3	
140.305 Rt	S.A.G		29.3		14.6	14.9	15.3		2.5 x 2.5 10 ga	16.8	4.0	4.4	4.7	2.19 x 2.19 10 ga	3	4	3 x 3 7 ga					3	
140.478 Rt mdn		11			13.9				2.5 x 2.5 12 ga	14.3	5.3			2.25 x 2.25 12 ga	1	4	3 x 3 7 ga	1			1		
143.839 Rt	S.A.H		20.1		16.2	16.4	16.7		2.5 x 2.5 10 ga	19.2					3	4	3 x 3 7 ga				3		
144.11 Rt	S.A.O		7.5		13.2				2.5 x 2.5 10 ga	15.7					1	4	3 x 3 7 ga				1		
144.141 Rt	S.A.J		38.0		15.8	16.2	16.7	17.2	2.5 x 2.5 10 ga	21.3	2.5	3.0	3.5	3.9 2.19 x 2.19 10 ga	4	4	3 x 3 7 ga					4	
147.598 Rt	S.A.K		13.5		14.6				2.5 x 2.5 10 ga	16.2	4.4			2.19 x 2.19 10 ga	1	4	3 x 3 7 ga					1	
<b>Sub Total</b>			320.5	56.0	<b>Total 747.5</b>											<b>Total</b>	192			1	0	47	
<b>Grand Total</b>			320.5	56.0	<b>Total 747.5</b>											<b>Total</b>	192			1	0	47	

Basis of Estimate  
Sign Support Lengths  
The sign support lengths have been calculated using the following vertical clearances:  
Rural expressway - 84"

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Sign Summary  
Perforated Tube  
  
US 83 Northbound  
  
Washburn N to N Jct ND 200



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
N.D.	NH-SHE-1-083(106)128	110	3

Sta/RP	Sign No.	Assembly No.	Flat Sheet For Signs		Sign Support Length				Support Size	Max Post Len LF	Sleeve Length				Sleeve Size	Anchor EA	Anchor LF	Anchor Size	Reset Sign Panel EA	Reset Sign Support EA	Break-Away EA	Comments
			IV SF	XI SF	1st LF	2nd LF	3rd LF	4th LF			1st LF	2nd LF	3rd LF	4th LF								
128.071 Lt	S.A.J		38.0		15.8	16.2	16.7	17.1	2.5 x 2.5 10 ga	21.3	2.5	3.0	3.5	3.9	2.19 x 2.19 10 ga	4	4	3 x 3 7 ga			4	
128.154 Lt	S.A.L		20.1		16.2	16.4	16.6		2.5 x 2.5 10 ga	19.2						3	4	3 x 3 7 ga			3	
128.531 Lt		11			13.4				2.5 x 2.5 12 ga	14.3	4.8				2.25 x 2.25 12 ga	1	4	3 x 3 7 ga	1		1	
128.622 Lt		21		16.0	14.6	14.9			2.25 x 2.25 12 ga	15.7	4.9	5.3			2 x 2 12 ga	2	4	3 x 3 7 ga			2	
128.622 Lt mdn		21		16.0	14.1	14.4			2.25 x 2.25 12 ga	15.7	4.4	4.8			2 x 2 12 ga	2	4	3 x 3 7 ga			2	
129.074 Lt	S.A.B		3.8		14.1				2.5 x 2.5 12 ga	16.3	4.1				2.25 x 2.25 12 ga	1	4	3 x 3 7 ga			1	
131.323 Lt	S.A.M			14.0	15.3	15.7			2.25 x 2.25 12 ga	19.2	3.4	3.7			2 x 2 12 ga	2	4	3 x 3 7 ga			2	
132.953 Lt	S.A.C		17.8		16.4	16.6	16.7		2.5 x 2.5 12 ga	18.2						3	4	3 x 3 7 ga			3	
132.983 Lt	S.A.N		10.6		14.3				2.5 x 2.5 12 ga	16.9	3.9				2.25 x 2.25 12 ga	1	4	3 x 3 7 ga			1	
133.06 Lt	SN 11		20.0		12.7	13.4			2.5 x 2.5 12 ga	15.9	3.2	3.9			2.25 x 2.25 12 ga	2	4	3 x 3 7 ga			2	
134.122 Lt	S.A.C		17.8		16.4	16.6	16.7		2.5 x 2.5 12 ga	18.2						3	4	3 x 3 7 ga			3	
135.144 Lt	S.A.C		17.8		16.4	16.6	16.7		2.5 x 2.5 12 ga	18.2						3	4	3 x 3 7 ga			3	
137.290 Lt	S.A.C		17.8		16.4	16.6	16.7		2.5 x 2.5 12 ga	18.2						3	4	3 x 3 7 ga			3	
140.064 Lt		11		12.0	13.4				2.5 x 2.5 12 ga	14.3	4.8				2.25 x 2.25 12 ga	1	4	3 x 3 7 ga			1	
140.064 Lt mdn		11		12.0	12.9				2.5 x 2.5 12 ga	14.3	4.3				2.25 x 2.25 12 ga	1	4	3 x 3 7 ga			1	
140.228 Lt	S.A.K		13.5		14.6				2.5 x 2.5 10 ga	16.2	4.4				2.19 x 2.19 10 ga	1	4	3 x 3 7 ga			1	
140.266 Lt		9	5.0		13.0				2.25 x 2.25 12 ga	15.0						1	4	2.5 x 2.5 12 ga				
140.360 Lt	S.A.J		38.0		15.8	16.2	16.7	17.1	2.5 x 2.5 10 ga	21.3	2.5	3.0	3.5	3.9	2.19 x 2.19 10 ga	4	4	3 x 3 7 ga			4	
140.508 Lt	S.A.H		20.1		16.2	16.4	16.6		2.5 x 2.5 10 ga	19.2						3	4	3 x 3 7 ga			3	
141.473 Lt		2		7.5	12.6				2.5 x 2.5 10 ga	14.6						1	4	3 x 3 7 ga			1	
141.550 Lt	SN 5		23.8		12.3	12.7	13.1	13.6	2.5 x 2.5 12 ga	14.9						4	4	3 x 3 7 ga			4	
141.602 Lt		11		12.0	13.4				2.5 x 2.5 12 ga	14.3	4.8				2.25 x 2.25 12 ga	1	4	3 x 3 7 ga			1	
141.795 Lt		21		16.0	14.6	14.9			2.25 x 2.25 12 ga	15.7	4.9	5.3			2 x 2 12 ga	2	4	3 x 3 7 ga			2	
141.795 Lt mdn		21		16.0	14.1	14.4			2.25 x 2.25 12 ga	15.7	4.4	4.8			2 x 2 12 ga	2	4	3 x 3 7 ga			2	
143.942 Lt		11		12.0	13.4				2.5 x 2.5 12 ga	14.3	4.8				2.25 x 2.25 12 ga	1	4	3 x 3 7 ga			1	
143.942 Lt mdn		11		12.0	13.0				2.5 x 2.5 12 ga	14.3	4.4				2.25 x 2.25 12 ga	1	4	3 x 3 7 ga			1	
144.179 Lt	S.A.G		29.3		14.6	14.9	15.3		2.5 x 2.5 10 ga	16.8	4.0	4.4	4.7		2.19 x 2.19 10 ga	3	4	3 x 3 7 ga			3	
147.556 Lt		2		7.5	12.3				2.5 x 2.5 10 ga	14.6						1	4	3 x 3 7 ga			1	
147.570 Lt mdn		16		9.0	12.5				2.25 x 2.25 12 ga	13.8	4.1				2 x 2 12 ga	1	4	3 x 3 7 ga			1	
147.607 Lt mdn		33		6.0	12.3				2.5 x 2.5 12 ga	14.8						1	4	3 x 3 7 ga				
147.617 Lt	S.A.F		33.5		15.7	16.1	16.5		2.5 x 2.5 10 ga	17.4	4.7	5.1	5.5		2.19 x 2.19 10 ga	3	4	3 x 3 7 ga			3	
<b>Sub Total</b>			326.9	168.0			<b>Total</b> 932.3									<b>Total</b> 248			1	0	60	
<b>Grand Total</b>			326.9	168.0			<b>Total</b> 932.3									<b>Total</b> 248			1	0	60	

Basis of Estimate  
Sign Support Lengths  
The sign support lengths have been calculated using the following vertical clearances:  
Rural expressway - 84"

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Sign Summary  
Perforated Tube  
  
US 83 Southbound  
  
Washburn N to N Jct ND 200

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
N.D.	NH-SHE-1-083(106)128	110	4

Sta/RP	Sign/ Assembly No.	Flat Sheet For Signs		Panel For Signs		Overlay Panel		Galv Steel Post Standard Pipe		Size	Galv Steel Post W-Shape Posts			Max Post Len LF	Post Space FT	Revise Fuse Joint EA	Std Pipe Fdn			W-Shape Pile LF	Remove Sign Fdns		Reset Sign Panel EA	Reset Sign Support EA	Stub Post EA	Multi Dir Base EA	Comments	
		IV SF	XI SF	IV SF	XI SF	IV SF	XI SF	1st LF	2nd LF		3rd LF	1st LF	2nd LF				3rd LF	Dia FT	Dep FT		Vol CY	Conc Fdn EA						W-Shape Pile EA
128.373 Lt	SN 4	6.3		77.0						W6x20	17.0	18.1		26.1	7.0					28			1					
143.997 Lt	SN 6			50.0						W4x13	15.3	16.1		17.2	5.0					28								
147.669 Lt	SN 12			42.5						W4x13	15.2	15.9		19.9	4.3					28								
<b>Sub Total</b>		6.3	0.0	169.5	0.0	0.0	0.0	<b>Total</b> 0.0			<b>Total</b> 97.7								0.0	84	0	0	1	0	0	0		
<b>Grand Total</b>		6.3	0.0	169.5	0.0	0.0	0.0	<b>Total</b> 0.0			<b>Total</b> 97.7								0.0	84	0	0	1	0	0	0		

Basis of Estimate  
Sign Support Lengths

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

Rural expressway - 84"

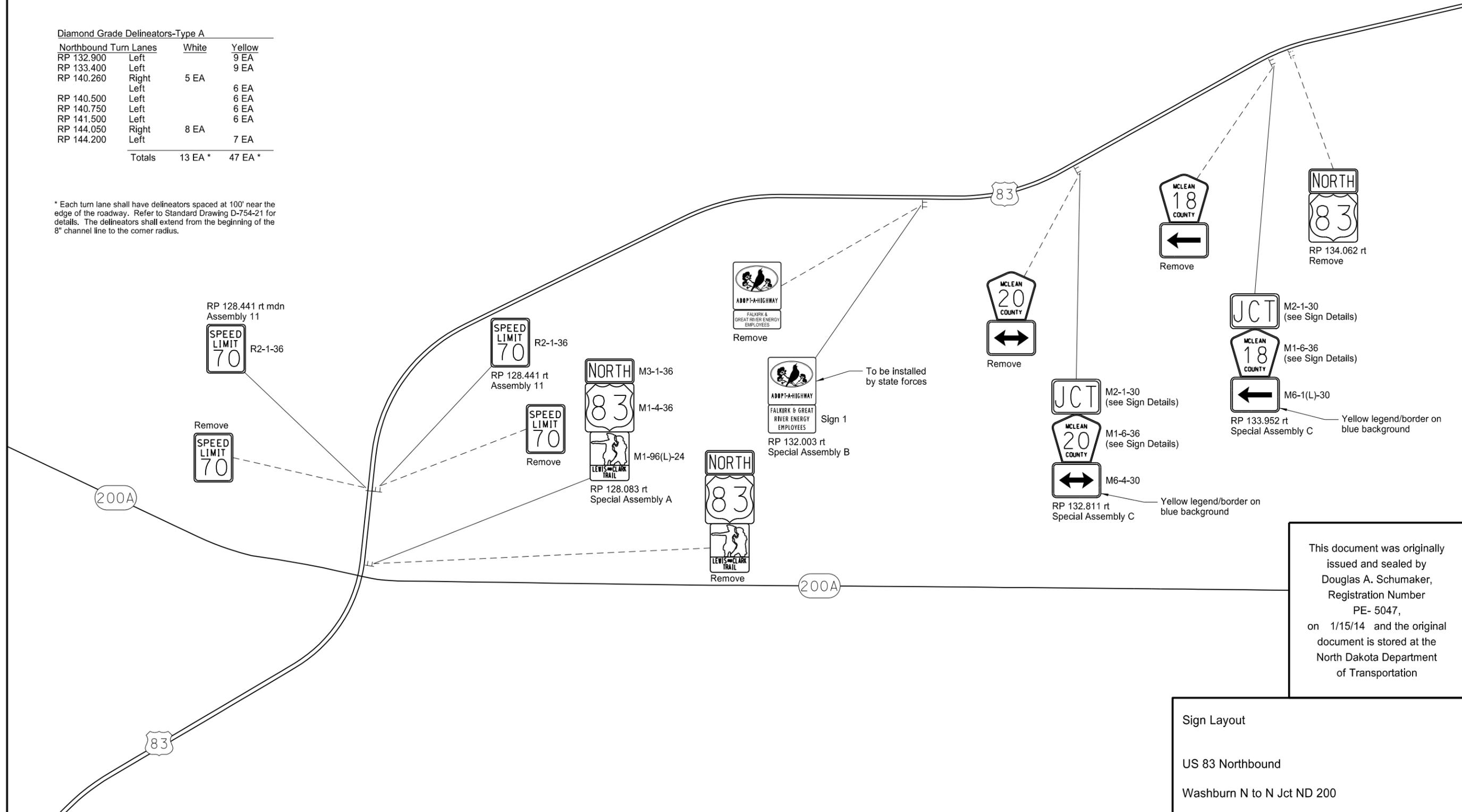
This document was originally issued and sealed by Douglas A. Schumaker, Registration Number PE-5047, on 1/15/2014 and the original document is stored at the North Dakota Department of Transportation	Sign Summary Round Steel Pipe and W-Shape
	US 83 Southbound
	Washburn N to N Jct ND 200



**Diamond Grade Delineators-Type A**

Northbound Turn Lanes	White	Yellow
RP 132.900 Left		9 EA
RP 133.400 Left		9 EA
RP 140.260 Right	5 EA	
RP 140.500 Left		6 EA
RP 140.750 Left		6 EA
RP 141.500 Left		6 EA
RP 144.050 Right	8 EA	
RP 144.200 Left		7 EA
<b>Totals</b>	<b>13 EA *</b>	<b>47 EA *</b>

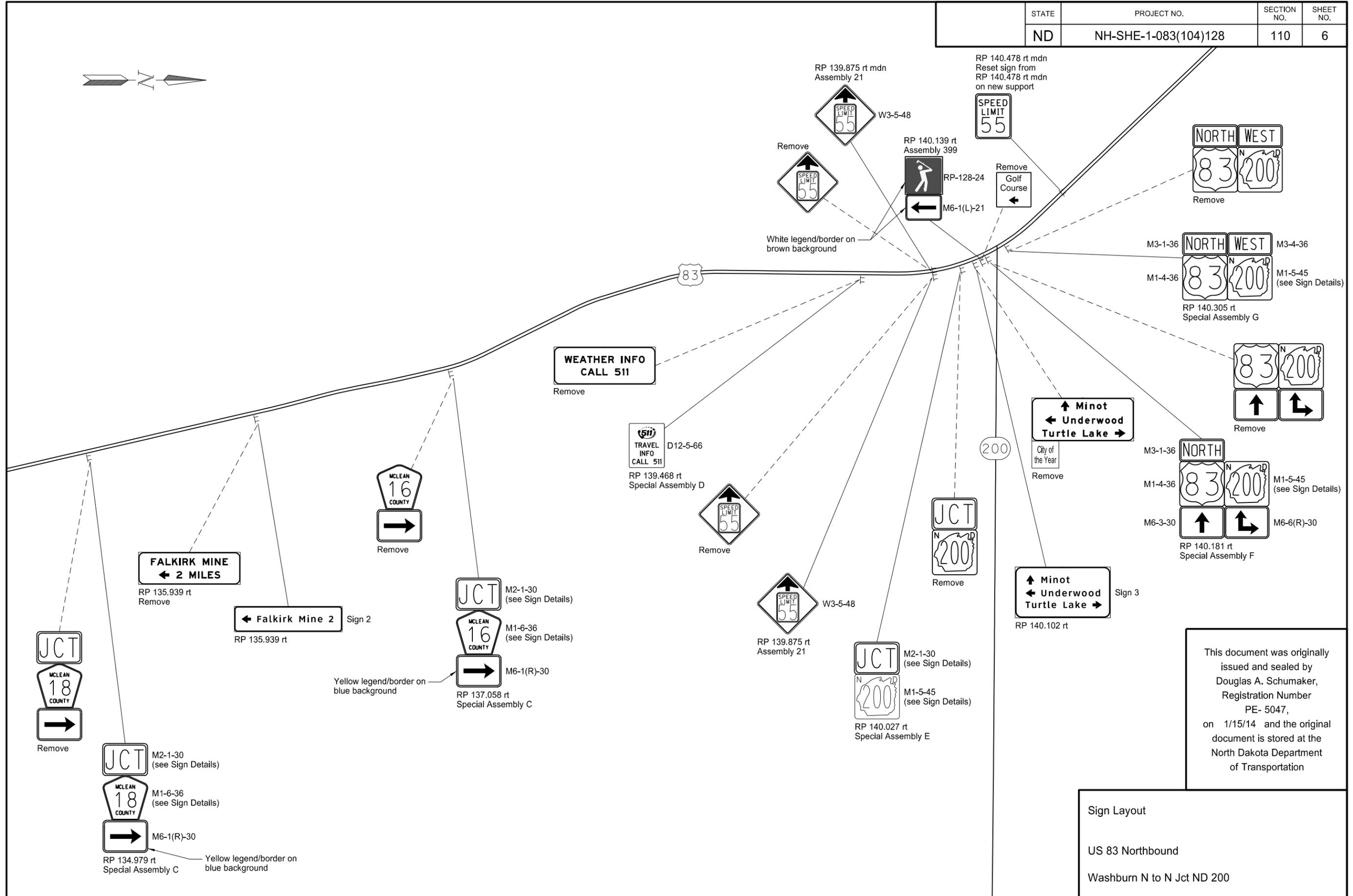
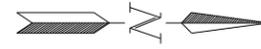
\* Each turn lane shall have delineators spaced at 100' near the edge of the roadway. Refer to Standard Drawing D-754-21 for details. The delineators shall extend from the beginning of the 8" channel line to the corner radius.



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Sign Layout  
 US 83 Northbound  
 Washburn N to N Jct ND 200

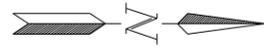
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	110	6



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Sign Layout  
 US 83 Northbound  
 Washburn N to N Jct ND 200

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	110	7



Reference Marker-Type C  
RP 144 Sta 1417+33.9 rt 1 EA

RP 144.11 rt  
Special Assembly O



M1-96(L)-24



M6-6-21

Remove



200

US Hwy 83 NB Equation  
RP 147.556 Ahd =  
RP 144.218 Bk

83



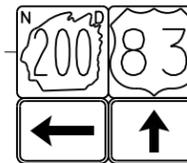
Remove



M3-1-36

M1-4-36

RP 147.598 rt  
Special Assembly K



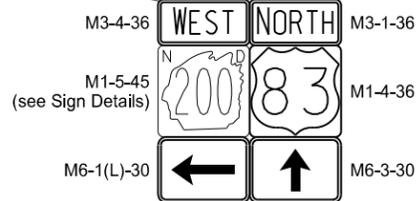
Remove



Remove



RP 144.07 rt



M3-4-36

M1-5-45  
(see Sign Details)

M6-1(L)-30

WEST NORTH

M3-1-36

M1-4-36

M6-3-30

RP 144.141 rt  
Special Assembly J



Remove



M3-4-36



M1-5-45  
(see Sign Details)

M5-1(L)-30

RP 143.839 rt  
Special Assembly H



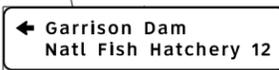
Remove



Remove



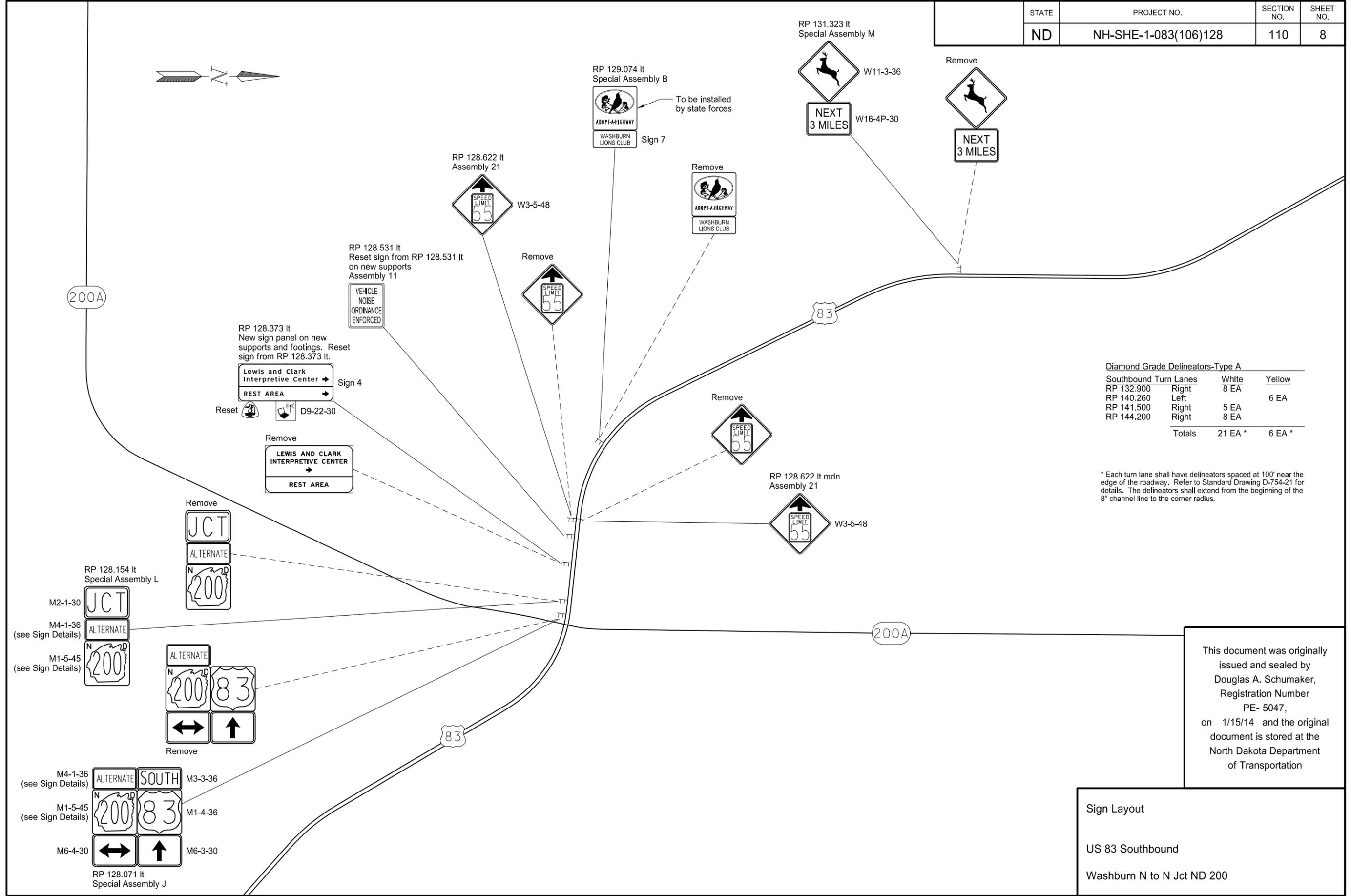
RP 144.02 rt



RP 143.95 rt

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Sign Layout  
US 83 Northbound  
Washburn N to N Jct ND 200



Diamond Grade Delineators-Type A

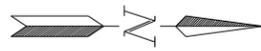
Southbound Turn Lanes	White	Yellow
RP 132.900 Right	8 EA	
RP 140.260 Left		6 EA
RP 141.500 Right	5 EA	
RP 144.200 Right	8 EA	
Totals	21 EA *	6 EA *

\* Each turn lane shall have delineators spaced at 100' near the edge of the roadway. Refer to Standard Drawing D-754-21 for details. The delineators shall extend from the beginning of the 8" channel line to the corner radius.

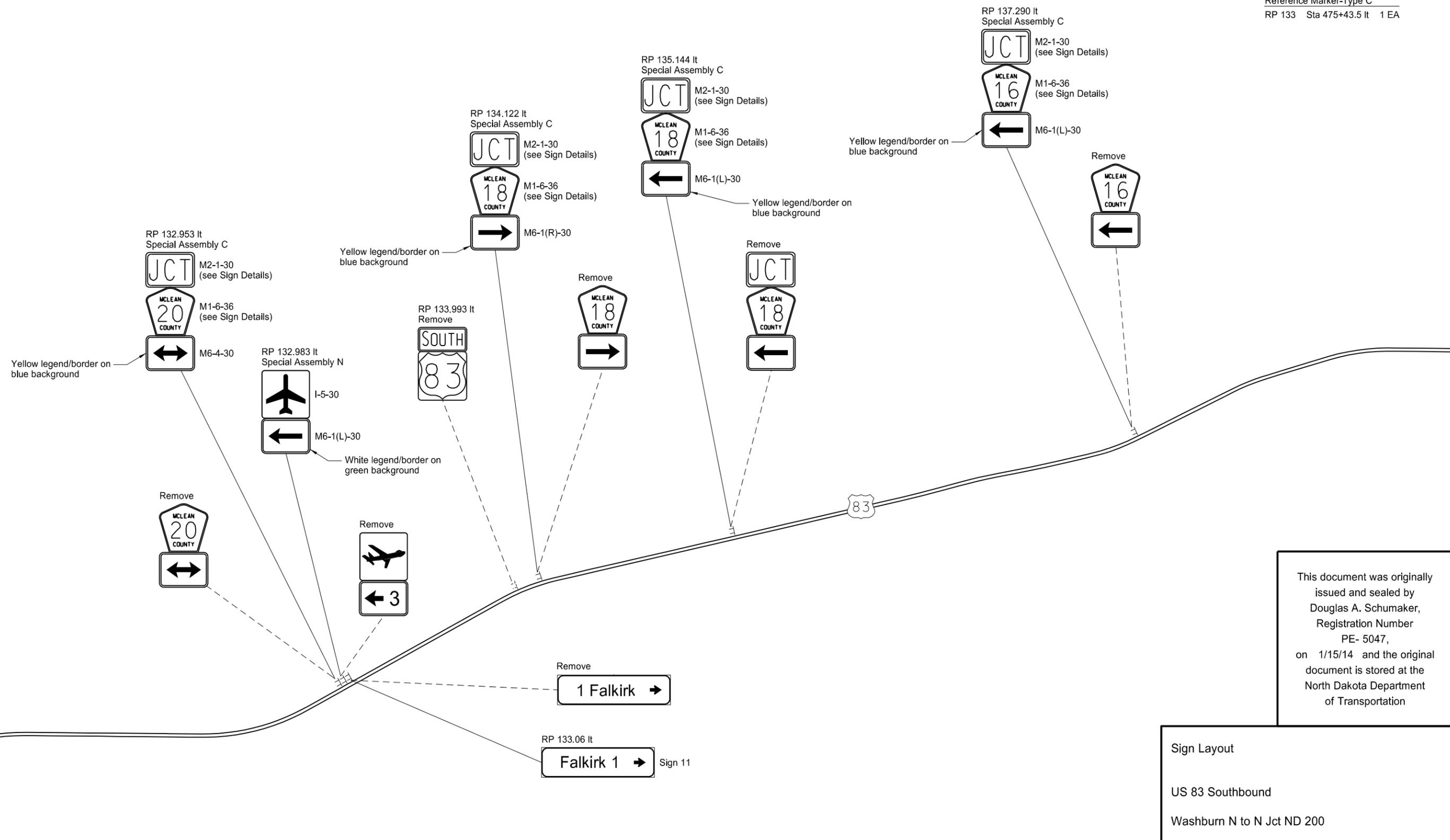
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Sign Layout  
US 83 Southbound  
Washburn N to N Jct ND 200

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(106)128	110	9



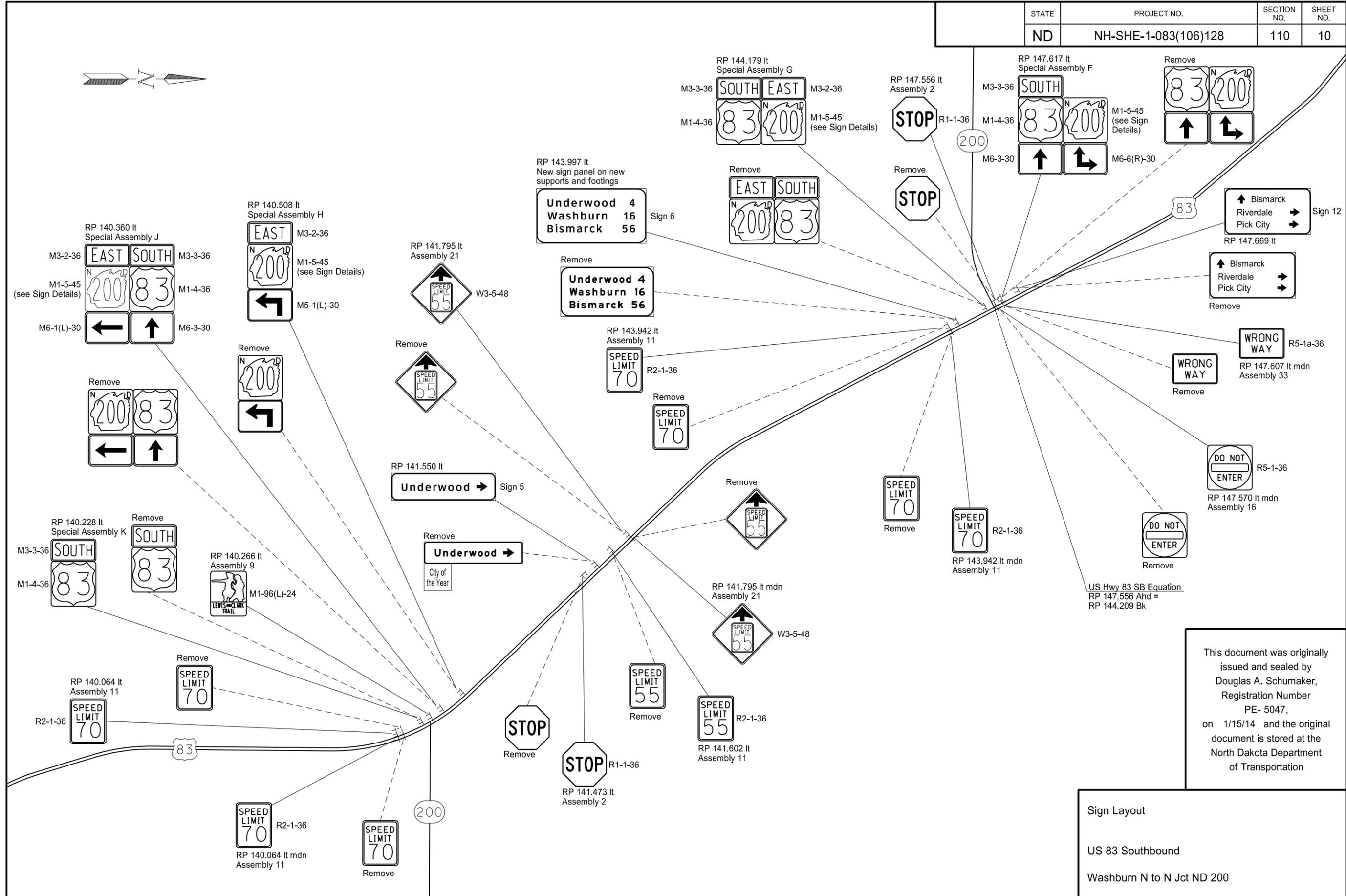
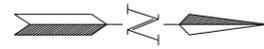
Reference Marker-Type C  
 RP 133 Sta 475+43.5 It 1 EA



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Sign Layout  
 US 83 Southbound  
 Washburn N to N Jct ND 200

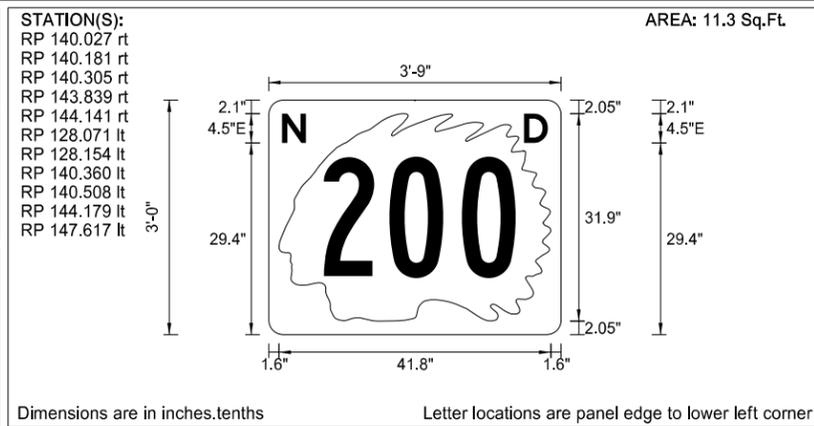
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(106)128	110	10



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Sign Layout  
 US 83 Southbound  
 Washburn N to N Jct ND 200

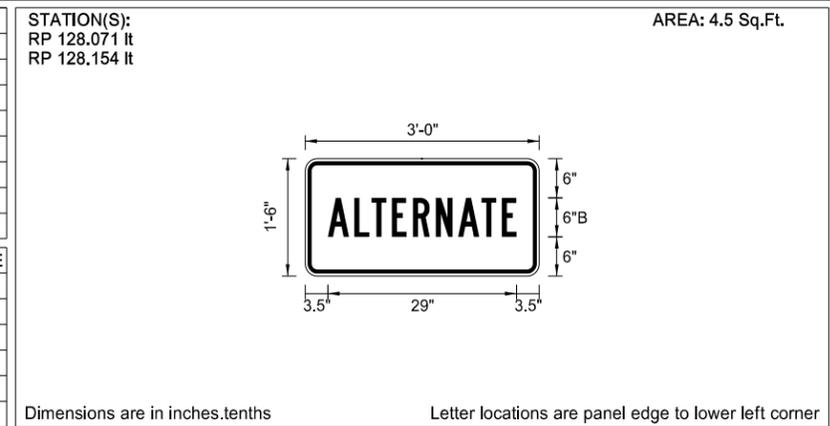
SIGN NUMBER	M1-5-45
WIDTH x HEIGHT	3'-9" x 3'-0"
BORDER WIDTH	0" (inset 0")
CORNER RADIUS	2.25"
MOUNTING	Ground
BACKGROUND	TYPE: Non-reflective
	COLOR: Black
LEGEND/BORDER	TYPE: IV Reflective
	COLOR: White



SYMBOL	X	Y	WID	HT	ANGLE
M1-5-45_RM3	1.6	2.1	41.8	31.9	0

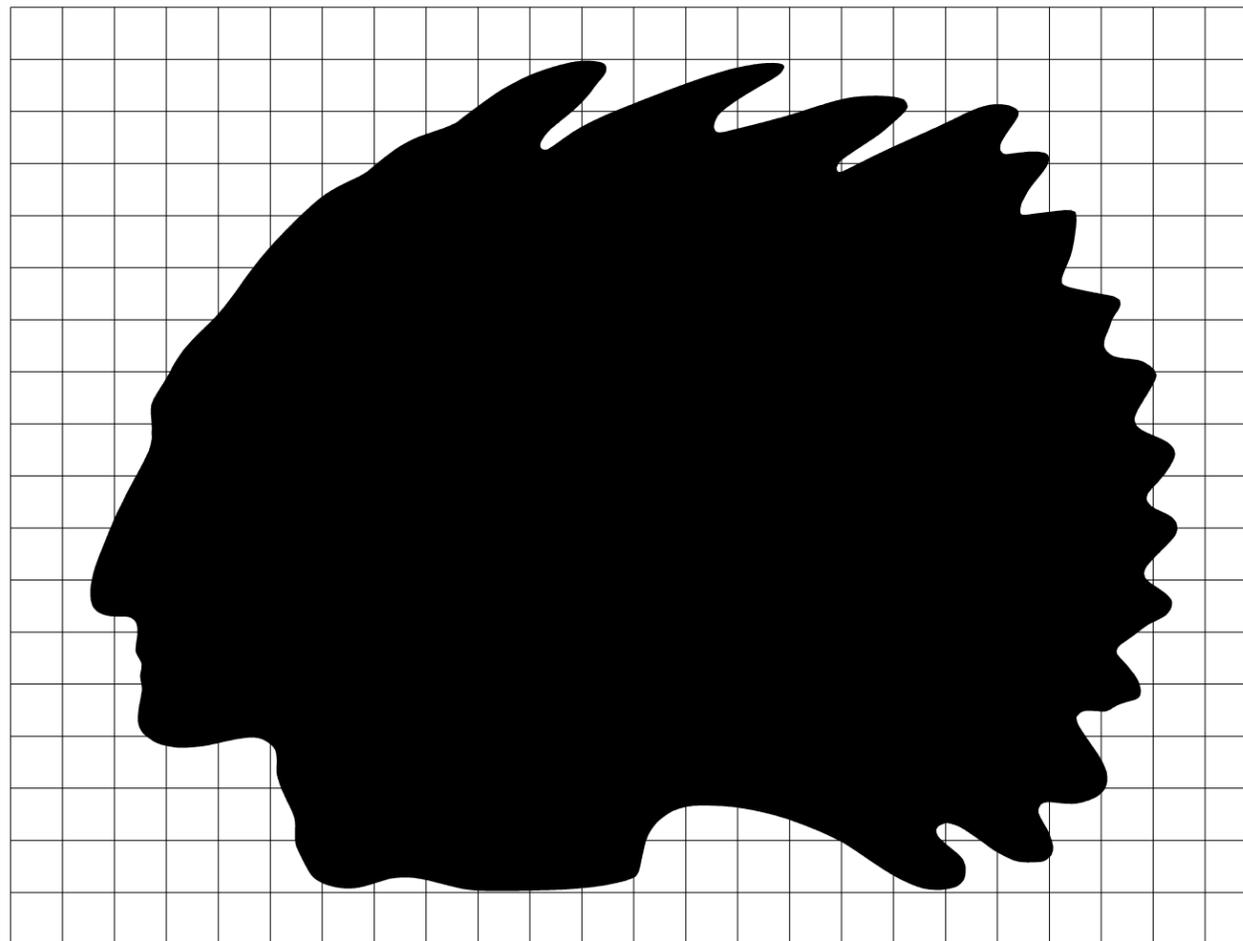
LETTER POSITION (X)		LENGTH	SIZE	SERIES
N	2.1	3.6	4.5	E 2000
D	39.3	3.6	4.5	E 2000

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



SYMBOL	X	Y	WID	HT	ANGLE

LETTER POSITION (X)		LENGTH	SIZE	SERIES
A	3.5	7.6	6	B 2000
L	10.2	13.3	6	B 2000
T	16.6	20.1	6	B 2000
E	23.5	27.1	6	B 2000
R	30.2			
N				
A				
T				
E				



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Sign Details  
 US 83 Northbound and Southbound  
 Washburn N to N Jct ND 200

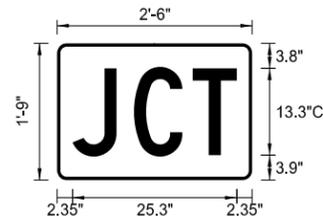
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	110	12

NH-SHE-1-083(106)128

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

STATION(S):  
 RP 132.811 rt  
 RP 133.952 rt  
 RP 134.979 rt  
 RP 137.058 rt  
 RP 140.027 rt  
 RP 128.154 lt  
 RP 132.953 lt  
 RP 134.122 lt  
 RP 135.144 lt  
 RP 137.290 lt

AREA: 4.4 Sq.Ft.



Dimensions are in inches.tenths Letter locations are panel edge to lower left corner

SYMBOL	X	Y	WID	HT	ANGLE

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

PANEL STYLE: ND\_Misc\_Guide.sst

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

STATION(S):  
 RP 132.003 rt

AREA: 3.8 Sq.Ft.



Dimensions are in inches.tenths Letter locations are panel edge to lower left corner

SYMBOL	X	Y	WID	HT	ANGLE

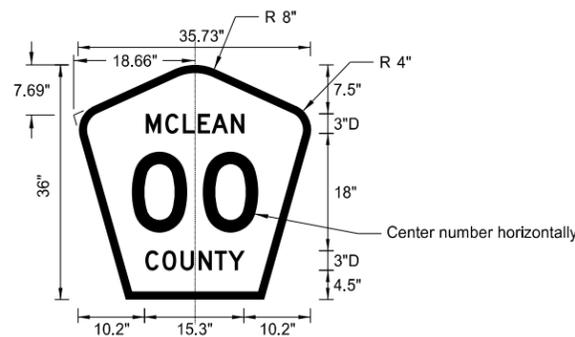
PANEL STYLE: ND\_Adopt-a-Highway.sst

LETTER POSITION (X)															LENGTH	SIZE	SERIES
F	A	L	K	I	R	K	&	G	R	E	A	T			26.4	3	ClearviewHwy-1-W
1.8	3.3	5.6	7.2	9.2	10.4	12.5	13.9	15.7	17.3	19	21.2	23.3	24.9	26.9			
R	I	V	E	R	E	N	E	R	G	Y					21.6	3	ClearviewHwy-1-W
4.2	6.3	7.2	9.4	11.2	12.6	14.5	16.2	18.5	20.3	22.3	24.3						
E	M	P	L	O	Y	E	E	S							16.7	3	ClearviewHwy-1-W
6.7	8.4	10.9	12.9	14.4	16.6	18.7	20.4	22									

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

STATION(S):  
 RP 132.811 rt  
 RP 133.952 rt  
 RP 137.058 rt  
 RP 134.979 rt  
 RP 132.953 lt  
 RP 134.122 lt  
 RP 135.144 lt  
 RP 137.290 lt

AREA: 9.0 Sq.Ft.



Dimensions are in inches.tenths Letter locations are panel edge to lower left corner

SYMBOL	X	Y	WID	HT	ANGLE

LETTER POSITION (X)						LENGTH	SIZE	SERIES
M	C	L	E	A	N	15.2	3	D 2000
10.3	13.3	16	18.3	20.4	23.4			
0	0						12	D 2000
C	O	U	N	T	Y	15.3	3	D 2000
10.2	12.9	15.6	18.4	20.9	22.9			

PANEL STYLE: ND\_Misc\_Guide.sst

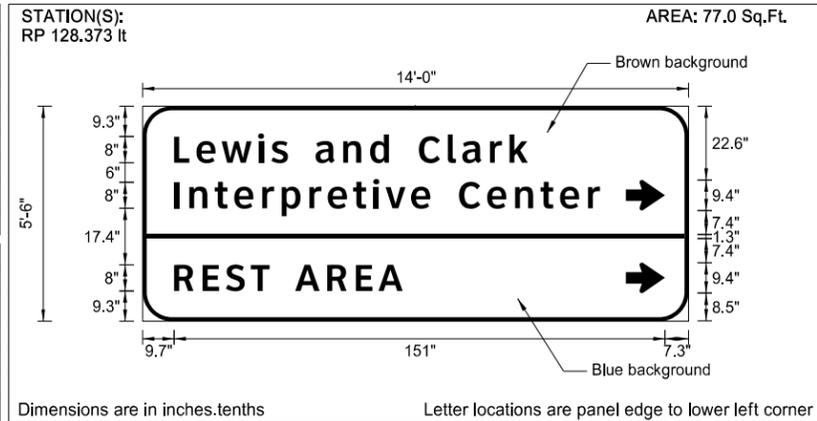
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Sign Details  
 US 83 Northbound and Southbound  
 Washburn N to N Jct ND 200



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(106)128	110	14

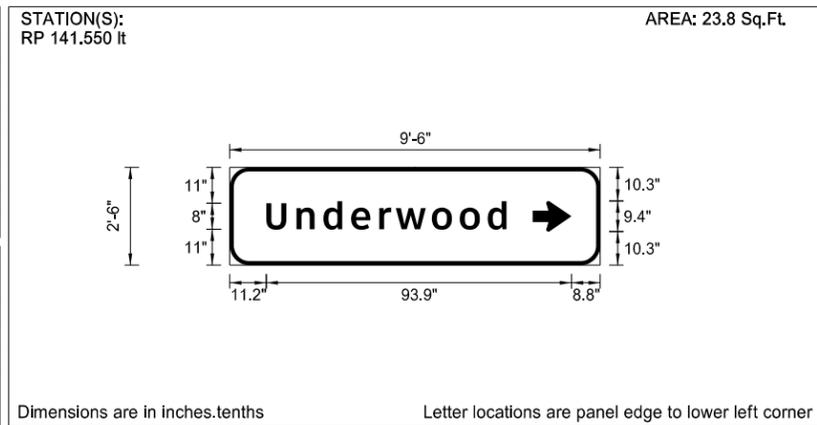
SIGN NUMBER	Sign 4				
WIDTH x HEIGHT	14'-0" x 5'-6"				
BORDER WIDTH	1.25" (inset 0")				
CORNER RADIUS	9"				
MOUNTING	Ground				
BACKGROUND	TYPE: IV Reflective COLOR: Blue / Brown				
LEGEND/BORDER	TYPE: IV Reflective COLOR: White				
SYMBOL	X	Y	WID	HT	ANGLE
ARDD	148.7	34	9.4	12	0
ARDD	148.7	8.6	9.4	12	0



Dimensions are in inches.tenths Letter locations are panel edge to lower left corner

LETTER POSITION (X)													LENGTH	SIZE	SERIES						
L	e	w	i	s	a	n	d	C	l	a	r	k	108.9	8/6.5	ClearviewHwy-5-W						
9.7	16.5	24.3	35.5	39.6	44.7	53.2	61.7	70	75.8	85	93.9	98.4	106.9	112.9							
I	n	t	e	r	p	r	e	t	i	v	e	C	e	n	t	e	r	131	8/6.5	ClearviewHwy-5-W	
9.7	14.4	22.2	28.2	36.8	42.8	51.3	57	64.8	71	74.8	82.6	88.5	97.4	106	114.6	122.4	128.4	137			
R	E	S	T	A	R	E	A												70.4	8	ClearviewHwy-5-W
9.7	18.5	25.6	33.3	39.1	47	56.8	65.6	72.5													

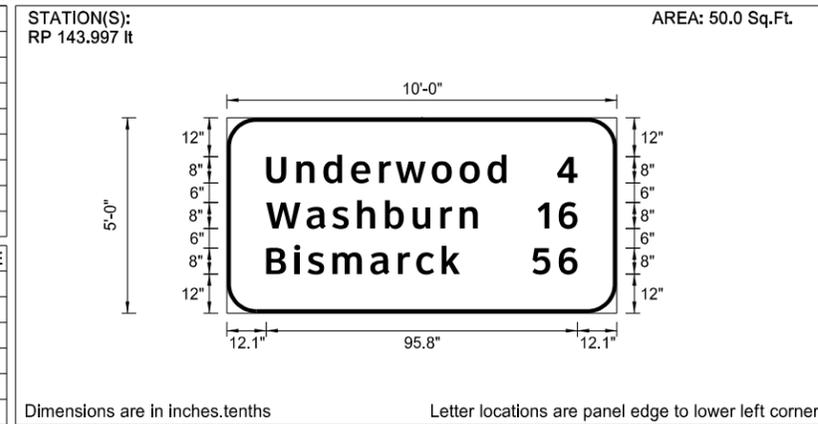
SIGN NUMBER	Sign 5				
WIDTH x HEIGHT	9'-6" x 2'-6"				
BORDER WIDTH	1.25" (inset 0")				
CORNER RADIUS	6"				
MOUNTING	Ground				
BACKGROUND	TYPE: IV Reflective COLOR: Green				
LEGEND/BORDER	TYPE: IV Reflective COLOR: White				
SYMBOL	X	Y	WID	HT	ANGLE
ARDD	93.2	10.3	9.4	12	0



Dimensions are in inches.tenths Letter locations are panel edge to lower left corner

LETTER POSITION (X)										LENGTH	SIZE	SERIES
U	n	d	e	r	w	o	o	d		73.9	8/6.5	ClearviewHwy-5-W
11.2	20.6	28.8	37.4	46	51.1	62.2	70.8	79.4				

SIGN NUMBER	Sign 6				
WIDTH x HEIGHT	10'-0" x 5'-0"				
BORDER WIDTH	1.25" (inset 0")				
CORNER RADIUS	9"				
MOUNTING	Ground				
BACKGROUND	TYPE: IV Reflective COLOR: Green				
LEGEND/BORDER	TYPE: IV Reflective COLOR: White				



Dimensions are in inches.tenths Letter locations are panel edge to lower left corner

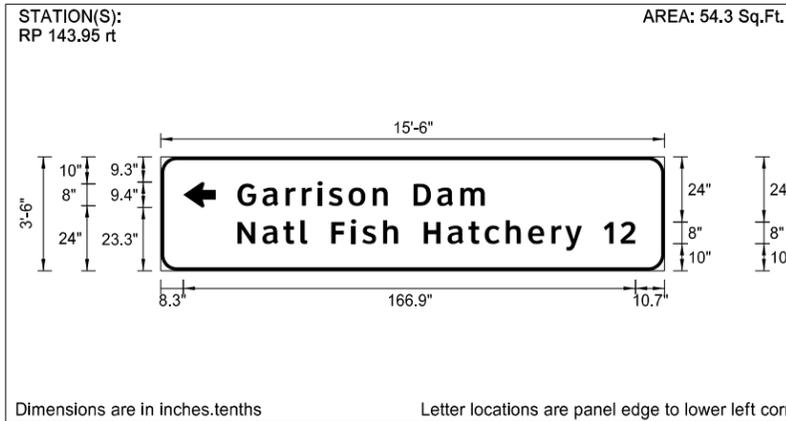
LETTER POSITION (X)													LENGTH	SIZE	SERIES
U	n	d	e	r	w	o	o	d					73.9	8/6.5	ClearviewHwy-5-W
12.1	21.4	29.7	38.2	46.8	52	63.1	71.6	80.2							
4													6.3	8	ClearviewHwy-5-W
101.6															
W	a	s	h	b	u	r	n						65.1	8/6.5	ClearviewHwy-5-W
12.1	24.5	32.4	40.1	48.7	57.2	65.7	71.7								
1	6												12.3	8	ClearviewHwy-5-W
95.6	102.1														
B	i	s	m	a	r	c	k						59.6	8/6.5	ClearviewHwy-5-W
12.1	20.7	24.8	32.5	44.1	52.6	58.3	66.1								
5	6												13.9	8	ClearviewHwy-5-W
94	102.1														

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Sign Details  
US 83 Southbound  
Washburn N to N Jct ND 200

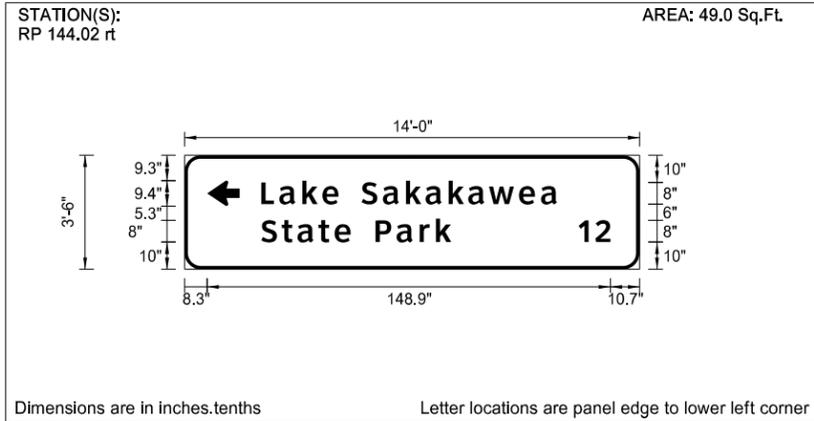


SIGN NUMBER	Sign 8
WIDTH x HEIGHT	15'-6" x 3'-6"
BORDER WIDTH	1.25" (inset 0")
CORNER RADIUS	6"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective COLOR: Green
LEGEND/BORDER	TYPE: IV Reflective COLOR: White
SYMBOL	X Y WID HT ANGLE
ARDD	8.3 23.3 9.4 12 180



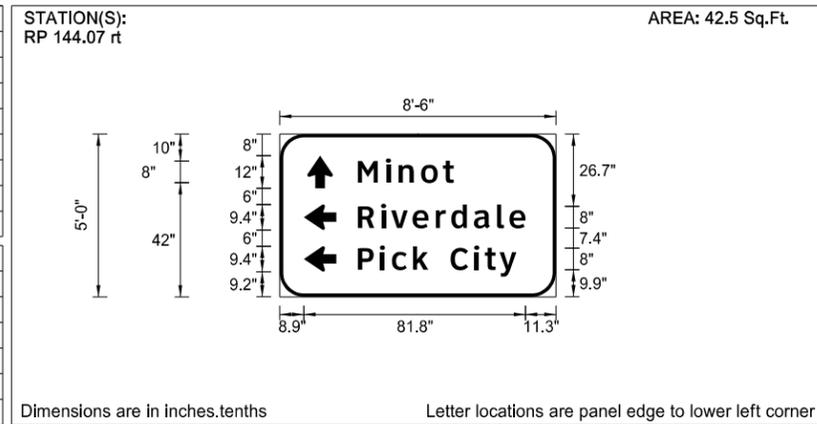
LETTER POSITION (X)													LENGTH	SIZE	SERIES						
G	a	r	r	i	s	o	n	D	a	m			91.3	8/6.5	ClearviewHwy-5-W						
28.3	37.6	46.1	52.1	57.9	62	69.4	78.3	83.8	93.3	102.1	110.6										
N	a	t	l	F	i	s	h	H	a	t	c	h	e	r	y						
28.3	37.6	45.2	51.6	54.1	63	70.3	74.4	82.1	87.6	97.2	105.9	113.6	119.6	127.4	135.7	144.3	149.3	127.3	8/6.5	ClearviewHwy-5-W	
1	2																		11.7	8	ClearviewHwy-5-W
163.6	169.8																				

SIGN NUMBER	Sign 9
WIDTH x HEIGHT	14'-0" x 3'-6"
BORDER WIDTH	1.25" (inset 0")
CORNER RADIUS	6"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective COLOR: Brown
LEGEND/BORDER	TYPE: IV Reflective COLOR: White
SYMBOL	X Y WID HT ANGLE
ARDD	8.3 23.3 9.4 12 180



LETTER POSITION (X)													LENGTH	SIZE	SERIES						
L	a	k	e	S	a	k	a	k	a	w	e	a	109.2	8/6.5	ClearviewHwy-5-W						
28.3	35	43.5	50.9	56.8	65.4	73.3	81.8	89	97.5	104.8	112.4	123.5	131.6								
S	t	a	t	e	P	a	r	k										70.2	8/6.5	ClearviewHwy-5-W	
28.3	35.9	41.7	49.4	55.4	61.3	70.5	78.4	86.8	92.8												
1	2																		11.7	8	ClearviewHwy-5-W
145.6	151.8																				

SIGN NUMBER	Sign 10
WIDTH x HEIGHT	8'-6" x 5'-0"
BORDER WIDTH	1.25" (inset 0")
CORNER RADIUS	9"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective COLOR: Green
LEGEND/BORDER	TYPE: IV Reflective COLOR: White



SYMBOL	X	Y	WID	HT	ANGLE
ARDD	10.2	40	9.4	12	90
ARDD	8.9	24.7	9.4	12	180
ARDD	8.9	9.3	9.4	12	180

LETTER POSITION (X)													LENGTH	SIZE	SERIES	
M	i	n	o	t									35.4	8/6.5	ClearviewHwy-5-W	
28.9	39.2	43.9	52.2	60.3												
R	i	v	e	r	d	a	l	e					61.8	8/6.5	ClearviewHwy-5-W	
28.9	37.4	41.2	49.1	57.7	63.3	71.7	80.2	84.8								
P	i	c	k	C	i	t	y						58.5	8/6.5	ClearviewHwy-5-W	
28.9	37	41.4	49.2	54.8	63.1	71.8	75.8	81.2								

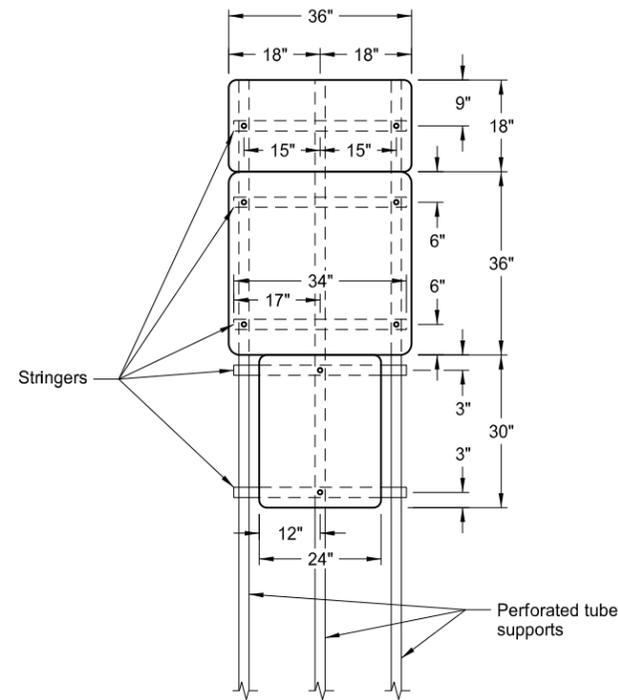
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Sign Details  
US 83 Northbound  
Washburn N to N Jct ND 200

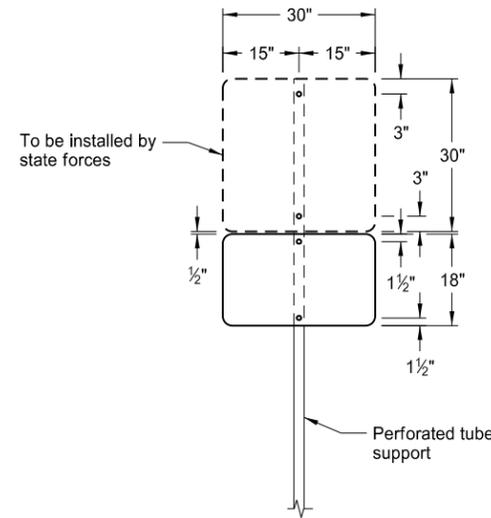


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	110	18

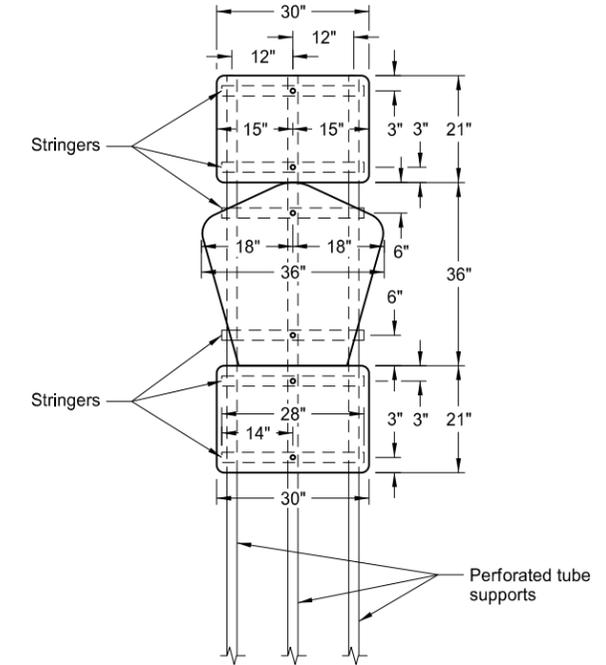
NH-SHE-1-083(106)128



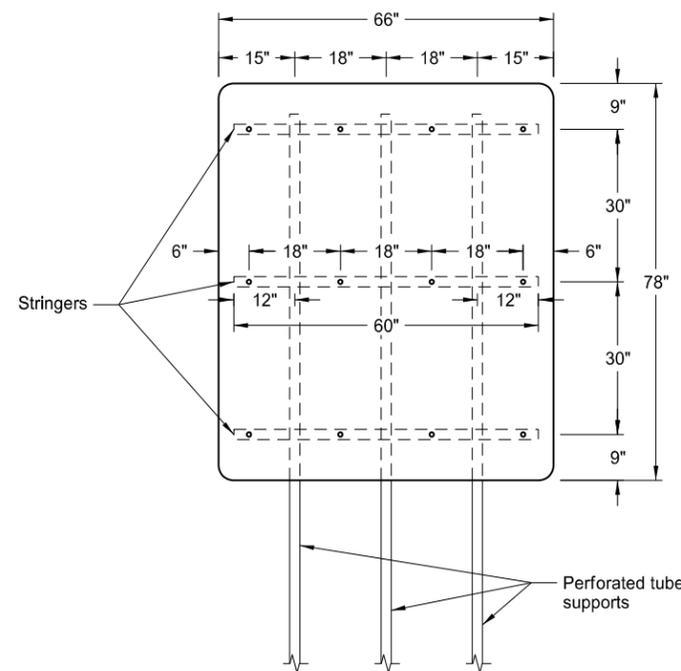
**Special Assembly A**  
 RP 128.083 rt  
 Pay Area: 18.5 SF



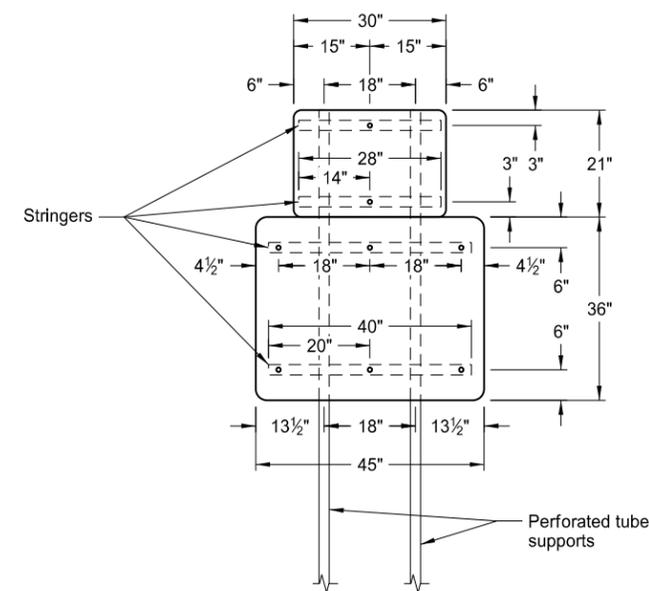
**Special Assembly B**  
 RP 129.074 lt  
 RP 132.003 rt  
 Pay Area: 3.8 SF



**Special Assembly C**  
 RP 132.811 rt    RP 132.953 lt  
 RP 133.952 rt    RP 134.122 lt  
 RP 134.979 rt    RP 135.144 lt  
 RP 137.058 rt    RP 137.290 lt  
 Pay Area: 17.8 SF



**Special Assembly D**  
 RP 139.468 rt  
 Pay Area: 35.8 SF



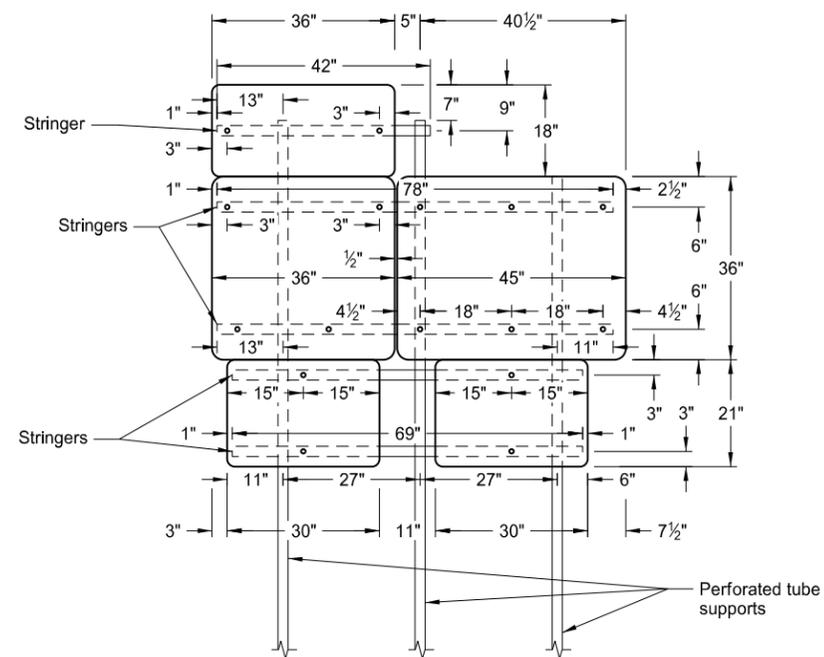
**Special Assembly E**  
 RP 140.027 rt  
 Pay Area: 15.6 SF

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Special Assembly Details  
 Perforated Tube  
 US 83 Northbound and Southbound  
 Washburn N to N Jct ND 200

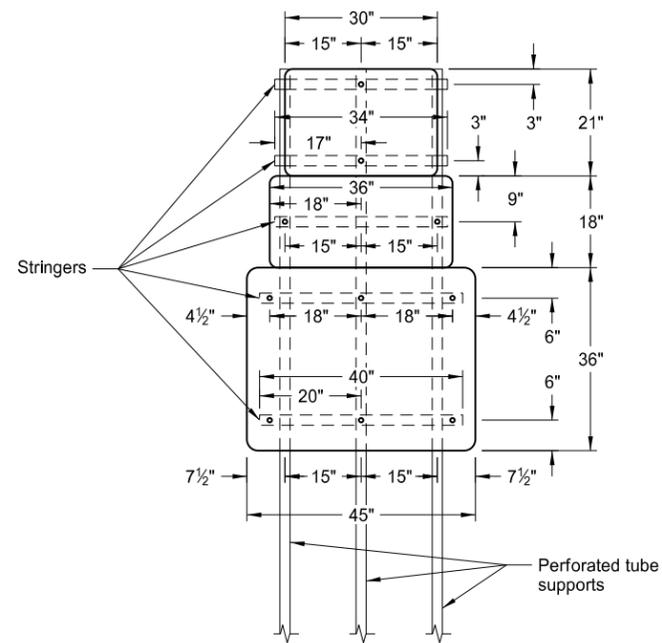
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-SHE-1-083(104)128	110	19

NH-SHE-1-083(106)128

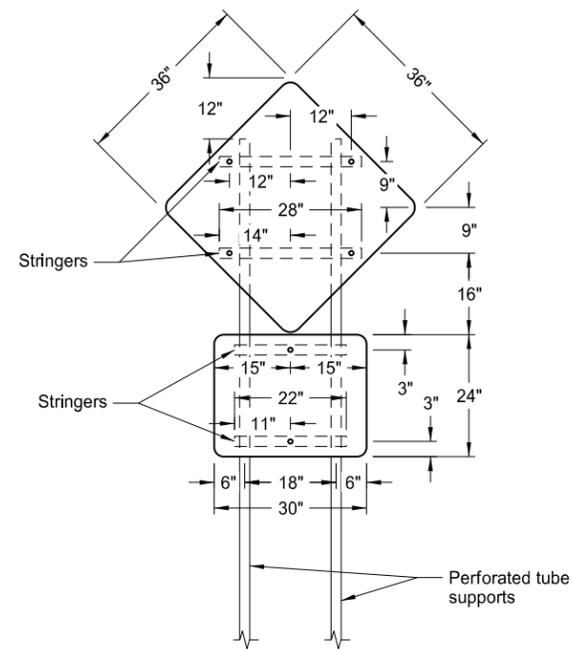


	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-SHE-1-083(104)128	110	20

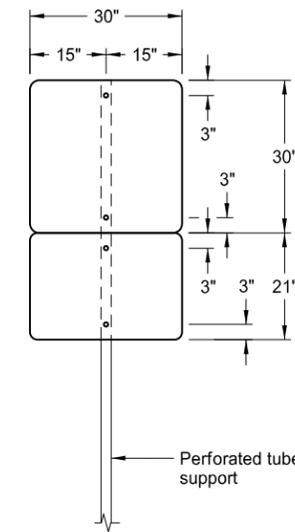
NH-SHE-1-083(106)128



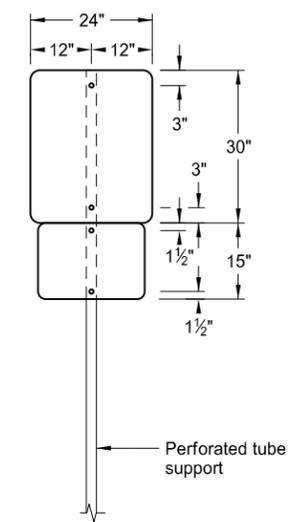
Special Assembly L  
RP 128.154 lt  
Pay Area: 20.1 SF



Special Assembly M  
RP 131.323 lt  
Pay Area: 14.0 SF



Special Assembly N  
RP 132.983 lt  
Pay Area: 10.6 SF

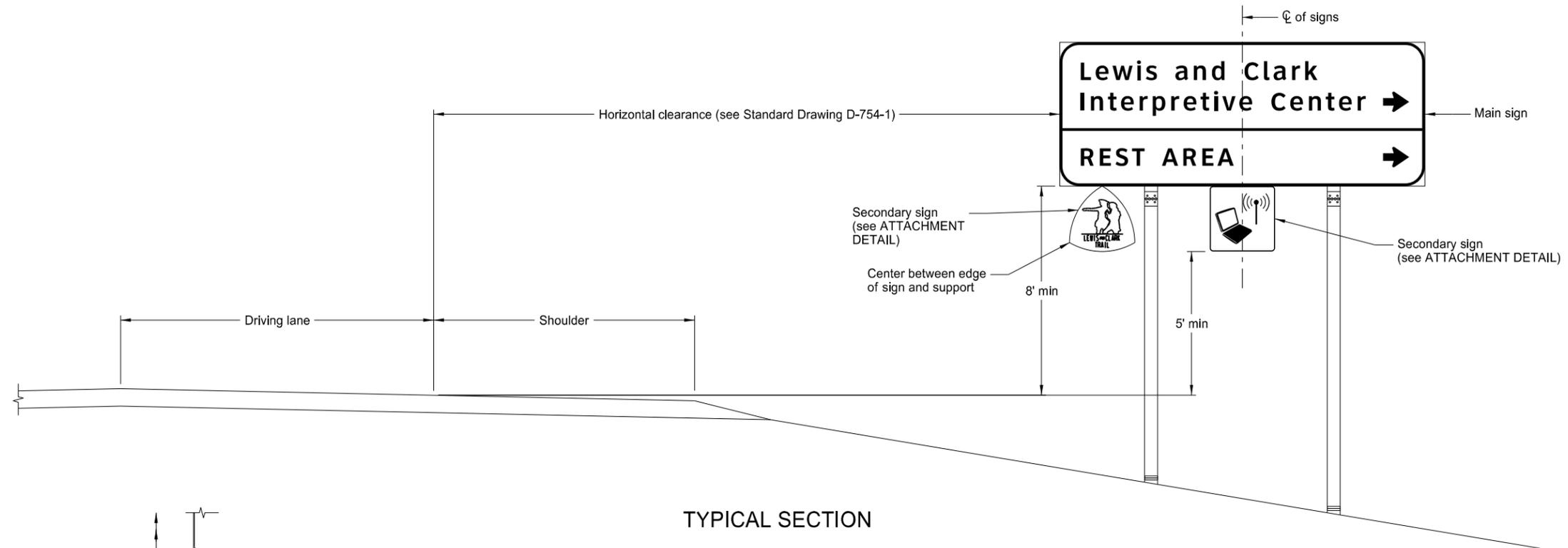


Special Assembly O  
RP 144.11 rt  
Pay Area: 7.19 SF

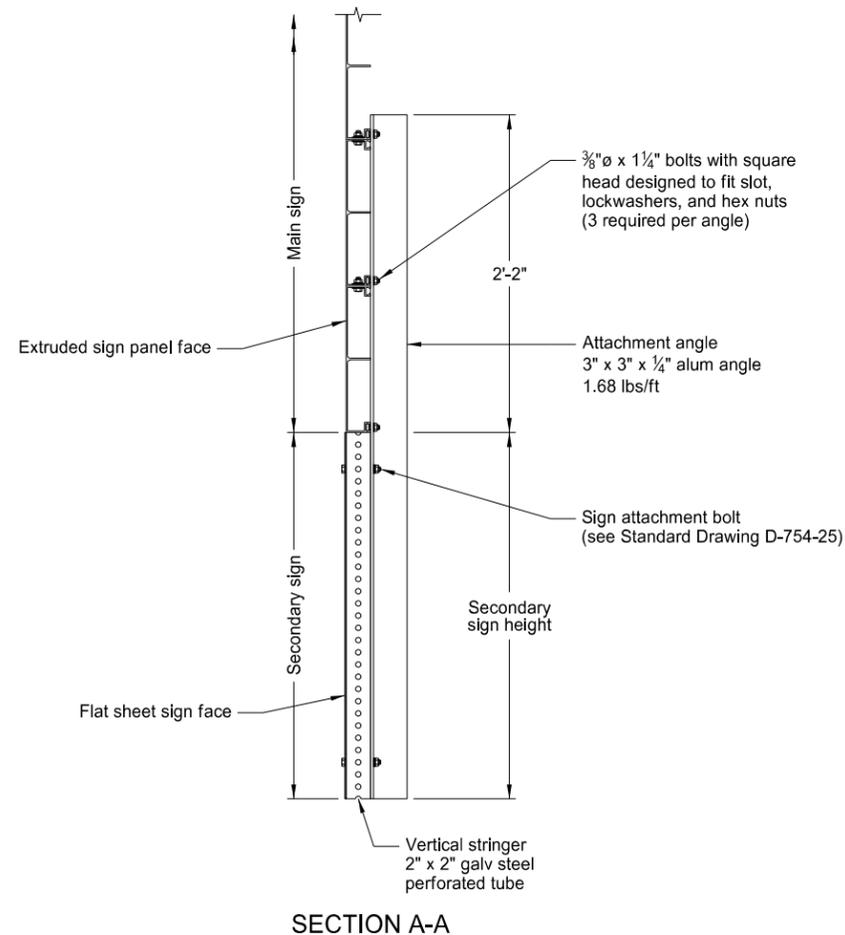
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Special Assembly Details  
Perforated Tube  
US 83 Northbound and Southbound  
Washburn N to N Jct ND 200

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-SHE-1-083(106)128	110	21

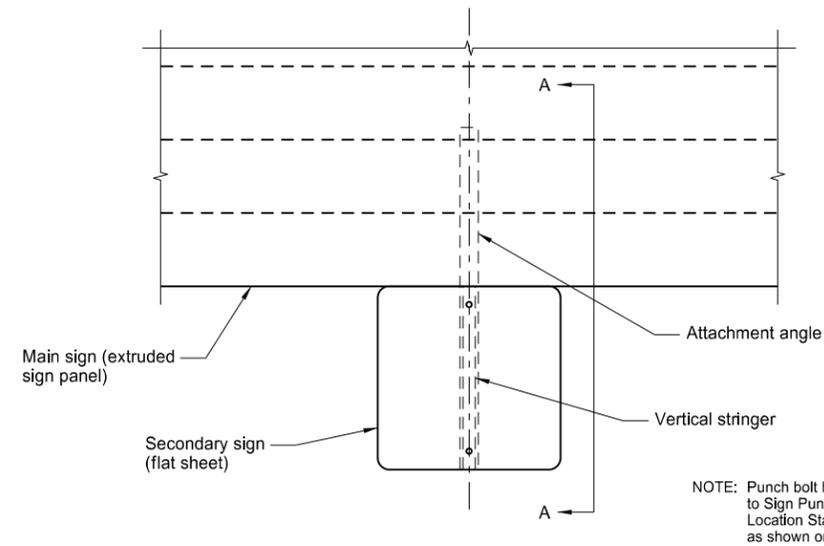


TYPICAL SECTION



SECTION A-A

ATTACHMENT DETAIL



ELEVATION VIEW

NOTE: Punch bolt holes in flat sheet sign according to Sign Punching, Stringer and Support Location Standard Drawings using sign size as shown on the Sign Layout sheets.

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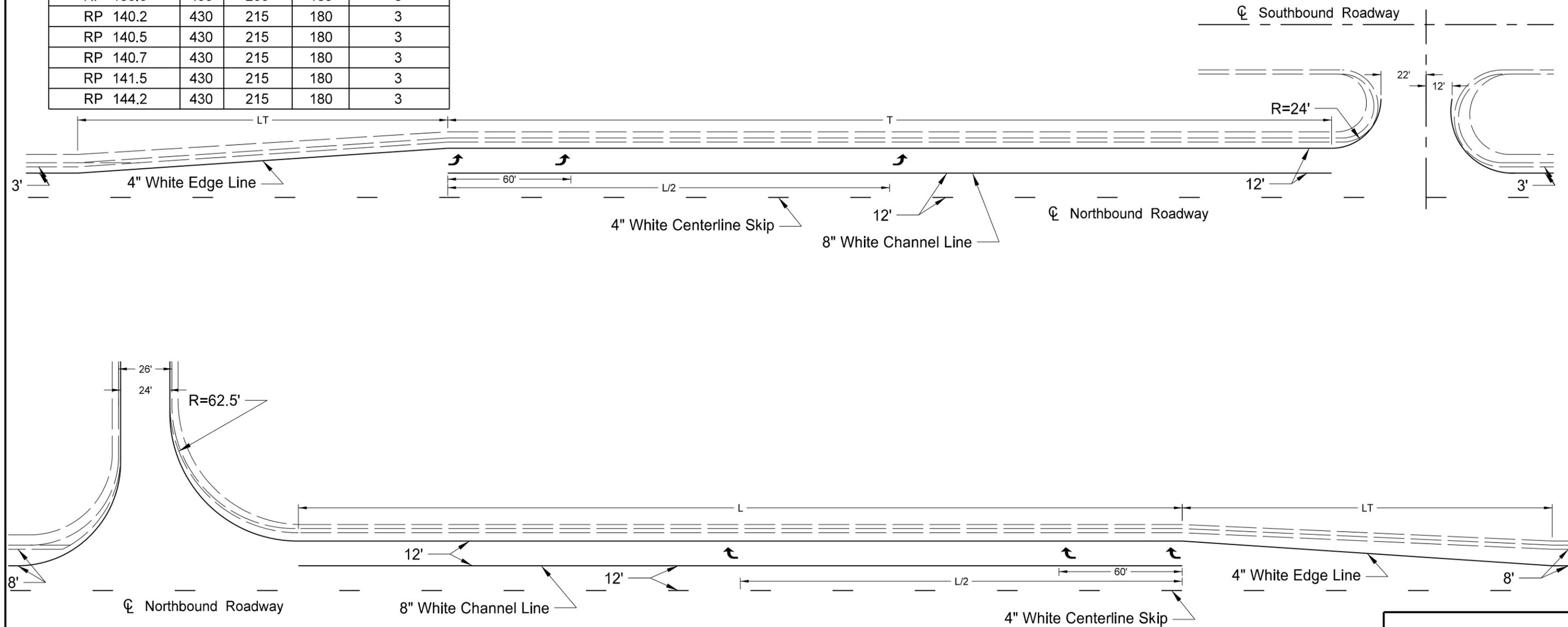
Sign Details  
Secondary Sign Attachment Detail

US 83 Southbound

Washburn N to N Jct ND 200

Left Turn Lanes	L (ft)	L/2 (ft)	LT (ft)	Lt Turn Arrow
RP 128.0	300	150	240	3
RP 132.9	430	215	180	3
RP 133.4	430	215	180	3
RP 134.0	425	212	235	3
RP 136.0	400	200	185	3
RP 140.2	430	215	180	3
RP 140.5	430	215	180	3
RP 140.7	430	215	180	3
RP 141.5	430	215	180	3
RP 144.2	430	215	180	3

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	120	1



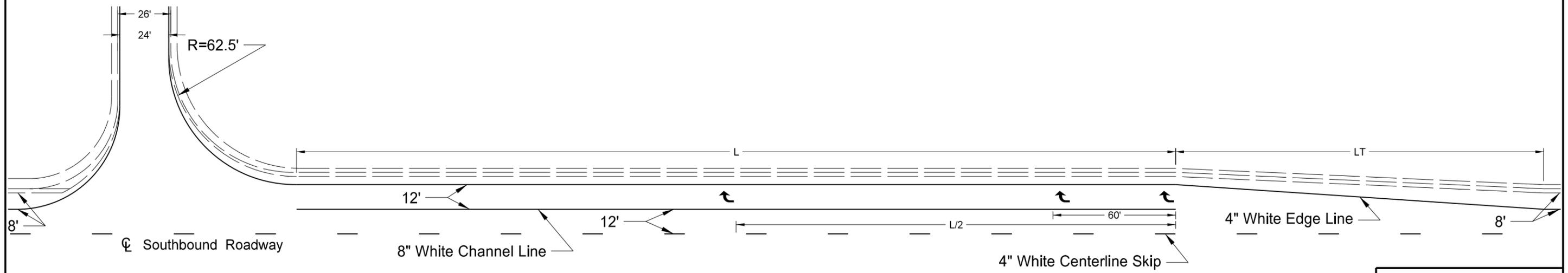
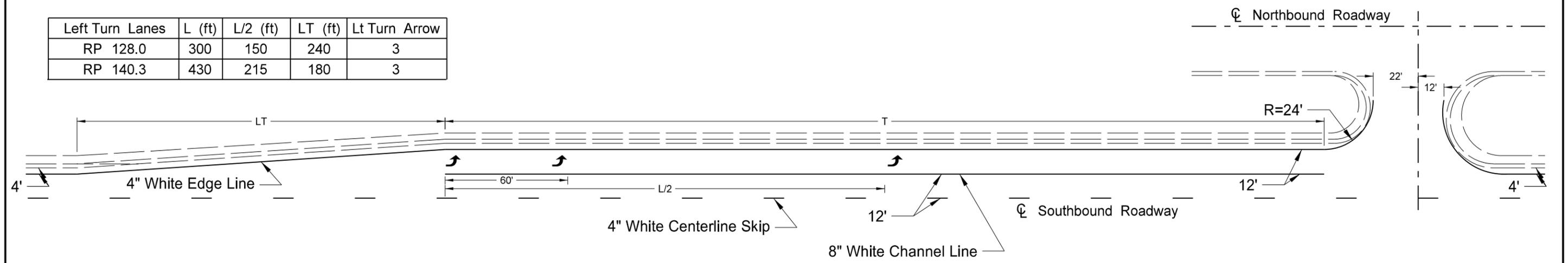
Right Turn Lanes	L (ft)	L/2 (ft)	LT (ft)	Rt Turn Arrow
RP 128.0	300	150	180	3
RP 140.2	430	215	180	3
RP 144.0	430	215	180	3

Left and Right Turn Lane Pavement Marking Details

Hot Bituminous Overlay and Turn Lanes

Washburn N to N Jct ND 200 - NB

Left Turn Lanes	L (ft)	L/2 (ft)	LT (ft)	Lt Turn Arrow
RP 128.0	300	150	240	3
RP 140.3	430	215	180	3



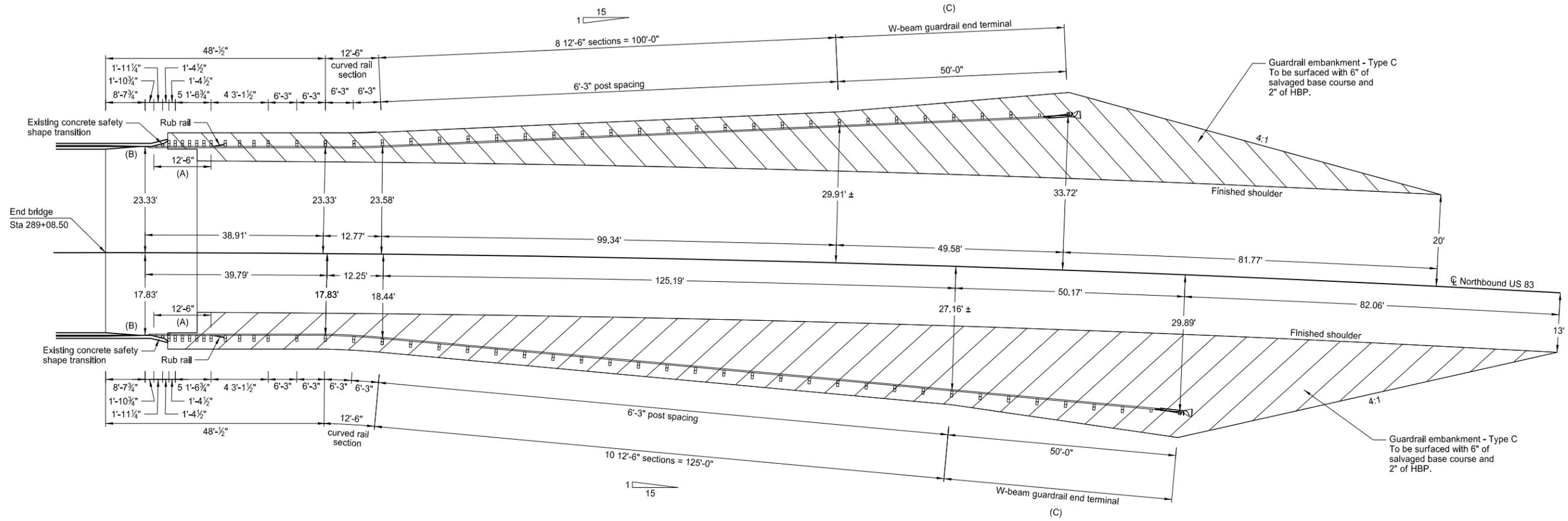
Right Turn Lanes	L (ft)	L/2 (ft)	LT (ft)	Rt Turn Arrow
RP 128.0	300	150	115	3
RP 132.9	430	215	180	3
RP 134.0	400	200	235	3
RP 136.1	500	250	260	3
RP 140.3	430	215	180	3
RP 141.5	430	215	180	3
RP 144.2	430	215	180	3

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Right Turn Lane Pavement Marking Details  
Hot Bituminous Overlay and Turn Lanes  
Washburn N to N Jct ND 200 - SB

23 USC § 409 Documents  
 NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	130	1



This document was originally issued and sealed by Douglas A. Schumaker, Registration Number PE- 5047, on 1/15/14 and the original document is stored at the North Dakota Department of Transportation

- (A) 12'-6" double rail section.
- (B) Installation of the guardrail onto the existing safety shape transition requires drilling new bolt holes through the concrete. See Standard D-764-11.
- (C) The W-beam guardrail end terminal to be installed at this location shall be either a FLEAT or a Slotted Rail Terminal.

W-Beam Guardrail Layout  
 Falkirk Mine Separation  
 RP 137.410  
 Northbound Roadway  
 US 83

W-BEAM GUARDRAIL SUMMARY OF QUANTITIES

W-BEAM GUARDRAIL AT BRIDGE ENDS WITH EXISTING SAFETY SHAPE TRANSITION

LOCATION	(A) TERMINAL CONNEC- TOR	(A) 6" ID STD PIPE 12" LONG	(A) 5/8" Ø x 2" LONG GUARD- RAIL BOLT	(A) 7/8" Ø x 10" LONG HEX HEAD BOLT	(A) 5/8" Ø x 18" LONG GUARD- RAIL BOLT	(A) 6"x 8" x 14" WOOD OFF- SET BLOCK	(A) 6"x 8" x 6" TIMBER POST	(A) 5/8" Ø x 1 1/4" LONG GUARD- RAIL BOLT	(A) 12'-6" DOUBLE RAIL SECTION	(A) 12'-6" STRAIGHT RAIL SECTION	(A) 12'-6" CURVED RAIL SECTION	(A) 5/8" Ø x 12" LONG GUARD- RAIL BOLT	(A) 6" x 8" x 7'-0" TIMBER POSTS	(A) 6" x 8" x 23" WOOD OFFSET BLOCK	(A) 5'-2 1/16" RUBRAIL SECTION	(A) 12'-6 5/16" RUBRAIL SECTION	(A) 5/8" Ø x 1 1/2" LONG HEX HEAD BOLT	(A) 5/8" Ø x 20" LONG GUARD- RAIL BOLT	(A) REFL- ECTOR- IZED PLATES	(B) EMBANK- MENT - TYPE C	(A) 7" x 7" x 1/2" RUBRAIL ANCHOR PLATE	(A) 7 3/4" x 4 1/2" x 3/8" RUBRAIL SPLICE PLATE	(A) 12" x 12 1/2" x 5/8" PLATE
	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	CY	EACH	EACH	EACH
Sta 289+17.15 to 289+69.19 Lt Mdn Sta 289+17.15 to 290+68.17 Lt	1 1	1 1	1 1	7 7	15 31	8 24	11 27	40 104	1 1	2 10	1 1	1 1	4 4	7 7	1 1	1 1	4 4	7 7	11 10	555 170	1 1	1 1	1 1
<b>TOTAL</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>14</b>	<b>46</b>	<b>32</b>	<b>38</b>	<b>144</b>	<b>2</b>	<b>12</b>	<b>2</b>	<b>2</b>	<b>8</b>	<b>14</b>	<b>2</b>	<b>2</b>	<b>8</b>	<b>14</b>	<b>21</b>	<b>725</b>	<b>2</b>	<b>2</b>	<b>2</b>

W-beam guardrail

Sta 289+17.15 to 289+69.19 Lt Mdn	51.9	LF
Sta 289+17.15 to 290+68.17 Lt	152	LF
<b>Total</b>	<b>204</b>	<b>LF</b>

Guardrail embankment - type C

Sta 289+17.15 to 292+25.06 Lt Mdn	1	ea
Sta 289+17.15 to 292+01.07 Lt	1	ea
<b>Total</b>	<b>2</b>	<b>ea</b>

(A) These items are not to be bid separately but shall be included in the price bid for the item "W-Beam Guardrail".

Reset W-beam guardrail

Sta 289+69.19 to 290+94.38 Lt MDn	125	LF
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W-beam guardrail end terminal

Sta 290+94.38 to 291+44.55 Lt Mdn	1	ea
Sta 290+68.17 to 291+17.75 Lt	1	ea
<b>Total</b>	<b>2</b>	<b>ea</b>

(B) The volume of embankment - type C (cubic yards) is for informational purposes only.

Remove W-beam guardrail & posts

Sta 289+16.00 to 289+67.90 Lt Mdn	51.9	LF
Sta 289+16.00 to 290+55.13 Lt	139	LF
<b>Total</b>	<b>191</b>	<b>LF</b>

Remove end treatment & transition

Sta 289+67.90 to 290+05.12 Lt Mdn	1	ea
Sta 290+55.13 to 290+91.93 Lt	1	ea
<b>Total</b>	<b>2</b>	<b>ea</b>

Remove 3-Cable guardrail

Sta 289+54.15 to 292+24.90 Lt Mdn	271	LF
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**W-Beam Guardrail Quantities**  
Falkirk Mine Separation  
RP 137.410  
Northbound Roadway  
US 83



23 USC § 409 Documents  
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(106)128	130	4

W-BEAM GUARDRAIL SUMMARY OF QUANTITIES

W-BEAM GUARDRAIL AT BRIDGE ENDS WITH EXISTING SAFETY SHAPE TRANSITION

LOCATION	(A) TERMINAL CONNEC- TOR	(A) 6" ID STD PIPE 12" LONG	(A) 5/8" Ø x 2" LONG GUARD- RAIL BOLT	(A) 7/8"Ø x 10" LONG HEX HEAD BOLT	(A) 5/8" Ø x 18" LONG GUARD- RAIL BOLT	(A) 6"x 8" x 14" WOOD OFF- SET BLOCK	(A) 6"x 8" x 6" TIMBER POST	(A) 5/8" Ø x 1 1/4" LONG GUARD- RAIL BOLT	(A) 12'-6" DOUBLE RAIL SECTION	(A) 12'-6" STRAIGHT RAIL SECTION	(A) 12'-6" CURVED RAIL SECTION	(A) 5/8" Ø x 12" LONG GUARD- RAIL BOLT	(A) 6" x 8" x 7'-0" TIMBER POSTS	(A) 6" x 8" x 23" WOOD OFFSET BLOCK	(A) 5'-2 1/16" RUBRAIL SECTION	(A) 12'-6 5/16" RUBRAIL SECTION	(A) 5/8" Ø x 1 1/2" LONG HEX HEAD BOLT	(A) 5/8" Ø x 20" LONG GUARD- RAIL BOLT	(A) REFL- ECTOR- IZED PLATES	(B) EMBANK- MENT - TYPE C	(A) 7" x 7" x 1/2" RUBRAIL ANCHOR PLATE	(A) 7 3/4" x 4 1/2" x 3/8" RUBRAIL SPLICE PLATE	(A) 12" x 12 1/2" x 5/8" PLATE
	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	CY	EACH	EACH	EACH
Sta 283+65.48 to 284+68.15 Rt Sta 283+78.87 to 284+68.15 Rt Mdn	1 1	1 1	1 1	7 7	23 21	16 14	19 17	72 64	1 1	6 5	1 1	1 1	4 4	7 7	1 1	1 1	4 4	7 7	10 10	170 555	1 1	1 1	1 1
<b>TOTAL</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>14</b>	<b>44</b>	<b>30</b>	<b>36</b>	<b>136</b>	<b>2</b>	<b>11</b>	<b>2</b>	<b>2</b>	<b>8</b>	<b>14</b>	<b>2</b>	<b>2</b>	<b>8</b>	<b>14</b>	<b>20</b>	<b>725</b>	<b>2</b>	<b>2</b>	<b>2</b>

W-beam guardrail

Sta 283+65.48 to 284+68.15 Rt	102	LF
Sta 283+78.87 to 284+68.15 Rt Mdn	89.4	LF
<b>Total</b>	<b>191</b>	<b>LF</b>

Guardrail embankment - type C

Sta 281+94.39 to 284+68.15 Rt	1	ea
Sta 281+62.70 to 284+68.15 Rt Mdn	1	ea
<b>Total</b>	<b>2</b>	<b>ea</b>

(A) These items are not to be bid separately but shall be included in the price bid for the item "W-Beam Guardrail".

Reset W-beam guardrail

Sta 283+14.91 to 283+65.48 Rt	50	LF
Sta 283+03.72 to 283+78.87 Rt Mdn	75	LF
<b>Total</b>	<b>125</b>	<b>LF</b>

W-beam guardrail end terminal

Sta 282+64.77 to 283+14.91 Rt	1	ea
Sta 282+54.06 to 283+03.72 Rt Mdn	1	ea
<b>Total</b>	<b>2</b>	<b>ea</b>

(B) The volume of embankment - type C (cubic yards) is for informational purposes only.

Remove W-beam guardrail & posts

Sta 283+30.17 to 284+69.30 Rt	139	LF
Sta 284+17.40 to 284+69.30 Rt Mdn	51.9	LF
<b>Total</b>	<b>191</b>	<b>LF</b>

Remove end treatment & transition

Sta 282+93.37 to 283+30.17 Rt	1	ea
Sta 283+80.18 to 284+17.40 Rt Mdn	1	ea
<b>Total</b>	<b>2</b>	<b>ea</b>

Remove 3-Cable guardrail

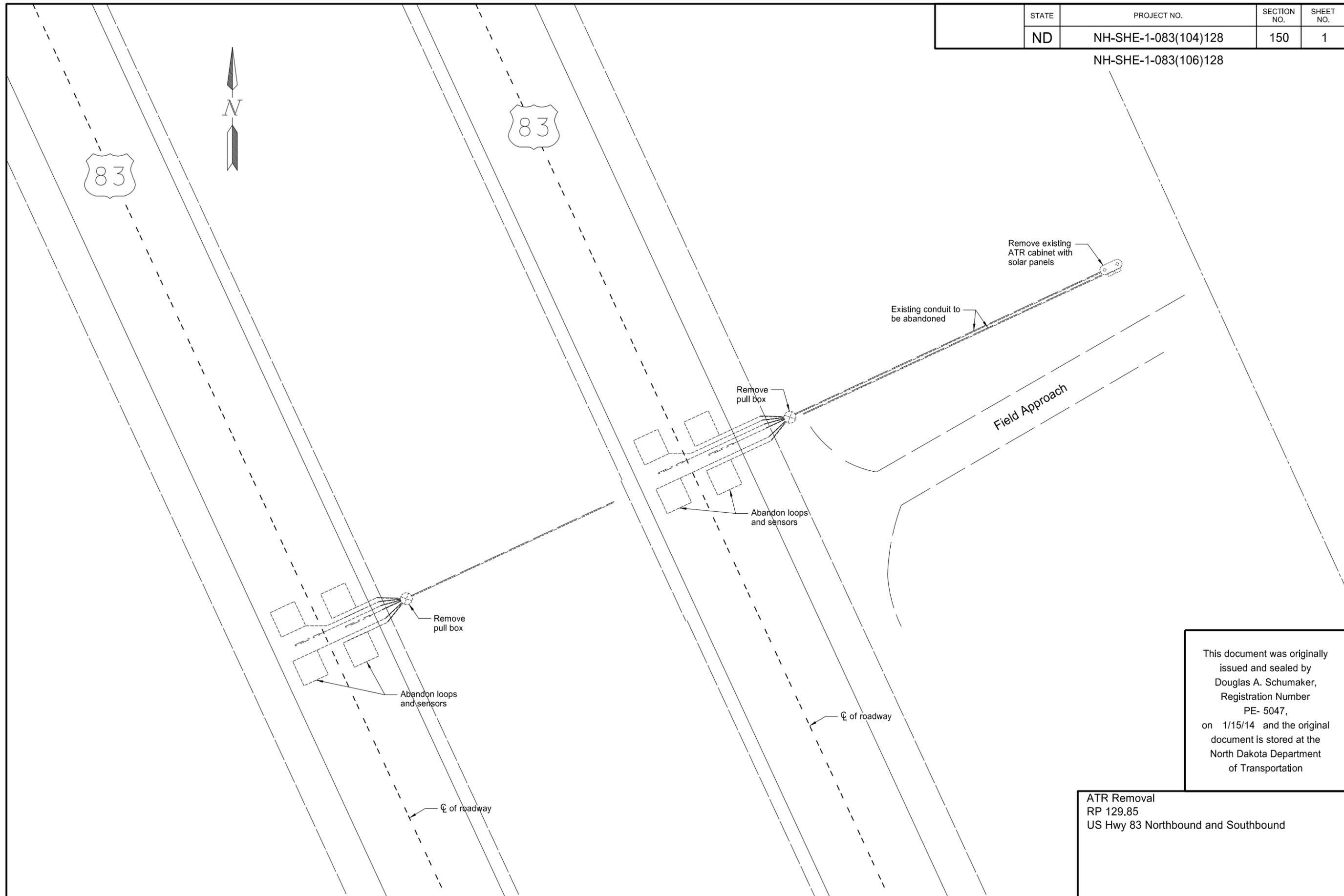
Sta 281+85.40 to 284+31.15 Rt Mdn	246	LF
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**W-Beam Guardrail Quantities**  
Falkirk Mine Separation  
RP 137.410  
Southbound Roadway  
US 83

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	150	1

NH-SHE-1-083(106)128



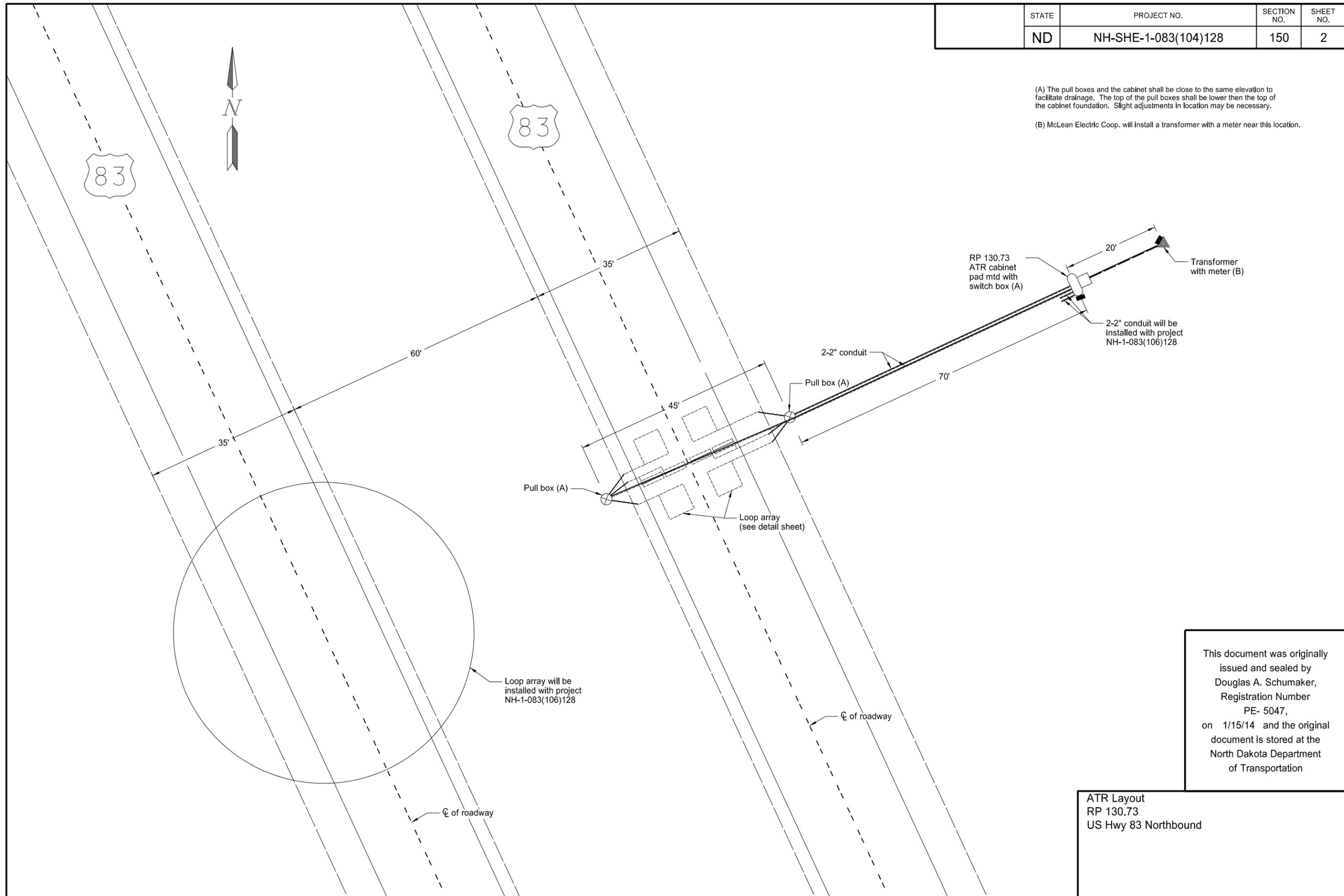
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ATR Removal  
 RP 129.85  
 US Hwy 83 Northbound and Southbound

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	150	2

(A) The pull boxes and the cabinet shall be close to the same elevation to facilitate drainage. The top of the pull boxes shall be lower than the top of the cabinet foundation. Slight adjustments in location may be necessary.

(B) McLean Electric Coop. will install a transformer with a meter near this location.



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ATR Layout  
 RP 130.73  
 US Hwy 83 Northbound

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-SHE-1-083(104)128	150	3

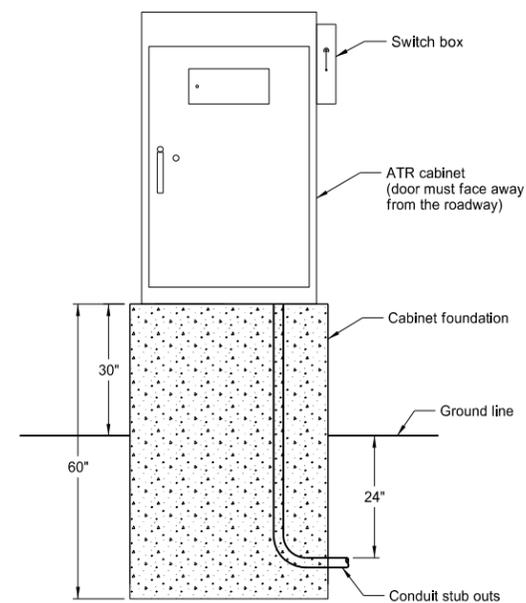
Quantities (A)		
Pull Box (Polymer Concrete)	EA	2
Underground Conductor No 4 Type RHW (B)	LF	120
Underground Conductor No 6 Type THW (B)	LF	60
Shielded Twisted Pair Loop Lead-In Wire 14 AWG XHHW	LF	860
Conductor Loop Wire 14 AWG XHHW (C)	LF	1000
Saw Slot and Sealant for Loops	LF	193
3/4 Inch Diameter Rigid HDPE Conduit	LF	42
2 Inch Diameter Rigid HDPE Conduit (D)	LF	289
NEMA Type 3R Ground Mounted Cabinet with Switch Box	EA	1
Concrete ATR Cabinet Foundation with working slab	EA	1
4G Cellular Modem with all necessary cabling including ethernet and power cables	EA	1
PEEK Traffic Recorder ADR 6000 with all necessary cabling	EA	1
6 Unit Power Strip	EA	1
Surge Protector	EA	1
Vehicle Classification and Testing	EA	1
30 Day Monitoring Period	EA	1
PEEK Representative	EA	1
Remove existing ATR cabinet and foundation, solar panels, electronic equipment, and pull box	EA	1
Automatic Traffic Recorder System	EA	0.6

(A) These quantities shall be included in the price bid for the item "Automatic Traffic Recorder System".

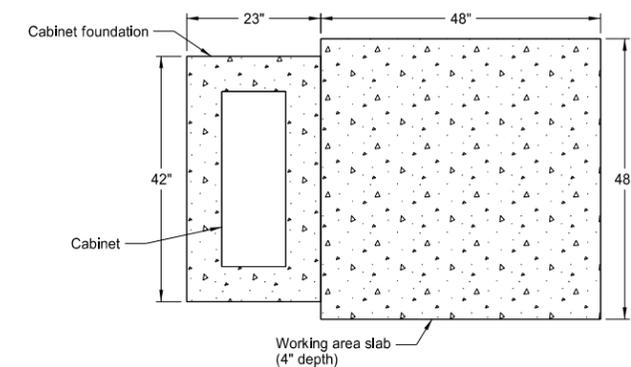
(B) 2 No 4 and 1 No 6 conductors are provided to extend from the ATR cabinet to the transformer. The service connection will be provided by McLean Electric Coop.

(C) The Entrance and Exit loops shall be 6'x6' with 4 turns of conductor per loop. The Inner Axle loops shall be 1.5'x5' Quadrapol with 3 turns of conductor.

(D) An extra 20 ft of conduit stub out is provided for future use. Both ends shall be capped.



ATR Recorder Cabinet with Concrete Foundation



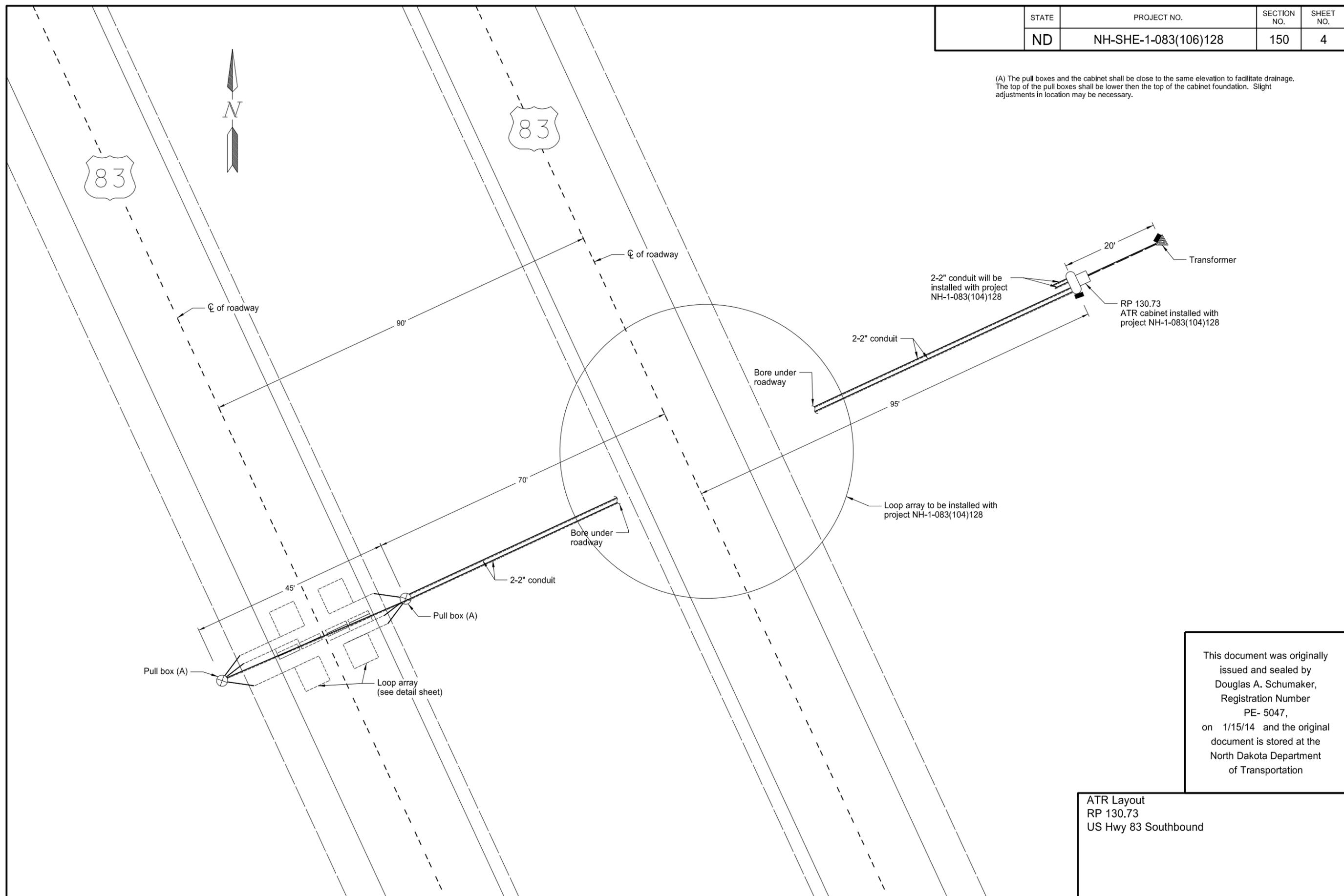
Cabinet Foundation and Working Slab

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ATR Details  
RP 130.73  
US Hwy 83 Northbound

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(106)128	150	4

(A) The pull boxes and the cabinet shall be close to the same elevation to facilitate drainage. The top of the pull boxes shall be lower than the top of the cabinet foundation. Slight adjustments in location may be necessary.



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ATR Layout  
 RP 130.73  
 US Hwy 83 Southbound

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-SHE-1-083(106)128	150	5

Quantities (A)		
Pull Box (Polymer Concrete)	EA	2
Shielded Twisted Pair Loop Lead-In Wire 14 AWG XHHW	LF	1620
Conductor Loop Wire 14 AWG XHHW (B)	LF	1000
Saw Slot and Sealant for Loops	LF	193
3/4 Inch Diameter Rigid HDPE Conduit	LF	42
2 Inch Diameter Rigid HDPE Conduit	LF	400
Remove pull box	EA	1

Automatic Traffic Recorder System	EA	0.4
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(A) These quantities shall be included in the price bid for the item "Automatic Traffic Recorder System".

(B) The Entrance and Exit loops shall be 6'x6' with 4 turns of conductor per loop.  
The Inner Axle loops shall be 1.5'x5' Quadrapol with 3 turns of conductor.

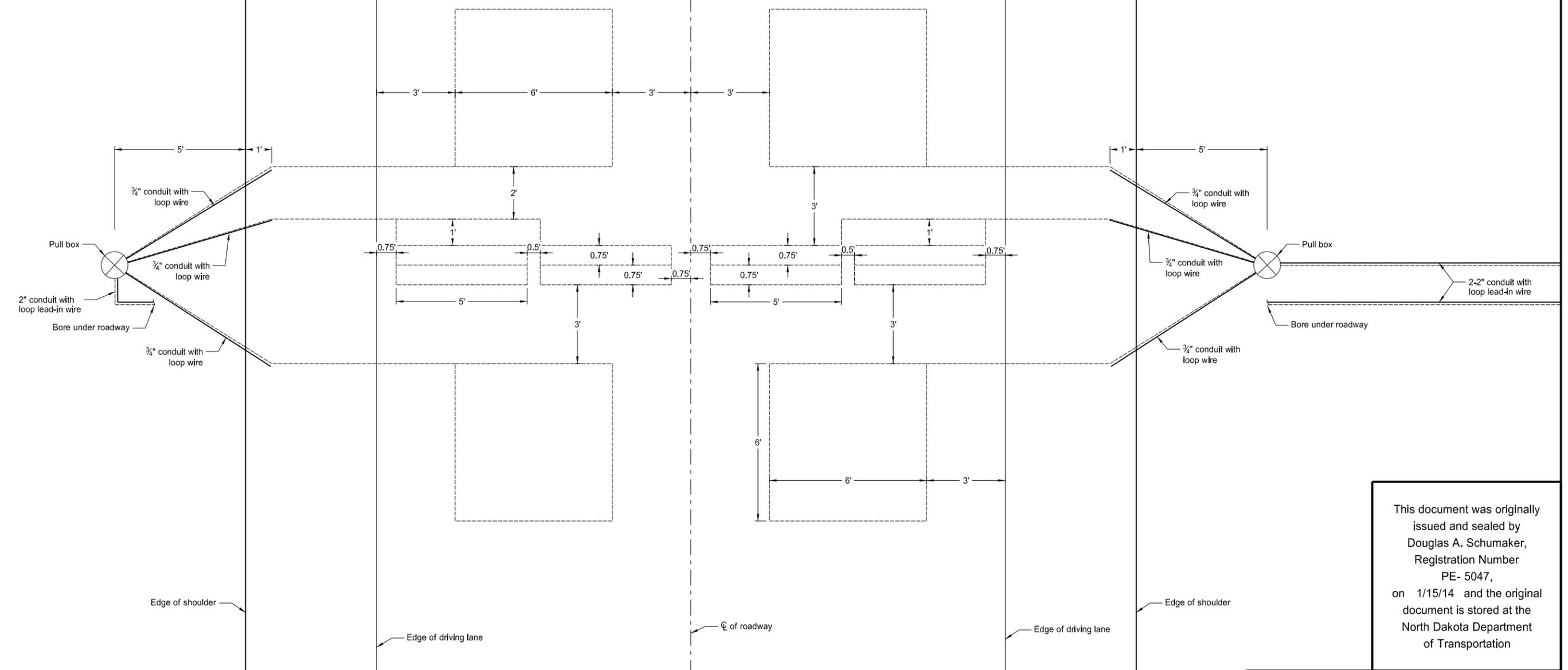
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ATR Details  
RP 130.73  
US Hwy 83 Southbound

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	150	6

NH-SHE-1-083(106)128

Note: This detail shall be used for both northbound and southbound roadways.



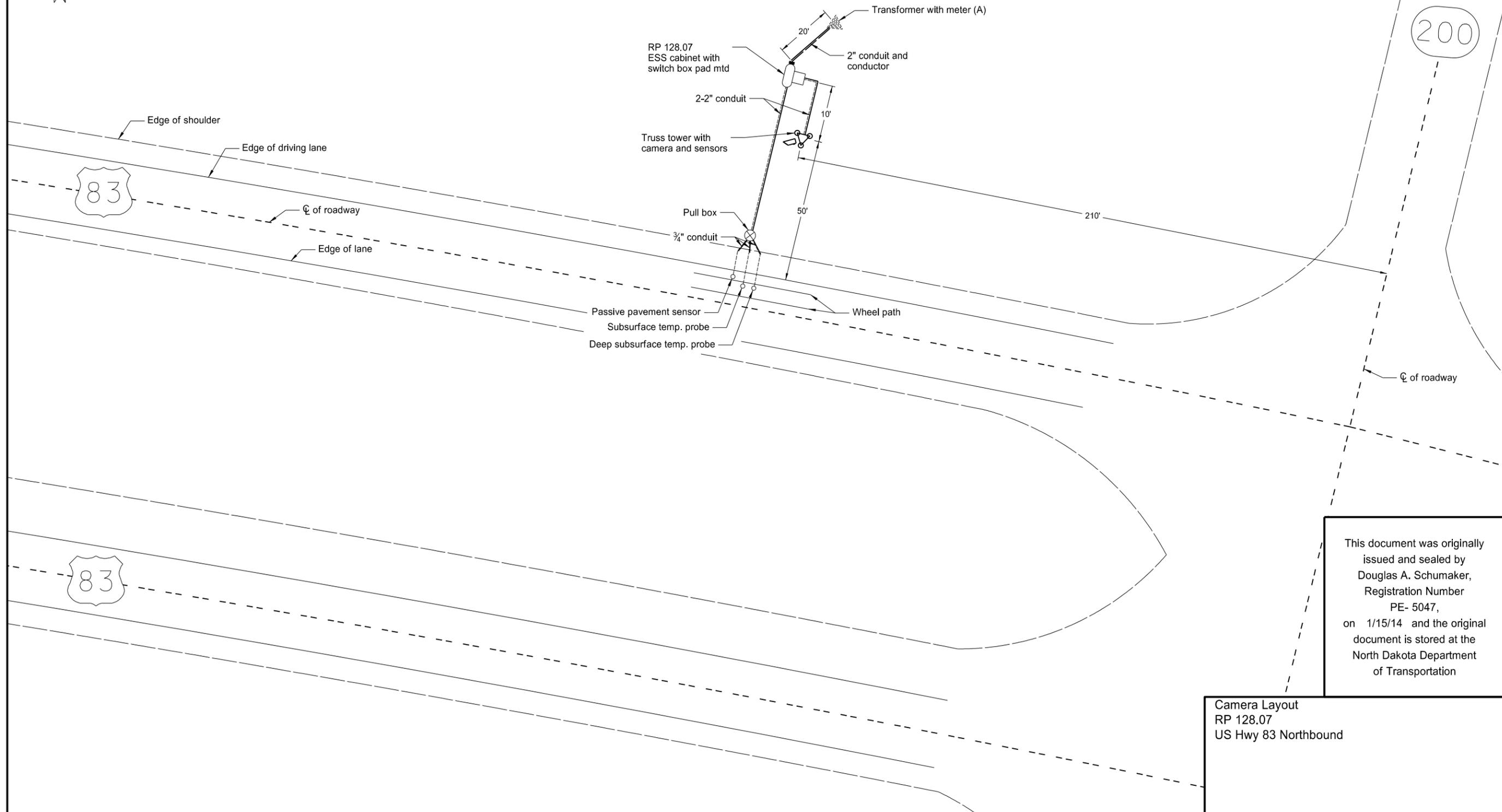
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ATR Details  
 RP 130.73  
 US Hwy 83 Northbound and Southbound

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	150	7



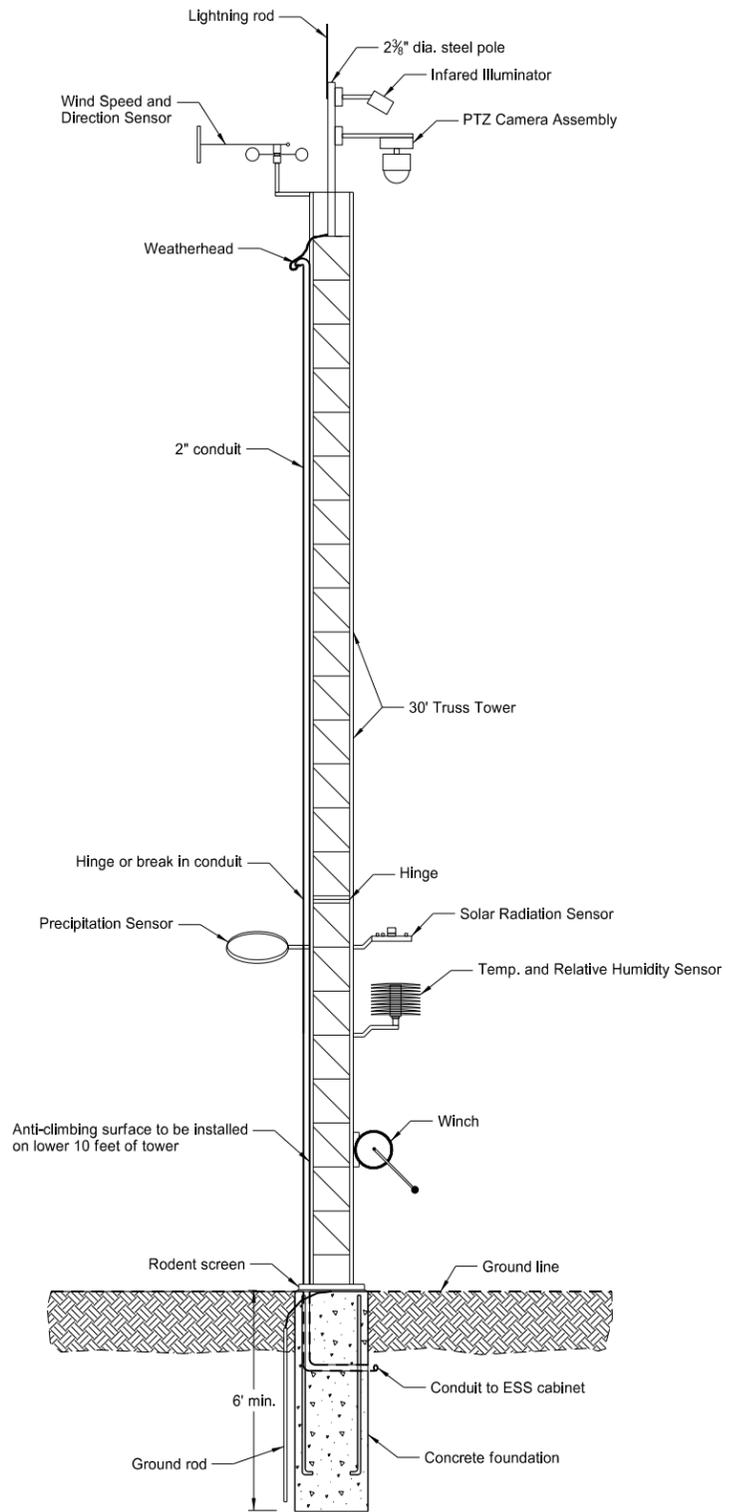
(A) McLean Electric Coop. will install a transformer with a meter near this location. 50 ft of conduit and conductor is provided to extend from the ESS cabinet to the transformer.



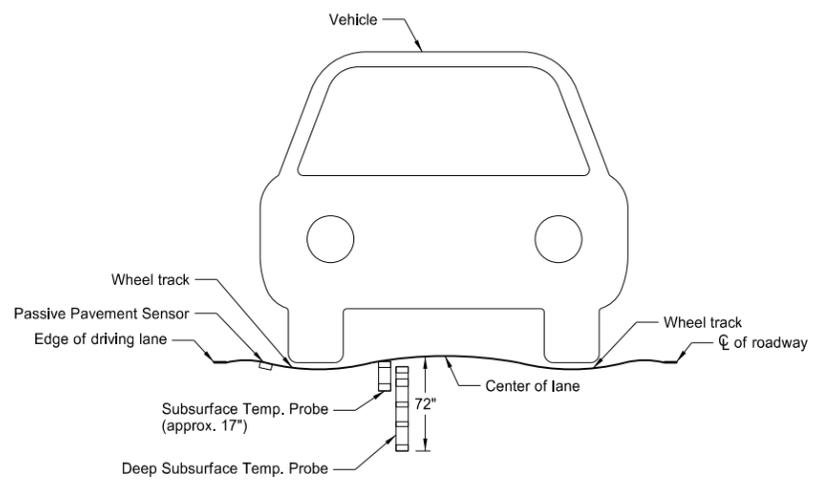
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Camera Layout  
 RP 128.07  
 US Hwy 83 Northbound

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128	150	8



ESS Tower Detail



ESS Sensor Placement in a Lane  
(approximate location shown)

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Camera Details  
RP 128.07  
US Hwy 83 Northbound

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-SHE-1-083(104)128	150	9

Quantities (A)		
Pull Box (Polymer Concrete)	EA	1
Underground Conductor No 4 Type RHW (B)	LF	120
Underground Conductor No 6 Type THW (B)	LF	60
Saw Slot and Sealant	LF	42
3/4 Inch Diameter Rigid HDPE Conduit	LF	21
2 Inch Diameter Rigid HDPE Conduit	LF	164
NEMA Type 4 Ground Mounted Cabinet with Switch Box (C)	EA	1
Concrete ESS Cabinet Foundation with working slab (D)	EA	1
Remote Processing Unit	EA	1
Ethernet Switch	EA	1
Barometric Pressure Sensor (E)	EA	1
Passive Pavement Sensor	EA	1
Chemical Concentration Sensor (F)	EA	1
Subsurface Temperature Probe	EA	1
Deep Subsurface Temperature Probe	EA	1
Temperature/Relative Humidity Sensor	EA	1
Precipitation Occurrence Sensor	EA	1
Ultrasonic Wind Speed/Direction Sensor	EA	1
Radiation Sensor	EA	1
PTZ Camera	EA	1
OSP Cat 5e Cable (G)	LF	65
Infrared Illuminator	EA	1
No 14 AWG 2, 600V Conductor Cable (H)	LF	70
30 Foot Hinged Truss Tower (accessories to be included according to Special Provision)	EA	1
Manufacturer Field Technician	EA	1

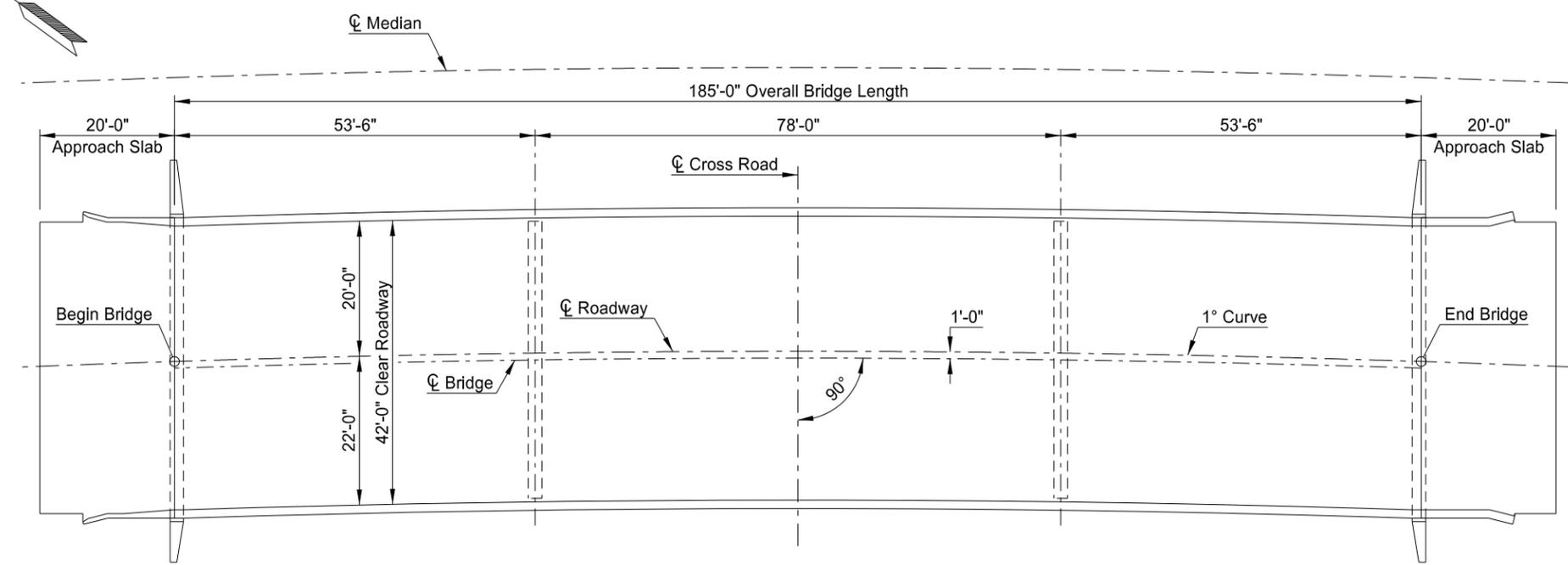
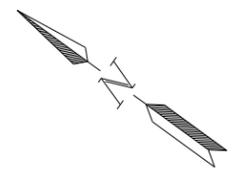
Install ESS Station/RWIS	EA	1
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- (A) These quantities shall be included in the price bid for the item "Install ESS Station/RWIS".
- (B) 1 No 6 and 2 No 4 conductors are provided to extend between the ESS cabinet and the meter.
- (C) The cabinet shall meet all the standards in the Special Provision.
- (D) The foundation for the cabinet shall be built according to Standard Drawing D-770-1.
- (E) The Barometric Pressure Sensor shall be mounted inside the ESS cabinet.
- (F) The Chemical Concentration Sensor shall be placed in the pavement as part of the Passive Pavement Sensor or separately.
- (G) This cable will extend from the cabinet to the PTZ camera.
- (H) This cable will extend from the cabinet to the Infrared Illuminator.

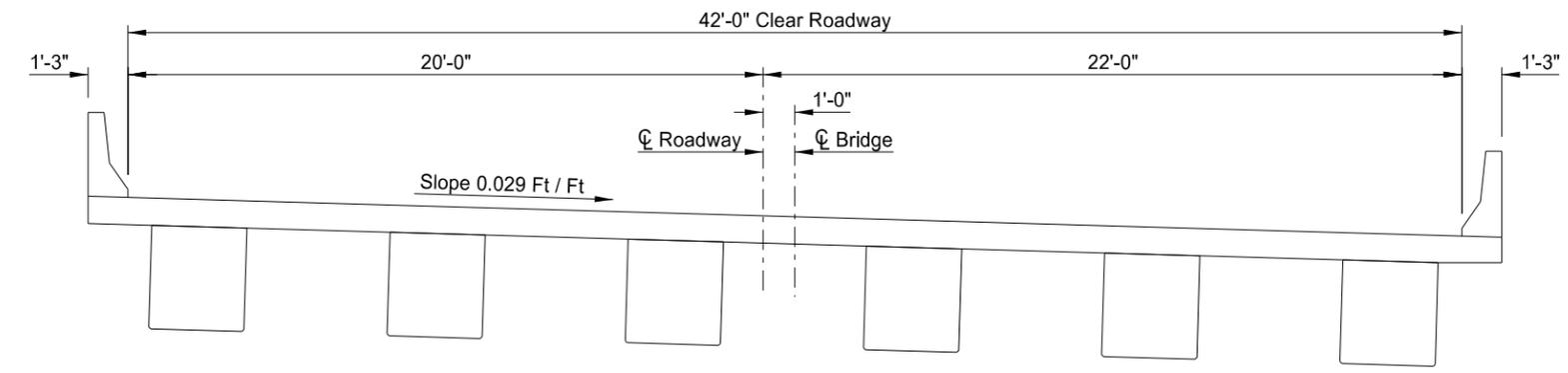
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Camera Details  
 RP 128.07  
 US Hwy 83 Northbound

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-1-083(106)128	170	1



PLAN



SLAB SECTION

**NOTES:**

- 100 SCOPE OF WORK: Work at this site consists of removing an asphalt overlay from the bridge deck and approach slab surfaces.
- 550 PCC PAVEMENT GRINDING: The bridge deck and approach slabs have been overlaid by 2" of asphalt. This asphalt overlay shall be removed off the concrete surface by milling or diamond grinding. Asphalt removal equipment shall not damage the surface of the concrete deck and approach slabs. The milling machine shall meet Section 152.05. The final driving surface of the bridge deck and approach slabs shall be diamond ground. The Engineer will pay plan quantity for the asphalt removal, regardless of the number of passes required by the Contractor's operation to complete the removal.

This document was originally issued and sealed by Brian W. Raschke, Registration Number PE 4361, on 12/11/13 and the original document is stored at the North Dakota Department of Transportation

**BRIDGE BID ITEMS**

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
550	0210	PCC PAVEMENT GRINDING	SY	1050

NORTH DAKOTA  
DEPARTMENT OF TRANSPORTATION  
COAL HAUL ROAD UNDERPASS  
3 MILES SOUTH OF ND 200 EAST

**BRIDGE LAYOUT**

PROJECT: NH-1-083(106)128

McLEAN COUNTY

DATE: 12/11/13 BRIDGE ENGINEER: Terrence R. Udland

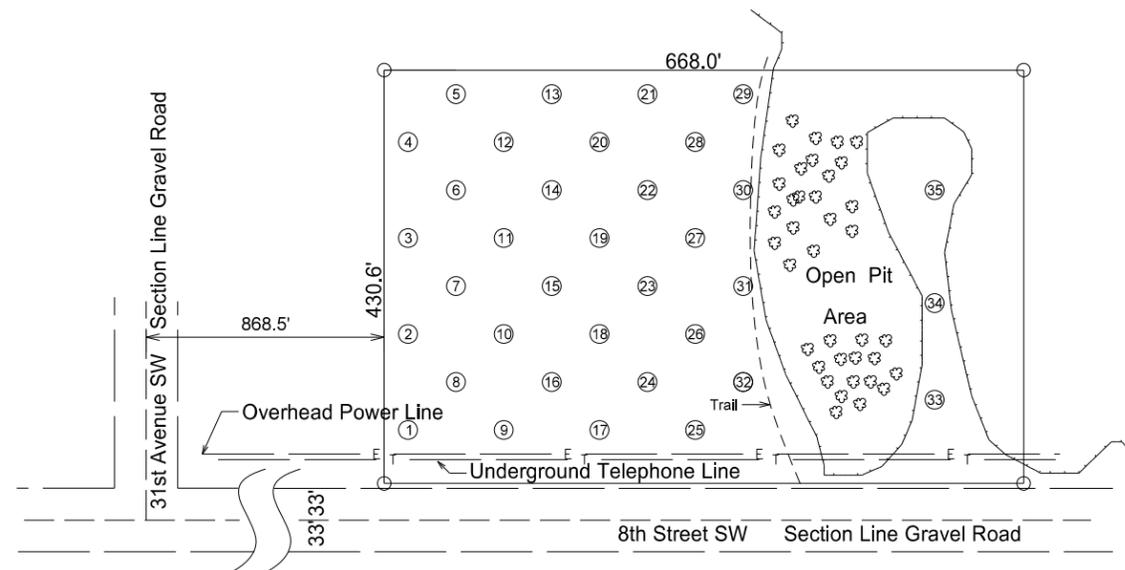
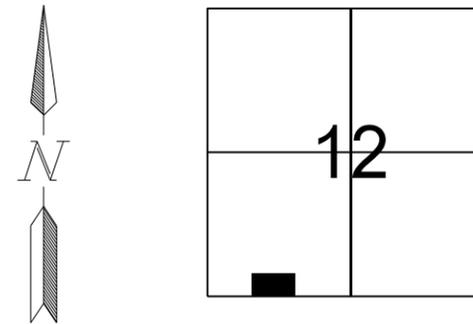
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-1-083(104)128 NH-SHE-1-083(106)128	180	1

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

TEST HOLE PLAT

Location: SW1/4SW1/4 12-144-83 County: McLean  
 Ownership: State Owned

LOCATION OF PIT IN SECTION



Area "A" consists of test holes 1-2, 7-10, 15-16  
 Area "B" consists of test holes 3-6, 11-14  
 Area "C" consists of test holes 19-22, 27-30  
 Area "D" consists of test holes 17-18, 23-26, 31-32

- Legend:
- gr = gravel
  - sd = sand
  - FS = fine sand
  - Fgr = fine gravel
  - CS = coarse sand
  - sh = shale
  - SICl = silt clay
  - rk = rock
  - FeO = Iron Oxide
  - CoS = Coal Slack
  - WI = water line
  - NG = no gravel

Scale 1" = 200'



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-SHE-1-083(104)128	180	3

NH-SHE-1-083(106)128

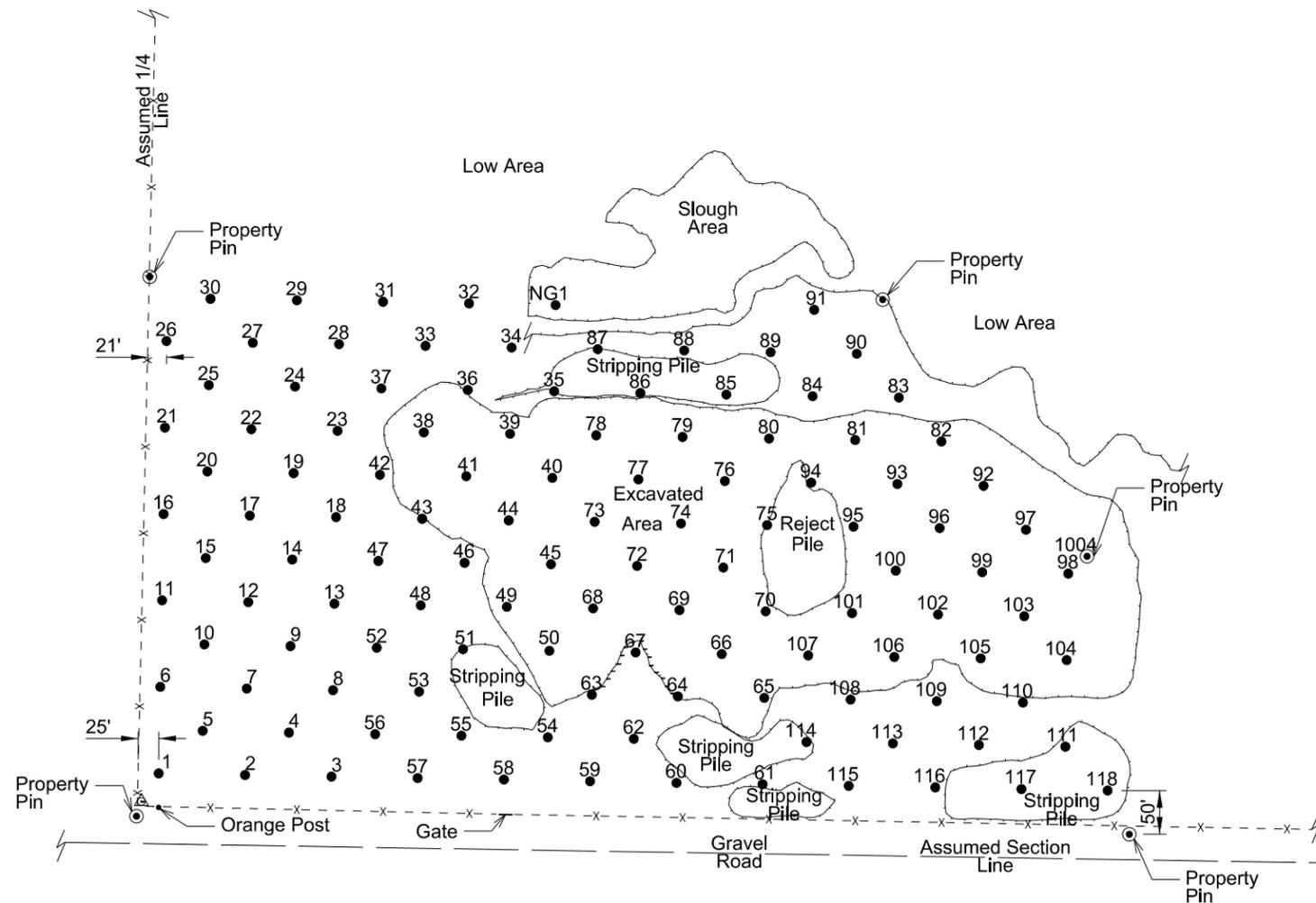
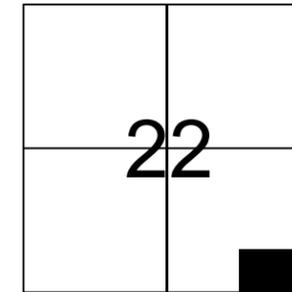
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

TEST HOLE PLAT

Location: SW1/4 Sec 22-144-80 County: McLean

Ownership: NDDOT Owned Aggregate & Clinton Hall, etal-Landowners

LOCATION OF PIT IN SECTION



Scale 1"=200'

- Area "A" consists of Test Holes 1 - 10
- Area "B" consists of Test Holes 11 - 20
- Area "C" consists of Test Holes 21 - 30
- Area "D" consists of Test Holes 31 - 39
- Area "E" consists of Test Holes 40 - 49
- Area "F" consists of Test Holes 50 - 58
- Area "G" consists of Test Holes 59 - 67
- Area "H" consists of Test Holes 68 - 77
- Area "I" consists of Test Holes 78 - 91
- Area "J" consists of Test Holes 92 - 103
- Area "K" consists of Test Holes 104 - 118

Legend:

- gr = gravel
- sd = sand
- FS = fine sand
- Fgr = fine gravel
- CS = coarse sand
- sh = shale
- SiCl = silt clay
- rk = rock
- FeO = Iron oxide
- CoS = Coal Slack
- WL = water line
- NG = no gravel



PIT LOGGING BY TEST HOLES								PIT LOGGING BY TEST HOLES								PIT LOGGING BY TEST HOLES								PIT LOGGING BY TEST HOLES							
Test Hole No.	Depth of Stripping (Ft)	Depth of Material (Ft)	% Retained on 1/2" Screen	% Retained on 3/4" Screen	% Retained on 3/8" Screen	% Retained on #4 Screen	Bottom of Test Hole	Test Hole No.	Depth of Stripping (Ft)	Depth of Material (Ft)	% Retained on 1/2" Screen	% Retained on 3/4" Screen	% Retained on 3/8" Screen	% Retained on #4 Screen	Bottom of Test Hole	Test Hole No.	Depth of Stripping (Ft)	Depth of Material (Ft)	% Retained on 1/2" Screen	% Retained on 3/4" Screen	% Retained on 3/8" Screen	% Retained on #4 Screen	Bottom of Test Hole	Test Hole No.	Depth of Stripping (Ft)	Depth of Material (Ft)	% Retained on 1/2" Screen	% Retained on 3/4" Screen	% Retained on 3/8" Screen	% Retained on #4 Screen	Bottom of Test Hole
23	0.5	0.5 Fgr SiCl	0	5	18	31	+WL 15.0	31	1.0	1.0 gr SiCl	0	8	28	47	+WL 9.0	39	2.0	1.0 gr sh	0	18	30	47	+WL 4.0	47	2.0	1.0 gr SiCl	0	13	37	51	+Cave
		1.0 gr sh								3.0 gr sh								1.0 gr CoS								2.0 gr sh					
		1.0 gr								1.0 gr						40	2.5	1.5 gr sh	0	6	27	44	+WL 7.0			2.0 sd sh					
		1.0 Fgr								2.0 gr sh								1.0 Fgr								10.0 gr sh					
		1.0 sd sh								1.0 sd CoS								1.0 gr								1.0 gr CoS					
		1.0 sd CoS						32	3.0	2.0 gr SiCl	0	6	19	35	+WL 11.0			1.0 Fgr sh						48	0.5	0.5 gr SiCl	0	11	34	52	+Cave
		2.0 FS sh								1.5 gr sh						41	0.5	0.5 gr CoS	0	11	29	53	+WL 4.5			1.0 gr sh					
		1.0 Fgr sh								1.5 sd								1.0 sd sh								1.0 sd CoS					
		2.0 gr sh								1.0 Fgr sh								1.0 gr CoS								1.0 FS sh					
		1.0 gr								1.0 gr sh								1.0 gr sh								1.0 sd sh					
		1.0 gr CoS								1.0 sd CoS								0.5 gr CoS								4.0 gr sh					
		0.5 Fgr CoS						33	4.0	1.0 CS SiCl	0	3	11	27	+WL 11.0	42	1.0	1.0 gr SiCl	0	8	30	51	+WL 19.0			2.0 gr SiCl					
		0.5 gr								1.0 gr sh								8.0 gr sh								1.0 sd sh					
		1.0 sd CoS								3.0 sd sh								1.0 gr CoS								4.0 gr sh					
24	4.0	1.0 gr	0	11	29	47	+WL 13.0			1.0 Fgr sh								1.0 gr sh						49	3.5	1.5 Fgr sh	0	3	21	50	+WL 13.0
		1.0 gr sh								1.0 sd CoS								1.5 Fgr CoS								1.0 gr sh					
		1.0 sd CoS						34	3.0	2.0 gr SiCl	0	4	15	28	+WL 13.0			2.5 gr sh								2.0 gr SiCl					
		6.0 gr sh								1.0 Fgr								1.0 gr CoS								1.0 Fgr CoS					
25	5.0	1.0 gr SiCl	0	11	29	48	+WL 11.0			1.0 sd sh								2.0 gr sh								3.0 Fgr sh					
		4.0 gr sh								1.0 Fgr						43	0.5	1.5 gr SiCl	0	8	22	40	+WL 17.5			1.0 gr					
		1.0 Fgr CoS								1.0 CS sh								1.0 gr						50	4.0	1.0 gr sh	0	8	27	46	+WL 12.0
26	4.0	1.0 gr SiCl	0	6	20	39	+WL 8.0			2.0 sd sh								1.0 FS								1.0 Fgr					
		3.0 gr sh								1.0 sd								2.0 gr SiCl								1.0 gr sh					
27	3.0	1.0 gr SiCl	0	6	20	37	+WL 12.0			1.0 sd CoS								1.0 CoS								1.0 gr					
		1.0 gr sh						35	2.0	1.0 gr SiCl	0	3	13	25	+WL 14.0			1.0 sd sh								1.0 gr sh					
		2.0 Fgr sh								2.0 sd sh								3.0 Fgr sh								1.0 Fgr sh					
		1.0 sd								1.0 sd								1.0 gr sh								1.0 gr sh					
		1.0 gr CoS								2.0 sd sh								2.0 Fgr sh								1.0 gr CoS					
		1.0 Fgr CoS								1.0 sd CoS								3.5 Fgr						51	1.0	1.0 gr SiCl	0	5	23	41	+WL 18.0
		1.0 Fgr								1.0 sd sh						44	2.0	1.0 gr	0	4	21	39	+WL 8.0			1.0 FS sh					
		1.0 gr sh								1.0 sd CoS								1.0 sd								1.0 sd					
28	4.0	1.0 FgrSiCl	0	3	13	29	+WL 11.0			1.0 Fgr sh								3.0 Fgr								1.0 Fgr sh					
		2.0 Fgr sh								1.0 gr sh								1.0 gr								3.0 gr sh					
		1.0 CS sh								1.0 gr						45	3.0	1.0 sd sh	0	4	23	45	+WL 9.0			2.0 Fgr sh					
		2.0 Fgr sh						36	2.0	1.5 gr SiCl	0	4	16	32	+WL 13.0			3.0 gr sh								4.5 gr SiCl					
		1.0 gr								1.5 gr sh								2.0 Fgr sh								1.5 gr					
29	0.5	0.5 FgrSiCl	0	11	29	47	RK			2.0 FS sh						46	1.0	1.0 gr SiCl	1	15	34	50	+WL 17.0			2.0 Fgr sh					
		1.0 gr SiCl								4.5 Fgr								1.0 sd sh													
		7.0 gr sh								0.5 FS CoS								1.0 gr SiCl													
		2.0 gr SiCl								1.0 gr								2.0 Fgr sh													
30	1.0	1.0 Fgr	0	6	22	37	+WL 13.0	37	4.0	1.0 gr sh	0	7	24	42	+WL 13.0			5.0 gr sh													
		1.0 gr SiCl								1.0 gr CoS								1.0 sd													
		1.0 gr								1.0 Fgr CoS								2.0 gr sh													
		1.0 gr sh								0.5 sd sh								1.0 gr CoS													
		4.0 Fgr sh								0.5 gr								1.0 gr sh													
		1.0 gr SiCl								1.5 gr CoS								1.0 gr CoS													
		1.0 sd CoS								3.5 gr sh																					
		2.0 Fgr						38	0.5	1.5 gr SiCl	0	4	17	36	+WL 4.0																
										1.0 Fgr sh																					
										1.0 gr																					

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INSPECTED & APPROVED B. Hoesel Nov-12

																								STATE	PROJECT NO.	SECTION NO.	SHEET NO.
																								ND	NH-SHE-1-083(104)128 NH-SHE-1-083(106)128	180	6

PIT LOGGING BY TEST HOLES								PIT LOGGING BY TEST HOLES								PIT LOGGING BY TEST HOLES								PIT LOGGING BY TEST HOLES							
Test Hole No.	Depth of Stripping (Ft)	Depth of Material (Ft)	% Retained on 1/2" Screen	% Retained on 3/4" Screen	% Retained on 3/8" Screen	% Retained on #4 Screen	Bottom of Test Hole	Test Hole No.	Depth of Stripping (Ft)	Depth of Material (Ft)	% Retained on 1/2" Screen	% Retained on 3/4" Screen	% Retained on 3/8" Screen	% Retained on #4 Screen	Bottom of Test Hole	Test Hole No.	Depth of Stripping (Ft)	Depth of Material (Ft)	% Retained on 1/2" Screen	% Retained on 3/4" Screen	% Retained on 3/8" Screen	% Retained on #4 Screen	Bottom of Test Hole	Test Hole No.	Depth of Stripping (Ft)	Depth of Material (Ft)	% Retained on 1/2" Screen	% Retained on 3/4" Screen	% Retained on 3/8" Screen	% Retained on #4 Screen	Bottom of Test Hole
52	1.0	1.0 gr sh	0	15	38	54	+Cave	57	1.5	1.5 gr SiCl	0	7	21	36	+WL 19.0	63	0.5	2.5 gr SiCl	0	12	37	55	+WL 18.0	69	0.5	0.5 gr sh	0	5	25	49	+WL 8.0
		2.0 gr SiCl								2.0 gr								1.0 gr sh								2.0 gr SiCl					
		1.0 Fgr sh								4.0 gr sh								1.0 gr SiCl								2.0 Fgr sh					
		1.0 gr sh								2.5 gr SiCl								1.0 gr CoS								1.0 gr sh					
		1.0 gr SiCl								1.5 gr								2.0 gr sh								1.0 gr					
		2.0 gr sh								1.0 FS SiCl								1.0 gr SiCl								1.0 gr sh					
		4.0 gr SiCl								1.0 FS sh								2.0 gr sh						70	0.5	1.5 gr SiCl	0	5	23	39	+WL12.0
		1.0 gr CoS								4.0 FS								2.0 gr SiCl								2.0 gr					
53	0.5	1.5 gr	0	6	21	36	+WL 17.0	58	3.0	1.0 gr SiCl	0	6	27	52	RK			1.0 gr sh								1.0 gr CoS					
		1.0 sd sh								1.0 Fgr sh								1.0 Fgr sh								2.0 Fgr sh					
		1.0 gr								1.0 gr								1.0 sd sh								2.0 sd sh					
		6.0 gr SiCl								1.0 gr SiCl								2.0 Fgr sh								1.0 gr					
		2.0 gr sh								1.0 gr sh						64	1.0	2.0 gr SiCl	0	6	23	40	+Cave			2.0 Fgr sh					
		2.0 sd sh								1.0 gr								2.0 Fgr sh						71	1.0	1.5 Fgr CoS	0	6	20	38	+WL12.5
		1.0 Fgr sh								3.0 gr SiCl								2.0 gr SiCl								0.5 gr sh					
		2.0 sd CoS								1.0 FgrSiCl								1.0 Fgr CoS								1.0 CS					
54	5.0	1.0 gr SiCl	0	8	23	41	SiCl	59	3.0	2.0 gr SiCl	0	10	31	50	SiCl			1.0 Fgr sh								2.0 gr sh					
		1.0 FgrSiCl								2.0 gr sh								1.0 gr SiCl								1.0 gr SiCl					
		2.5 gr SiCl								1.0 gr								4.0 gr sh								1.0 gr sh					
		0.5 gr sh								4.0 gr sh								4.0 Fgr sh								1.0 gr SiCl					
		2.0 gr SiCl								2.0 gr SiCl						65	2.0	1.0 CS sh	0	1	17	34	+WL 12.0			3.0 gr sh					
		2.0 sd sh								2.0 gr sh								1.0 Fgr sh								0.5 Fgr CoS					
		1.5 sd CoS						60	3.5	3.5 gr sh	0	12	27	45	SiCl			1.0 gr sh						72	1.0	1.0 FS	0	9	25	41	+WL10.0
		1.5 Fgr CoS								1.0 gr SiCl								1.0 gr SiCl								1.0 Fgr CoS					
55	3.0	2.0 gr SiCl	0	8	22	38	+WL 17.0			3.0 gr sh								1.5 gr CoS								1.0 sd sh					
		1.0 Fgr sh								4.0 gr SiCl								1.5 gr sh								3.0 gr SiCl					
		1.0 gr SiCl								1.0 Fgr								2.0 Fgr CoS								3.0 Fgr sh					
		2.0 gr						61	4.0	1.0 gr SiCl	0	9	31	51	SiCl			1.0 sd sh						73	0.5	0.5 Fgr sh	0	5	25	48	+WL 8.0
		1.0 Fgr								2.0 gr sh						66	0.5	1.5 Fgr sh	0	3	18	37	+WL 12.5			2.0 gr					
		1.0 FgrSiCl								3.0 gr SiCl								4.0 gr SiCl								0.5 Fgr					
		2.0 FS CoS								1.0 Fgr sh								2.0 Fgr sh								0.5 sd sh					
		1.5 sd sh								1.0 gr sh								1.0 gr SiCl								3.0 gr sh					
		2.5 FS								2.0 gr SiCl								2.0 Fgr sh								1.0 gr SiCl					
56	1.0	1.0 gr SiCl	0	8	20	37	+			1.0 Fgr sh								1.5 Fgr CoS						74	1.0	2.0 FS	0	5	17	38	+WL 9.0
		1.0 Fgr sh								1.0 gr SiCl						67	0.5	0.5 gr SiCl	0	4	20	41	+WL 19.0			6.0 Fgr sh					
		2.0 gr SiCl						62	3.0	3.0 gr	0	6	25	45	+WL 17.5			1.0 FgrSiCl													
		1.0 gr								1.0 gr SiCl								1.0 gr CoS													
		1.0 gr SiCl								1.0 gr sh								2.0 Fgr sh													
		2.0 Fgr sh								3.0 gr SiCl								2.0 gr sh													
		4.0 gr sh								3.0 gr sh								2.0 Fgr sh													
		2.0 sd sh								3.5 Fgr sh								5.0 gr SiCl													
		4.0 FS sh																1.0 gr CoS													
		1.0 sd sh																1.0 Fgr sh													
																		1.0 gr SiCl													
																		1.0 Fgr sh													
																		1.0 Fgr CoS													
																68	2.5	1.5 gr sh	0	6	21	47	+WL10.0								
																		2.0 Fgr sh													
																		3.0 gr sh													
																		1.0 sd sh													

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INSPECTED & APPROVED B. Hoesel Nov-12

PIT LOGGING BY TEST HOLES								PIT LOGGING BY TEST HOLES								PIT LOGGING BY TEST HOLES								PIT LOGGING BY TEST HOLES							
Test Hole No.	Depth of Stripping (Ft)	Depth of Material (Ft)	% Retained on 1/2" Screen	% Retained on 3/4" Screen	% Retained on 3/8" Screen	% Retained on #4 Screen	Bottom of Test Hole	Test Hole No.	Depth of Stripping (Ft)	Depth of Material (Ft)	% Retained on 1/2" Screen	% Retained on 3/4" Screen	% Retained on 3/8" Screen	% Retained on #4 Screen	Bottom of Test Hole	Test Hole No.	Depth of Stripping (Ft)	Depth of Material (Ft)	% Retained on 1/2" Screen	% Retained on 3/4" Screen	% Retained on 3/8" Screen	% Retained on #4 Screen	Bottom of Test Hole	Test Hole No.	Depth of Stripping (Ft)	Depth of Material (Ft)	% Retained on 1/2" Screen	% Retained on 3/4" Screen	% Retained on 3/8" Screen	% Retained on #4 Screen	Bottom of Test Hole
75	0.5	0.5 gr sh	0	5	23	40	+WL11.0	84	2.0	1.0 gr SiCl	0	6	19	37	+WL17.0	90	3.0	1.0 gr SiCl	0	5	17	34	+WL14.0	96	0.5	0.5 gr SiCl	0	3	16	34	+WL12.0
		2.0 FS								1.0 Fgr								1.0 Fgr sh								1.0 CoS					
		1.0 sd sh								2.0 gr CoS								1.0 gr sh								1.0 sd CoS					
		1.0 Fgr CoS								1.0 sd CoS								1.0 gr SiCl								3.0 gr					
		4.0 gr sh								2.0 sd								3.0 Fgr sh								1.0 gr SiCl					
		2.0 gr CoS								2.0 Fgr sh								1.0 Fgr								1.0 Fgr sh					
76	1.0	1.0 FS	0	5	25	46	+WL 7.0			1.0 gr SiCl								1.0 Fgr sh								2.0 gr CoS					
		3.0 Fgr sh								2.0 gr sh								2.0 gr sh								2.0 Fgr sh					
		1.0 gr CoS								3.0 Fgr sh						91	4.0	2.0 gr SiCl	0	8	21	39	+WL13.0	97	0.5	2.5 sd sh	0	3	12	27	+WL10.0
		1.0 sd						85	6.0	1.0 gr SiCl	0	5	17	31	+WL18.0			2.0 gr sh								2.0 gr sh					
77	1.0	1.0 FgrSiCl	0	3	18	37	+WL 7.0			1.0 gr								1.0 gr SiCl								1.0 Fgr sh					
		1.0 sd sh								1.0 Fgr sh								2.0 sd sh								4.0 sd sh					
		1.0 Fgr								1.0 sd CoS								1.0 Fgr						98	0.5	1.5 Fgr sh	0	3	23	40	+WL 9.5
		3.0 gr sh								1.0 sd sh								1.0 sd CoS								1.5 gr sh					
78	0.5	0.5 CS sh	0	2	19	38	+WL 4.0			2.0 Fgr sh						92	0.5	0.5 sd sh	0	2	18	40	+WL11.0			1.5 Fgr sh					
		1.0 Fgr sh								1.0 sd								2.0 Fgr sh								2.0 sd sh					
		1.0 gr CoS								1.0 Fgr								2.0 gr sh								1.0 FS CoS					
		1.0 gr sh								1.0 sd								1.0 Fgr sh								1.0 Fgr sh					
79	0.5	0.5 sd sh	0	4	19	39	+WL 4.0			1.0 Fgr sh								3.0 gr sh								0.5 sd					
		2.0 gr sh								1.0 Fgr CoS								2.0 gr CoS						99	0.5	0.5 gr SiCl	0	6	20	41	+WL13.0
		1.0 Fgr sh						86	9.0	1.0 Fgr sh	0	6	20	36	+	93	0.5	1.0 gr SiCl	0	6	18	36	+WL14.0			4.0 gr sh					
80	0.5	1.5 FgrSiCl	0	1	16	33	+WL 6.0			1.0 sd sh								2.5 sd sh								1.0 gr SiCl					
		3.0 Fgr sh								1.5 Fgr sh								1.0 Fgr								1.0 gr sh					
		1.0 sd sh								2.5 sd sh								7.0 Fgr sh								1.0 Fgr sh					
81	1.0	1.0 sd sh	0	1	12	29	+Cave			1.0 Fgr CoS								1.0 sd sh								1.0 gr SiCl					
		2.0 Fgr sh								1.0 Fgr sh								1.0 Fgr sh								1.0 Fgr sh					
		2.0 gr sh								3.0 gr SiCl						94	0.5	0.5 Fgr sh	0	3	13	28	+WL15.0			1.0 gr sh					
		1.0 gr CoS						87	4.0	1.0 gr SiCl	0	5	16	28	+WL13.0			2.0 sd sh								1.0 Fgr CoS					
		1.0 Fgr sh								2.0 gr sh								1.0 Fgr sh								1.0 Fgr sh					
		1.0 CS sh								1.0 sd sh								1.0 gr sh						100	0.5	4.5 gr sh	0	3	18	38	+WL11.0
		1.0 Fgr sh								2.0 gr sh								1.0 sd sh								1.0 Fgr CoS					
		1.0 gr sh								1.0 sd								1.0 gr sh								1.0 gr sh					
82	0.5	1.0 FgrSiCl	0	1	14	31	+Cave			2.0 FS CoS								1.0 Fgr CoS								1.0 gr CoS					
		1.0 Fgr sh						88	3.0	1.0 gr SiCl	0	8	27	42	+WL13.0			1.0 FS CoS								1.0 sd sh					
		2.0 sd sh								1.0 gr sh								4.0 gr sh								2.0 Fgr sh					
		3.0 Fgr sh								1.0 Fgr CoS								1.0 sd CoS								1.0 Fgr sh					
		1.0 gr SiCl								2.0 gr sh								1.0 Fgr CoS								1.0 gr CoS					
		3.0 Fgr sh								1.0 sd sh						95	0.5	1.0 gr sh	0	6	19	33	+WL12.5			1.0 gr sh					
		1.0 gr sh								2.0 Fgr sh								3.5 FS sh								1.0 gr sh					
		2.0 Fgr sh								2.0 gr sh								2.0 gr sh								1.0 gr SiCl					
83	0.5	2.5 gr	0	6	23	42	+WL17.0	89	5.0	1.0 gr SiCl	0	9	25	41	+WL14.0			1.0 gr SiCl								1.0 CS					
		2.0 gr sh								2.0 Fgr sh								1.0 CS								1.0 Fgr sh					
		1.0 sd sh								4.0 gr sh								1.0 Fgr sh								1.0 gr CoS					
		2.0 gr sh								1.0 gr CoS								1.0 gr CoS								1.0 gr CoS					
		2.0 sd								1.0 gr								1.0 CS								0.5 gr CoS					
		1.0 Fgr sh						90																							
		2.0 FgrSiCl																													
		1.0 Fgr																													
		2.0 sd sh																													
		1.0 Fgr																													

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NDDOT ABBREVIATIONS

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
06-15-10	
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04-20-11	Added Items
03-15-13	Added Items
11-01-13	Added Items

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NDDOT ABBREVIATIONS

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

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NDDOT ABBREVIATIONS

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

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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-20-10

702COM 702 Communications  
 ACCENT Accent Communications  
 AGASSIZ WU Agassiz Water Users Incorporated  
 AGC Associated General Contractors of America  
 All PI Alliance Pipeline  
 ALL SEAS WU All Seasons Water Users Association  
 AMOCO PI Amoco Pipeline Company  
 AMRDA HESS Amerada Hess Corporation  
 AT&T AT&T Corporation  
 B PAW Bear Paw Energy Incorporated  
 BAKER ELEC Baker Electric  
 BASIN ELEC Basin Electric Cooperative Incorporated  
 BEK TEL Bek Communications Cooperative  
 BELLE PL Belle Fourche Pipeline Company  
 BLM Bureau of Land Management  
 BNSF Burlington Northern Santa Fe Railway  
 BOEING Boeing  
 BRNS RWD Barnes Rural Water District  
 BURK-DIV ELEC Burke-Divide Electric Cooperative  
 BURL WU Burleigh Water Users  
 Cable One Cable One  
 CABLE SERV Cable Services  
 CAP ELEC Capital Electric Cooperative Incorporat  
 CASS CO ELEC Cass County Electric Cooperative  
 CASS RWU Cass Rural Water Users Incorporated  
 CAV ELEC Cavalier Rural Electric Cooperative  
 CBLCOM Cablecom Of Fargo  
 CENEX PL Cenex Pipeline  
 CENT PL WATER DIST Central Pipe Line Water District  
 CENT PWR ELEC Central Power Electric Cooperative  
 COE Corps of Engineers  
 CONS TEL Consolidated Telephone  
 CONT RES Continental Resource Inc  
 CPR Canadian Pacific Railway  
 D O E Department Of Energy  
 DAK CARR Dakota Carrier Network  
 DAK CENT TEL Dakota Central Telephone  
 DAK RWD Dakota Rural Water District  
 DGC Dakota Gasification Company  
 DICKEY R NET Dickey Rural Networks  
 DICKEY RWU Dickey Rural Water Users Association  
 DICKEY TEL Dickey Telephone  
 DNRR Dakota Northern Railroad  
 DOME PL Dome Pipeline Company  
 DVELEC Dakota Valley Electric Cooperative  
 DVMW Dakota, Missouri Valley & Western  
 ENBRDG Enbridge Pipelines Incorporated  
 ENVENTIS Enventis Telephone  
 FALK MNG Falkirk Mining Company  
 FHWA Federal Highway Administration  
 G FKS-TRL WD Grand Forks-trail 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  
 MCKENZ ELEC McKenzie Electric Cooperative  
 MCKNZ WRD McKenzie County Water Resource District  
 MCLEOD McLeod USA  
 MCLN ELEC McLean Electric Cooperative  
 MCLN-SHRDN R WAT McLean-Sheridan Rural Water  
 MDU Montana-dakota Utilities  
 MID-CONT CABLE Mid-Continent Cable  
 MIDSTATE TEL Midstate Telephone Company  
 MINOT CABLE Minot Cable Television  
 MINOT TEL Minot Telephone Company  
 MISS W W S Missouri West Water System  
 MNKOTA PWR Minnkota Power  
 MOR-GRAN-SOU ELEC Mor-gran-sou Electric Cooperative  
 MOUNT-WILLI ELEC Mountrail-williams Electric Cooperative  
 MRE LBTY TEL Moore & Liberty Telephone  
 MUNICIPAL City Water And Sewer  
 MUNICIPAL City Of '.....'  
 N CENT ELEC North Central Electric Cooperative  
 N VALL W DIST North Valley Water District  
 ND PKS & REC North Dakota Parks And Recreation  
 ND TEL North Dakota Telephone Company  
 NDDOT North Dakota Department of Transportation  
 NDSU SOIL SCI DEPT NDSU Soil Science Department  
 NEMONT TEL Nemont Telephone  
 NODAK R ELEC Nodak Rural Electric Cooperative  
 NOON FRMS TEL Noonan Farmers Telephone Company  
 NPR Northern Plains Railroad  
 NSP Northern States Power  
 NTH PRAIR RW Northern Prairie Rural Water Association  
 NTHN BRDR PL Northern Border Pipeline  
 NTHN PLNS ELEC Northern Plains Electric Cooperative Incorporated  
 NTHWSTRN REF Northwestern Refinery Company  
 NW COMM Northwest Communication Cooperation  
 ONEOK Oneok gas  
 OSHA Occupational Safety and Health Administration  
 OTTR TL PWR Otter Tail Power Company  
 P L E M Prairielands Energy Marketing  
 POLAR COM Polar Communications  
 PVT ELEC Private Electric  
 QWEST Qwest Communications  
 R & T W SUPPLY R & T Water Supply Association  
 RAMSEY R SEW Ramsey Rural Sewer Association  
 RAMSEY RW Ramsey Rural Water Association  
 RAMSEY UTIL Ramsey County Rural Utilities

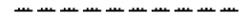
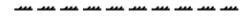
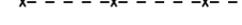
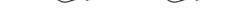
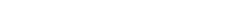
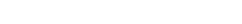
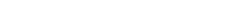
RED RIV TEL Red River Rural Telephone  
 RESVTN TEL Reservation Telephone  
 ROBRTS TEL Roberts Company Telephone  
 R-RIDER ELEC Roughrider Electric Coop  
 RRVW Red River Valley & Western Railroad  
 RSR ELEC R.S.R. Electric Cooperative  
 S E W U South East Water Users Incorporated  
 SCOTT CABLE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

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

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Line Styles

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

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Symbols

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

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# Symbols

D-20-31

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

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

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**PE-2930,**  
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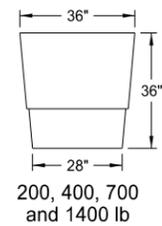
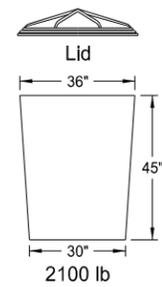
# Symbols

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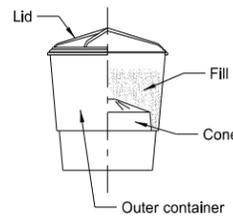
ATTENUATION DEVICE



Outer Containers

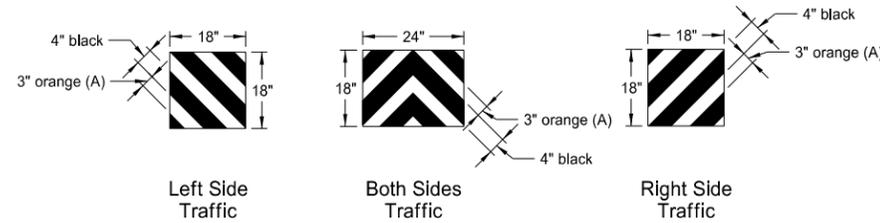


Cones



Typical Assembly

Typical Module Construction Detail

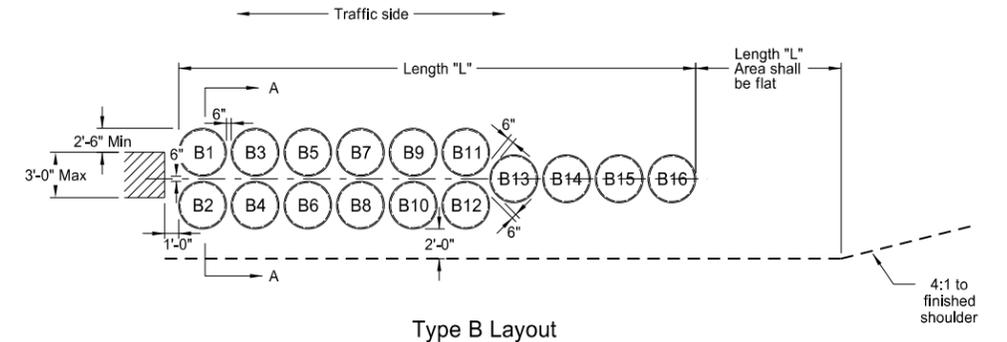


Reflective Sheet Detail

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 III C as specified in NDDOT Standard Specifications.

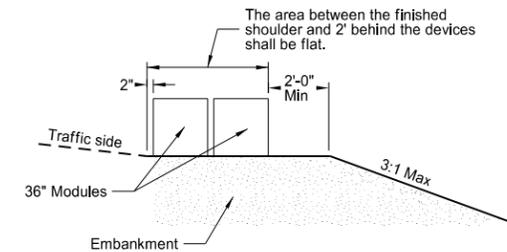
(A) 3" orange sheeting shall be used for temporary installations, and 3" yellow sheeting shall be used for permanent installations.

	Fill Chart				
	Module Weights (LBS)				
Distance from top edge	200	400	700	1400	2100
	8 1/2"	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	1
	1400	1	1	1	1	1	1	1	1	1	1
	700	2	2	2	2	2	2	2	2	2	2
	400	1	1	1	1	1	1	1	1	1	1
200	2	2	2	1	1	1	1	1	1	1	

Notes:

- Materials
  - Modules shall be manufactured from a frangible polyethylene material which will shatter upon impact.
  - 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.
- Modules
 

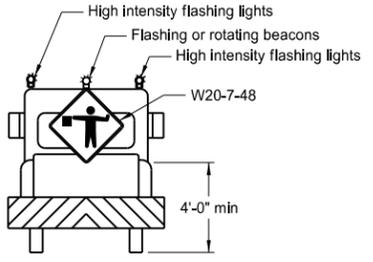
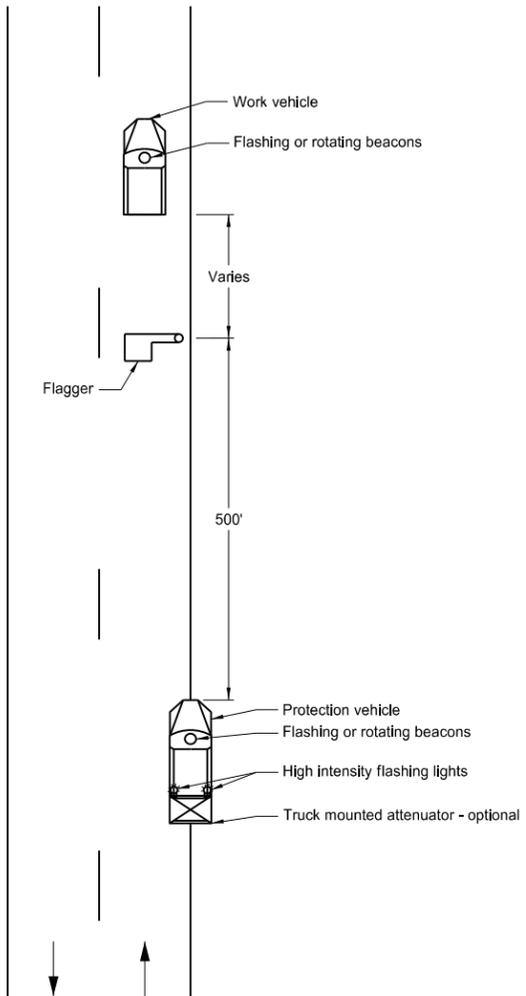
The modules shall be provided in two sizes to contain volumes of either 2, 4, 7, 14, or 21 cubic feet as a minimum.

  - The module for the 2, 4 or 7 cubic foot container shall consist of three components:
    - A 14 C.F., yellow outer container.
    - A black lid which locks securely over the top lip of the container.
    - 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.
  - The module for the 21 cubic foot container shall consist of two components:
    - A 36" height X 36" width yellow outer container.
    - A black lid which locks securely over the top of the container.
- 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 3 1/2".
- 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.

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9-25-12	
REVISIONS	
DATE	CHANGE

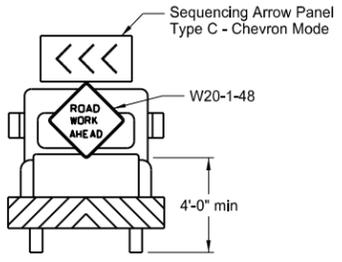
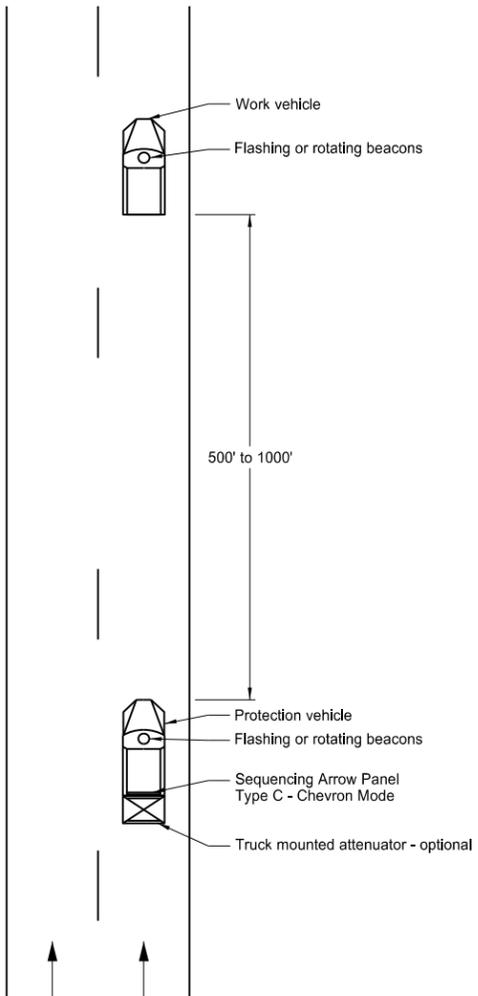
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Two Lane, Two Way Roadways



Typical Protection Vehicle

Multilane Roadways



Typical Protection Vehicle

- Notes:
1. The working vehicle shall display a 360 degree rotating, flashing, oscillating or strobe light.
  2. The shadow vehicle shall display a 360 degree rotating, flashing, oscillating or strobe light. The shadow vehicle for Multilane Roadway shall also have a sequencing arrow panel Type C operated in the chevron mode.
  3. This application is for use during daylight hours and in areas of good visibility only.
  4. Two lane, two way roadway, a flagger shall be used to protect the work area and warn oncoming traffic.

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9-25-12	
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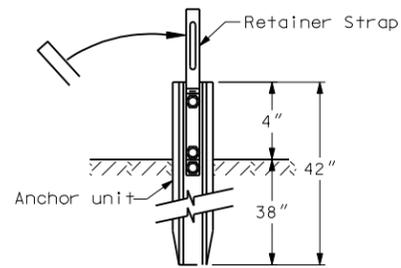




# BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

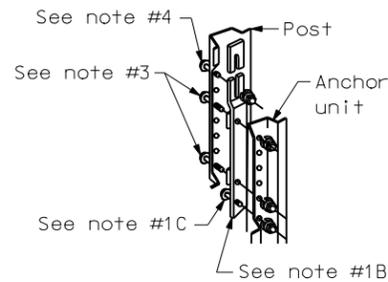
## FLANGED CHANNEL



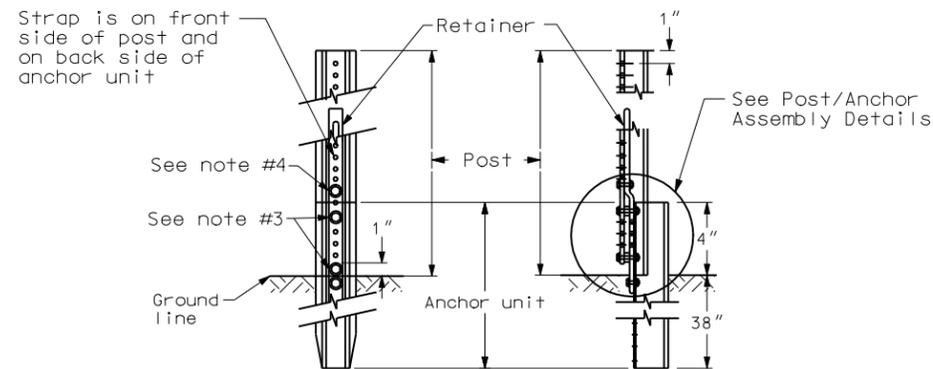
Anchor Unit & Strap Assembly Detail

### STEPS OF INSTALLATION

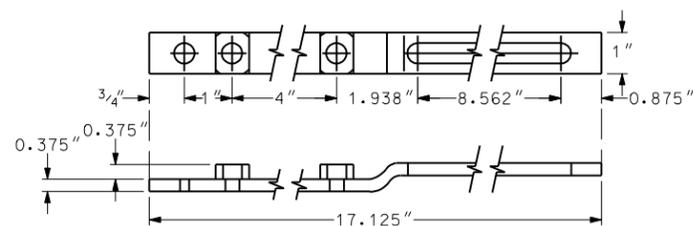
1. A) Drive anchor unit to within 12" of ground level.  
B) Proper assembly established by lining up the top 3/4" slot of retainer spacer strap with top hole of anchor unit.  
C) Assemble strap to back of anchor unit using 3/8"-16 UNC x 2.0" long bolt, lock washer and nut.  
D) Rotate strap 90° to left.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



Post/Anchor Assembly Details



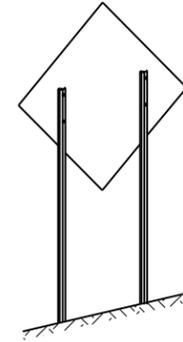
Front View Side View Sign Post Assembly Detail



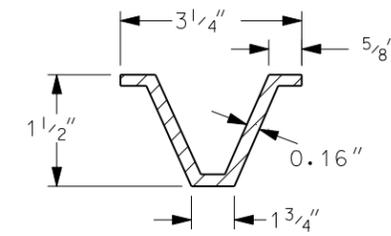
Retainer/Spacer Strap Detail

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

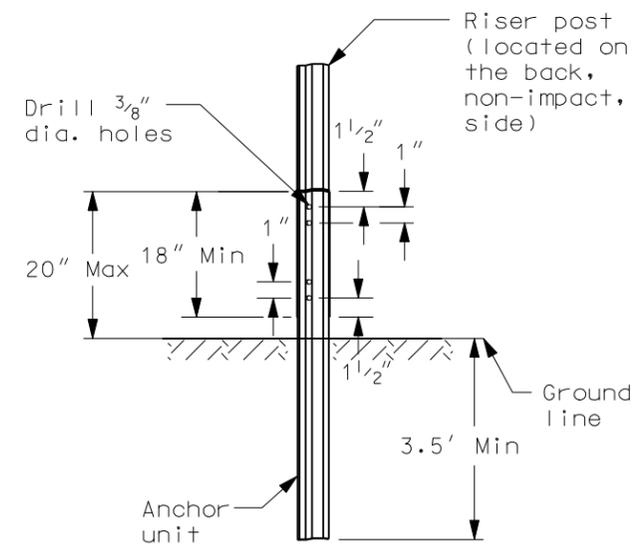
## 3 LB/FT U POSTS



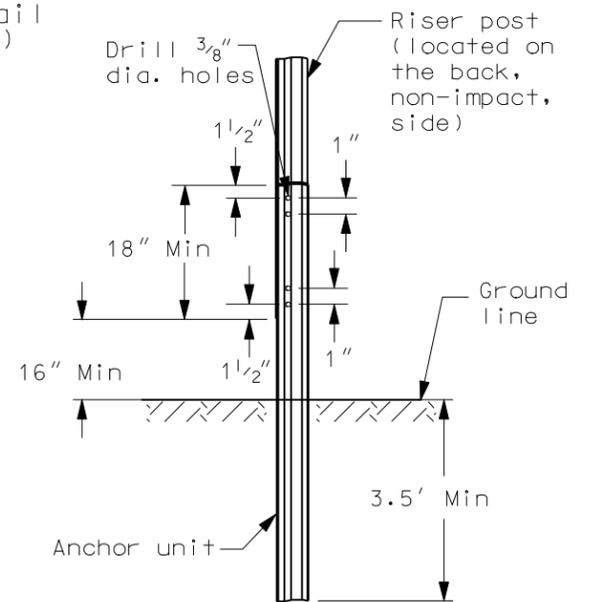
Typical Installation



U-Post Detail (3 lb/ft)



U-Channel Splice Option 1



U-Channel Splice Option 2

### Notes

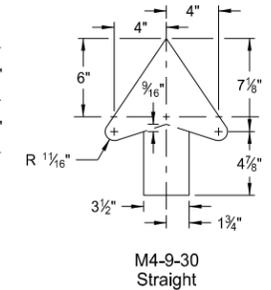
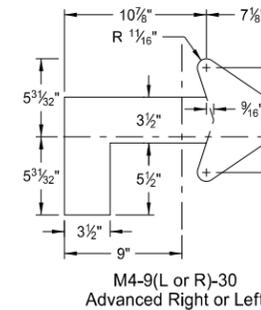
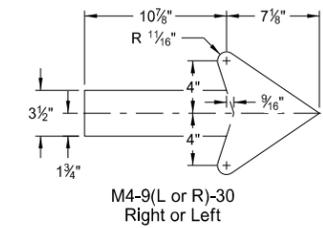
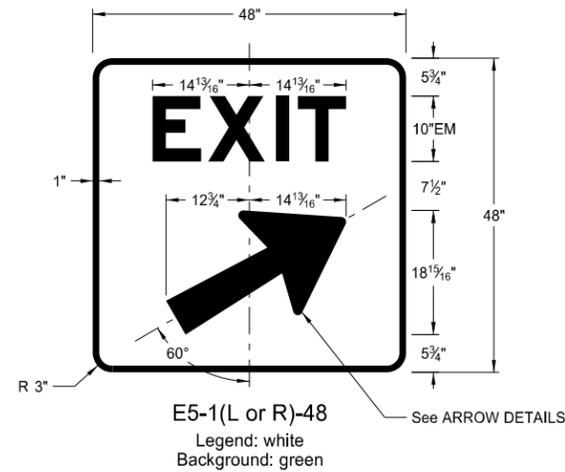
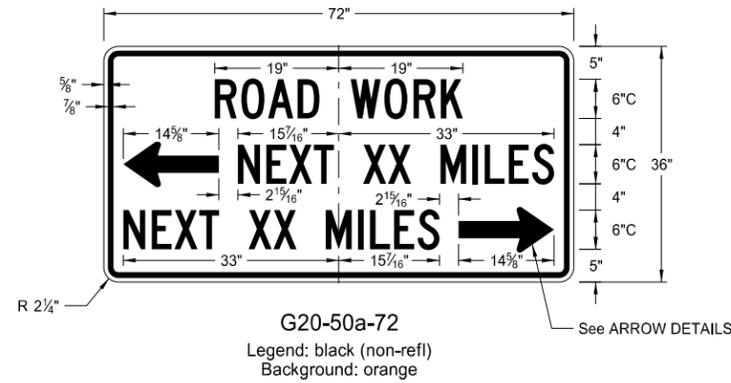
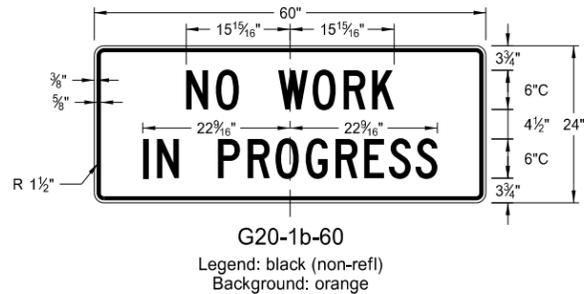
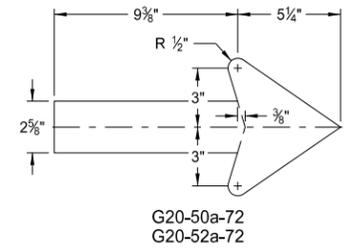
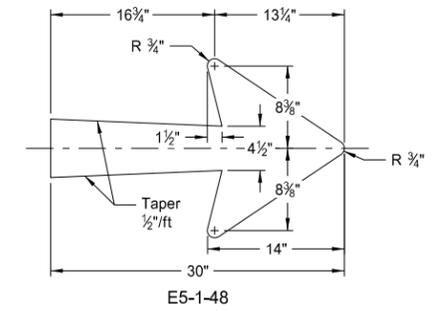
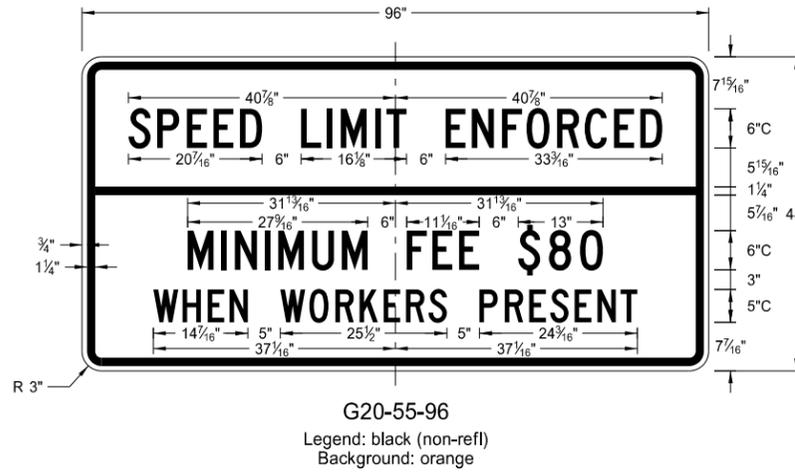
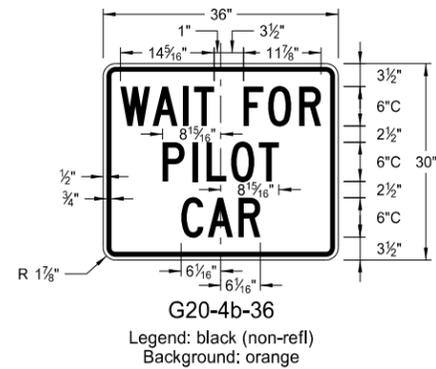
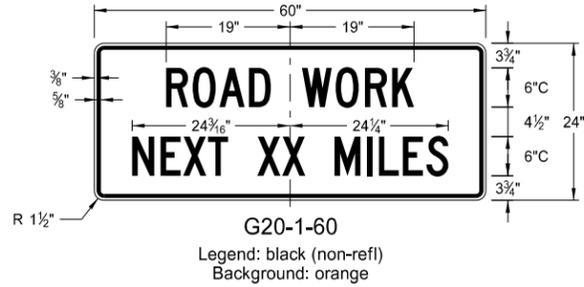
1. Use 3 lb/ft riser anchor units and risers
2. Driven riser posts shall be at least 7' long and embedded at least 3.5'.
3. A splice shall overlap a minimum of 18".
4. Use 4 bolts 5/16" diameter with washers and nuts. Two at top and two at bottom of splice.
5. Anchor unit for guy wires shall be no more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

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

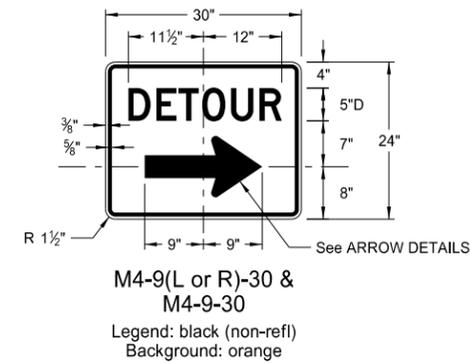
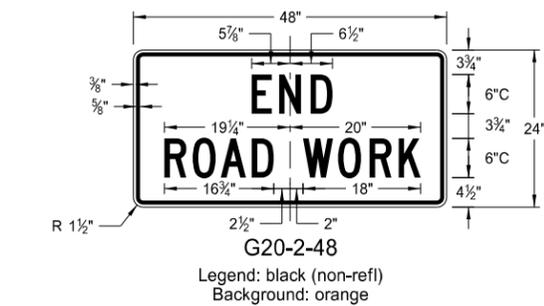
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CONSTRUCTION SIGN DETAILS  
TERMINAL AND GUIDE SIGNS

D-704-9



ARROW DETAILS



NOTES:

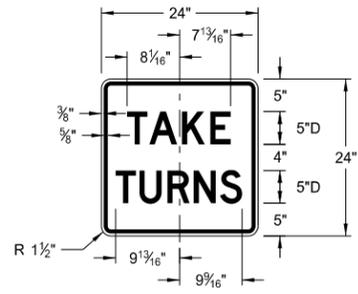
(A) Arrow may be right or left of the legend to indicate construction to the right or left.

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

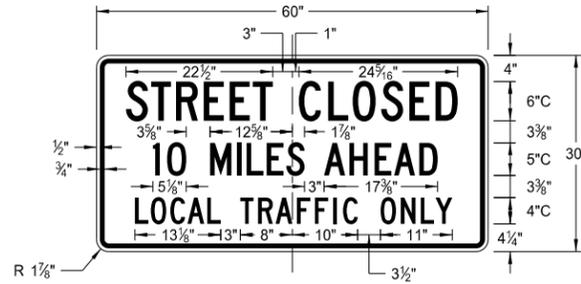
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CONSTRUCTION SIGN DETAILS  
REGULATORY SIGNS

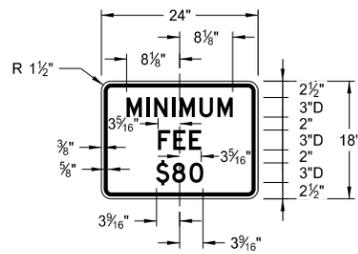
D-704-10



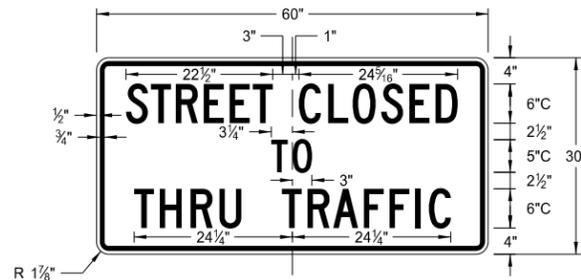
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R2-1a-24  
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R11-4a-60  
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R11-2a-48  
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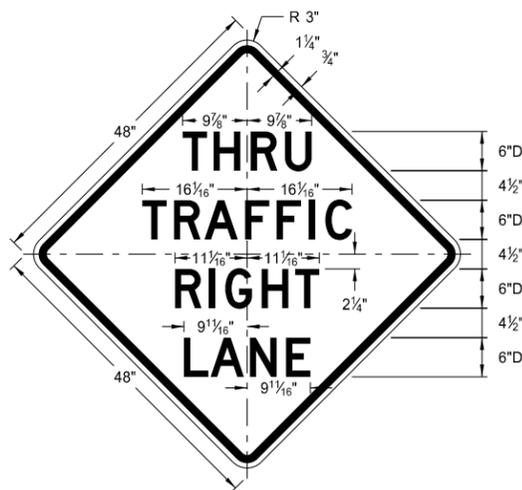
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

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CONSTRUCTION SIGN DETAILS  
WARNING SIGNS

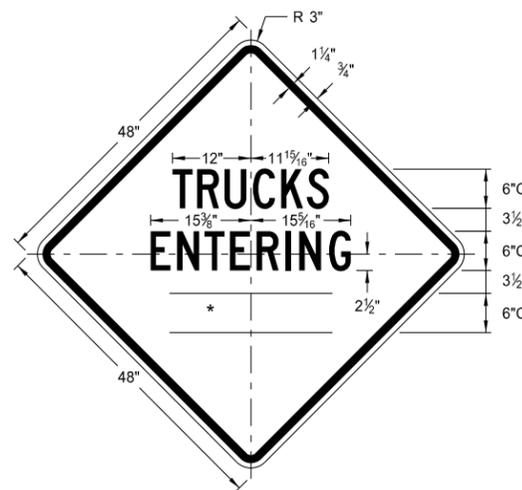
WORD	LETTER SPACING
AHEAD	Standard
200 FT	Standard
350 FT	Standard
500 FT	Standard
1000 FT	Reduce 40%
1500 FT	Reduce 40%
½ MILE	Reduce 50%
1 MILE	Standard

\* DISTANCE MESSAGES



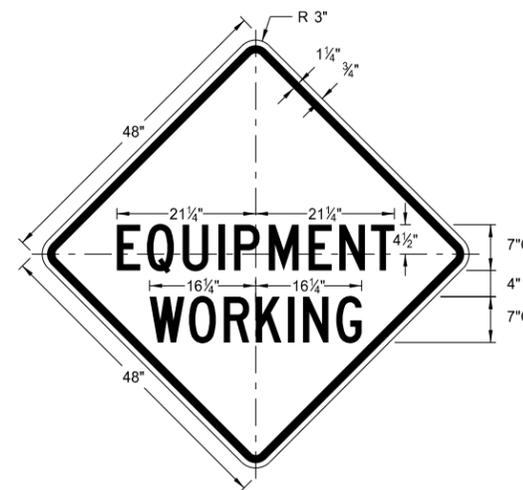
W5-8-48

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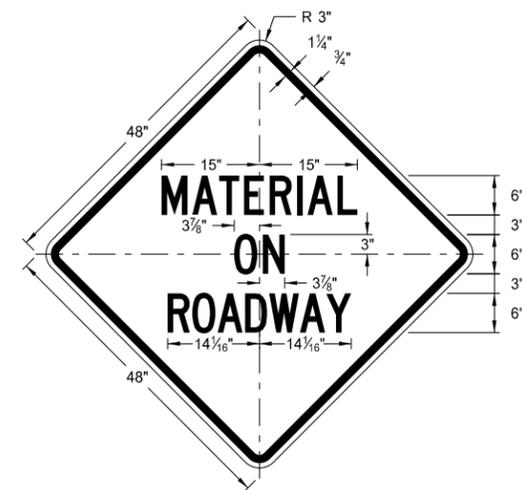
W8-54-48

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Background: orange



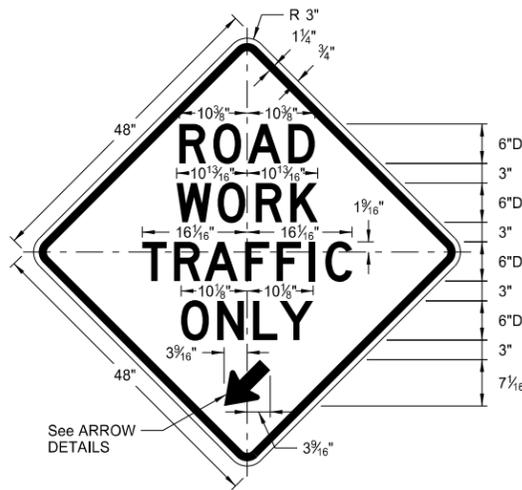
W20-51-48

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Background: orange



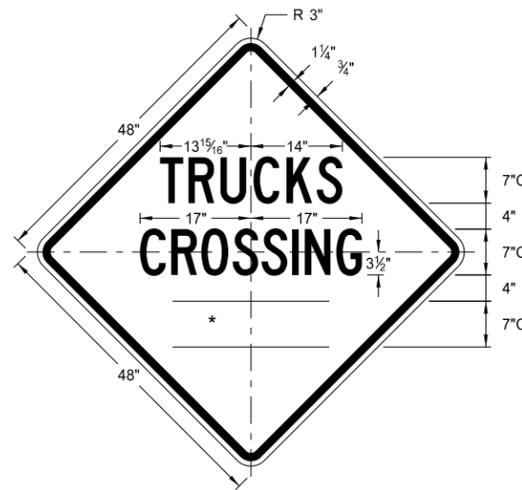
W21-51-48

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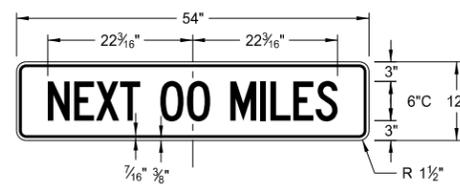
W5-9-48

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Background: orange



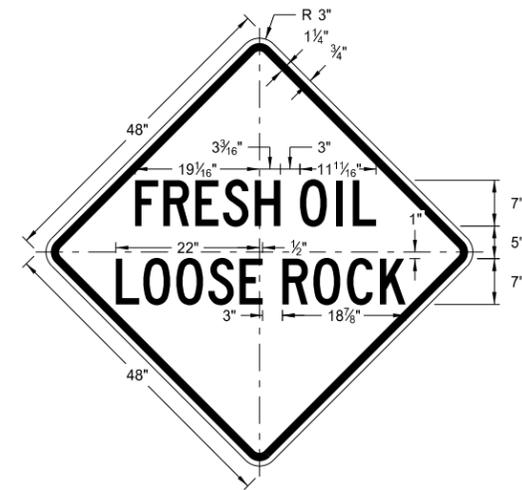
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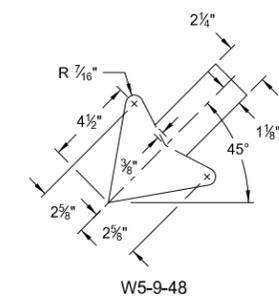
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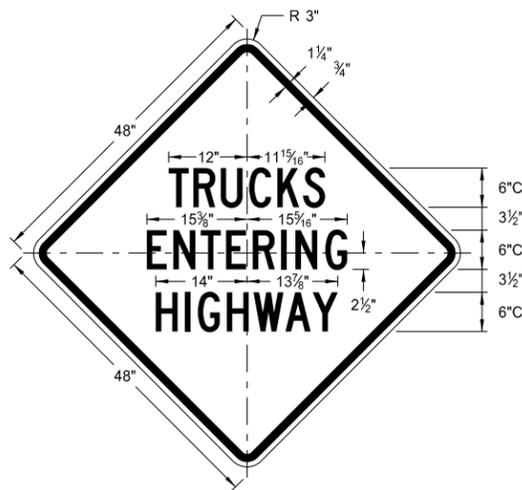


W22-8-48

Legend: black (non-refl)  
Background: orange

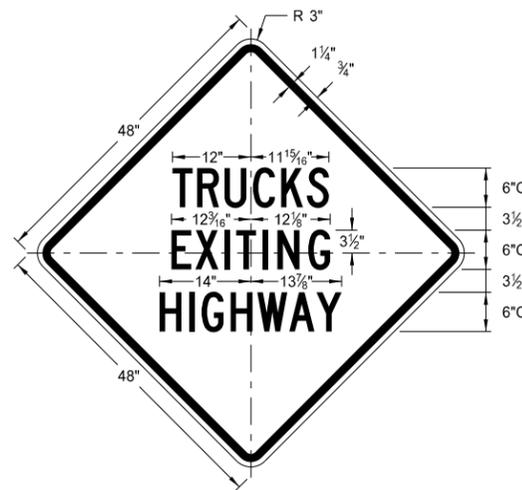


ARROW DETAILS



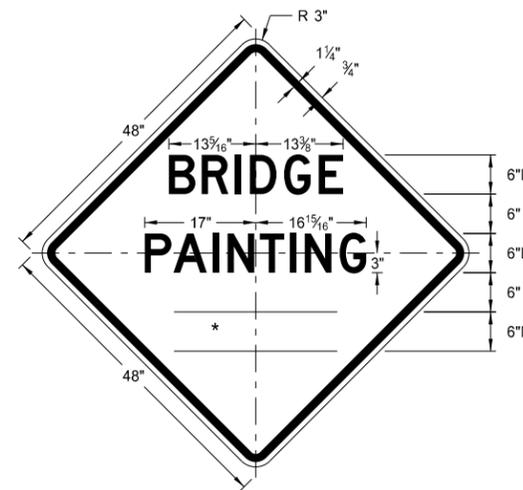
W8-53-48

Legend: black (non-refl)  
Background: orange



W8-56-48

Legend: black (non-refl)  
Background: orange



W21-50-48

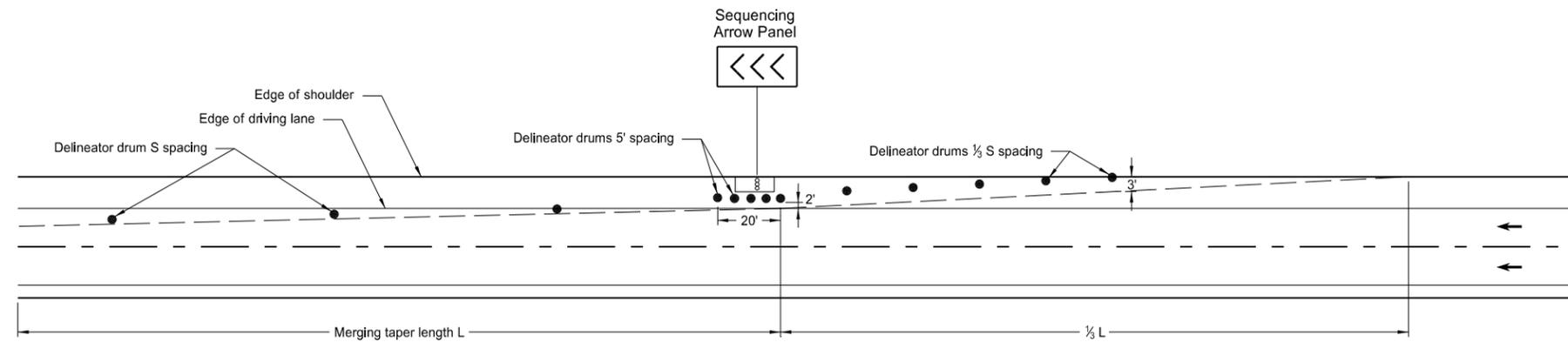
Legend: black (non-refl)  
Background: orange

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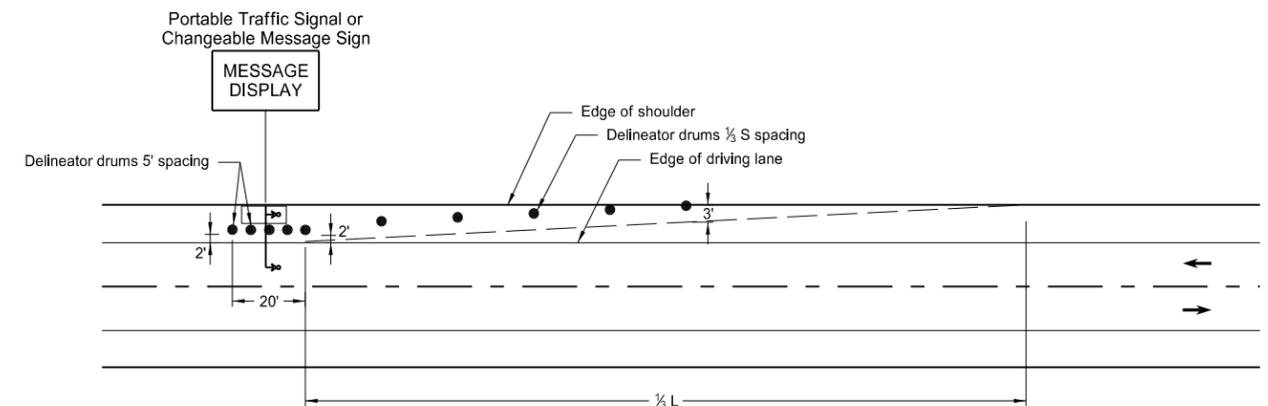
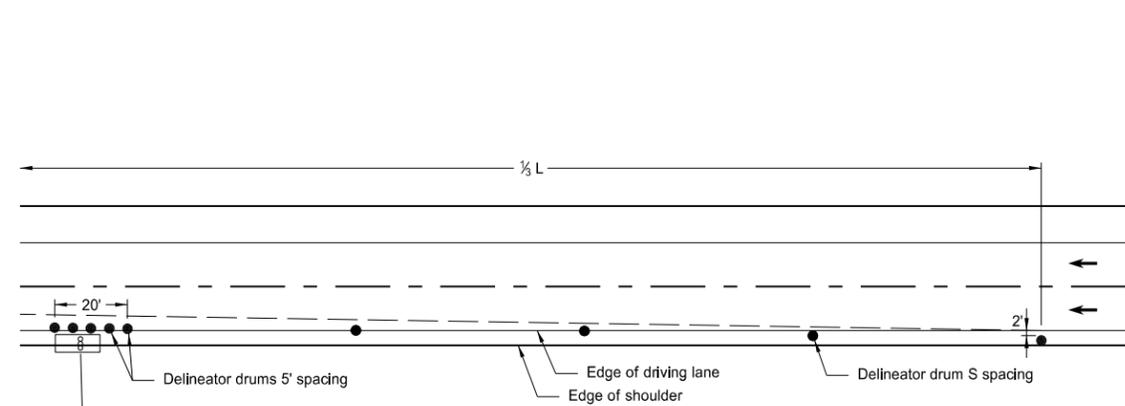
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# SHOULDER CLOSURE TAPERS

D-704-12

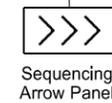


SHOULDER CLOSURE WITH LANE CLOSURE  
(when shoulder is 8' or wider)



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

PORTABLE TRAFFIC SIGNAL OR CHANGEABLE MESSAGE SIGN ON SHOULDER



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

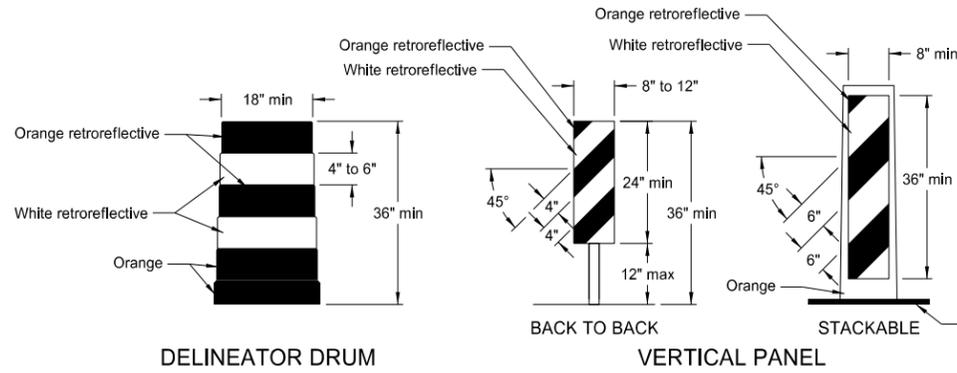
Notes:

- S = Posted Speed Limit in mph  
W = Width of offset in feet  
L = Taper length in feet  
L = WS<sup>2</sup>/60 (40mph or less)  
L = WS (45mph or more)
- If a shoulder taper is used, it should have a length of approximately 1/2 L. If a shoulder is used as a travel lane, a normal merging or shifting taper should be used.
- When paved shoulders of 8 foot width or more are closed, channelizing devices shall be used to close the shoulder in advance to delineate the beginning of the work space and direct vehicular traffic to remain within the traveled way.

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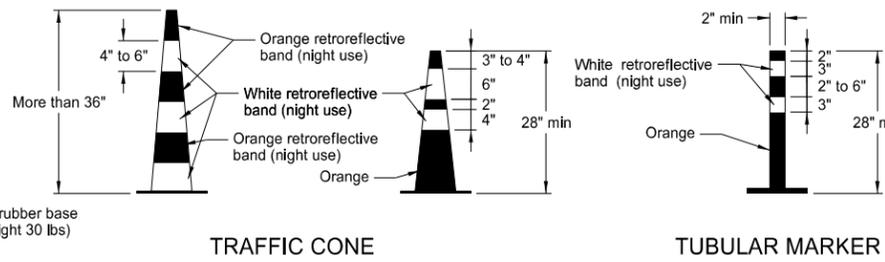
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BARRICADE AND CHANNELIZING DEVICE DETAILS



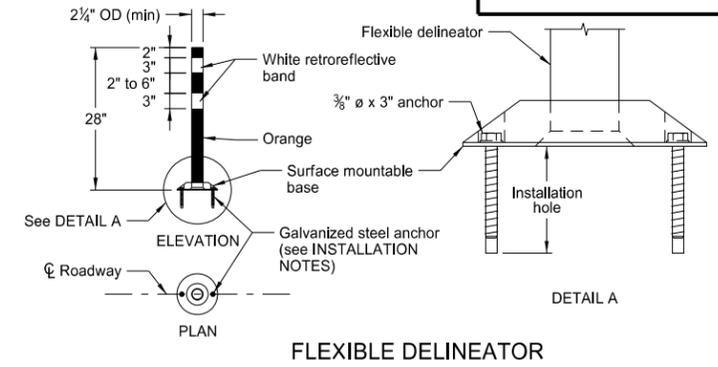
The markings on drums shall be horizontal, circumferential, alternating orange and white retroreflective stripes 4" to 6" wide. Each drum shall have a minimum of two orange and two white stripes with the top stripe being orange. Any nonretroreflectORIZED spaces between the horizontal orange and white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

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



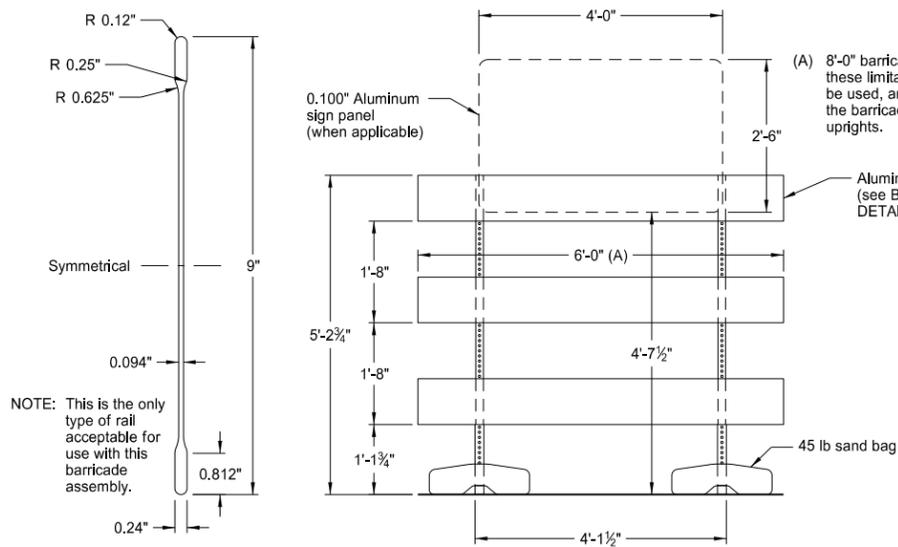
RetroreflectORIZATION of cones more than 36" in height shall be provided by alternating orange and white retroreflective stripes. Each cone shall have a minimum of two orange and two white stripes with the top stripe being orange. Any nonretroreflectORIZED space between the orange and white stripes shall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

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



INSTALLATION NOTES:

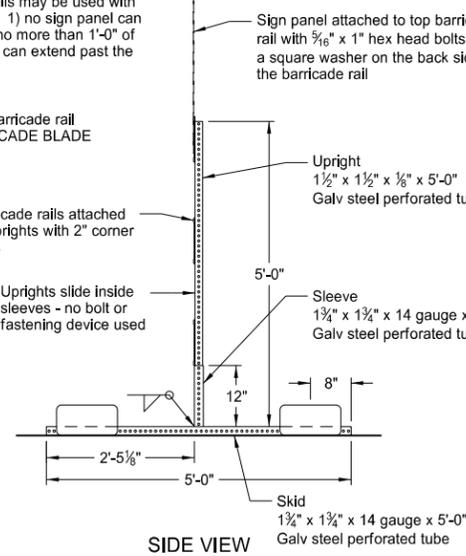
1. Drill installation holes to diameter and depth as required by manufacturer's specifications.
2. For removal, remove anchors and fill installation hole with an epoxy designed to bond to pavement surface.
3. In lieu of bolted down base, the contractor may use an 8" x 8" butyl pad or hot melt butyl.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



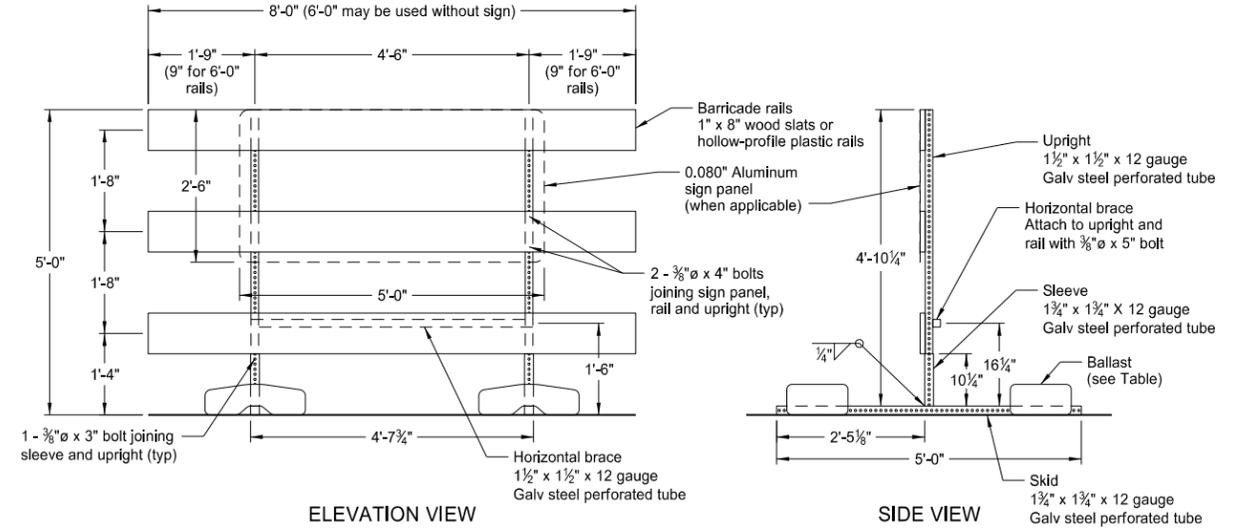
BARRICADE BLADE DETAIL

ELEVATION VIEW

BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)



SIDE VIEW

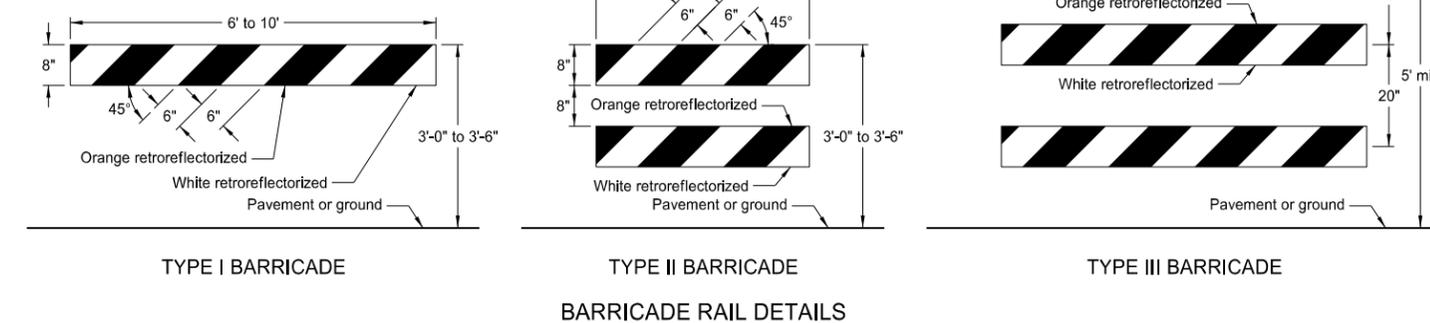


ELEVATION VIEW

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".

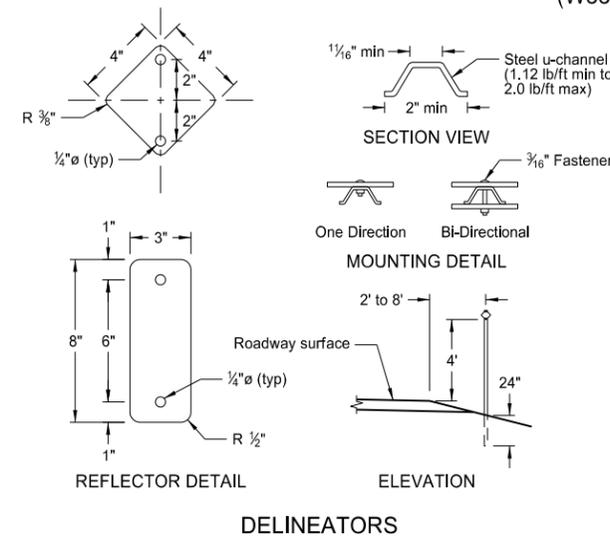


TYPE I BARRICADE

TYPE II BARRICADE

TYPE III BARRICADE

BARRICADE RAIL DETAILS



REFLECTOR DETAIL

ELEVATION

DELINEATORS

MINIMUM BALLAST (For each side of barricade support)

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

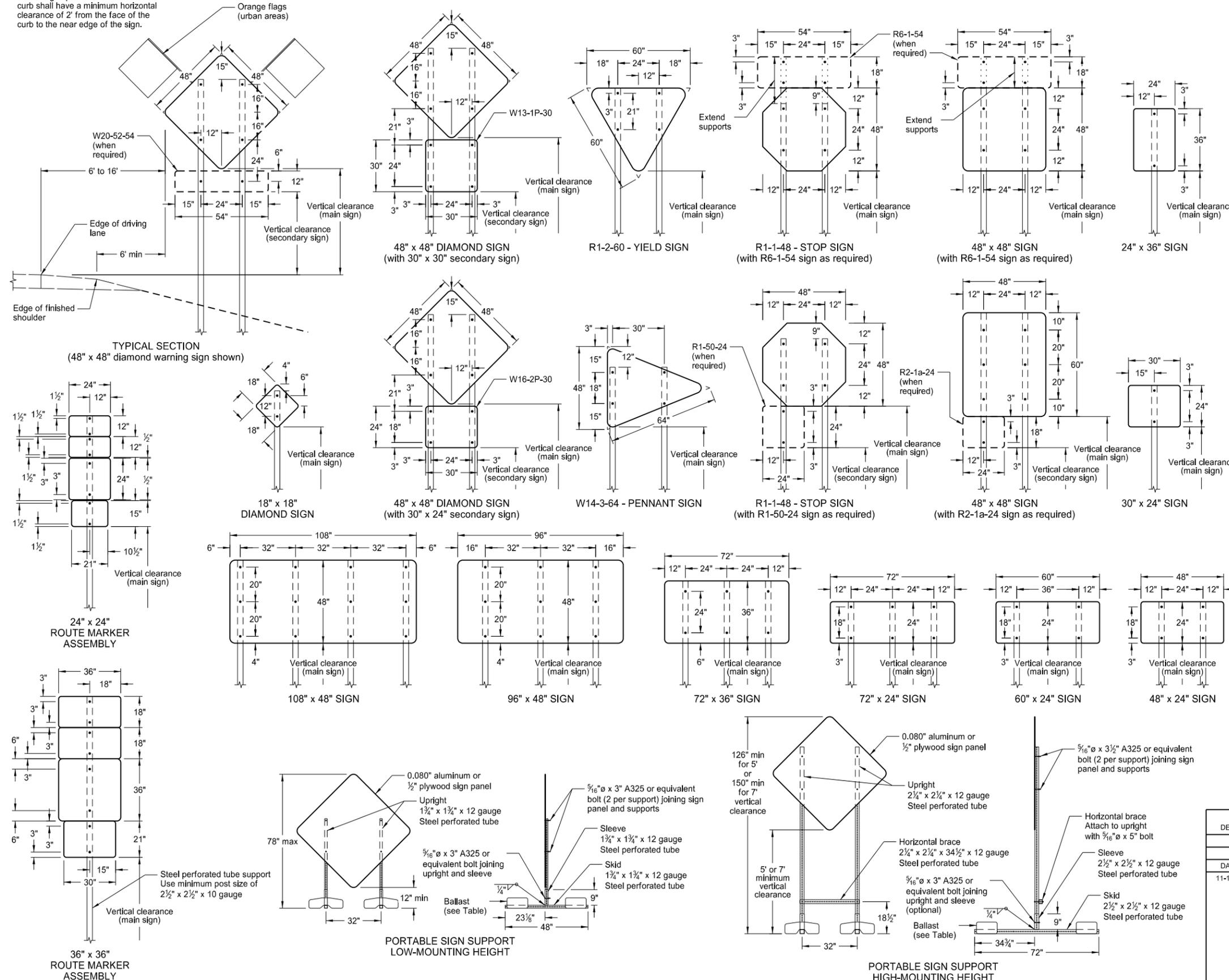
Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

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CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

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



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

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

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

2. Sign Panels: Provide sign panels made of 0.100" aluminum, 1/2" plywood, or other approved material, except where noted. All holes to be punched round for 3/8" bolts.
3. Alternate Messages: The signs that have alternate messages may have these alternate messages placed on a reflectorized plate (without a border) and installed and removed as required. (i.e. "Left" and "Right" message on a lane closure sign)
4. Route Marker Auxiliary Signs: Provide route marker auxiliary signs, such as the cardinal direction and directional arrows, with a background and legend that match the route marker they are used with:

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

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

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

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

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

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

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

MINIMUM BALLAST  
 (For each side of sign support base)

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

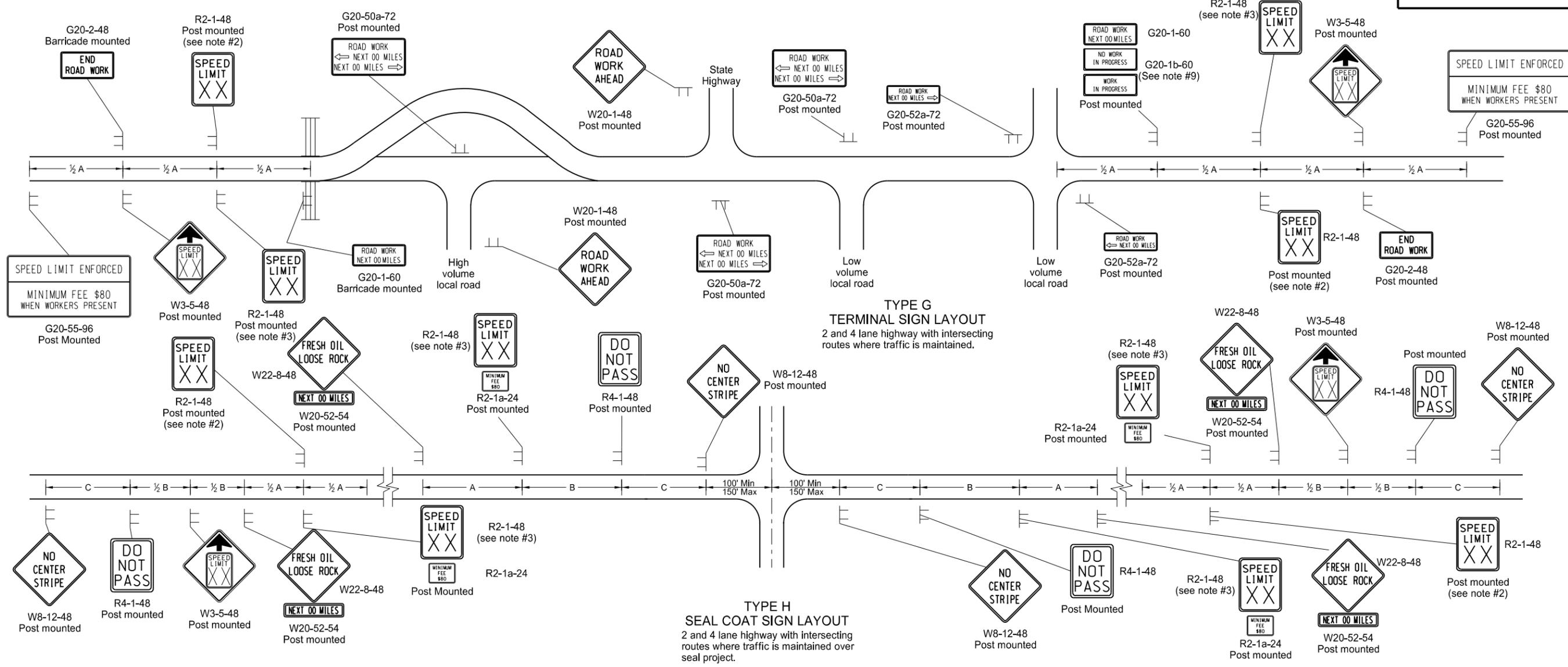
Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

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11-14-13	Revised Note 6.

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# TERMINAL AND SEAL COAT SIGN LAYOUTS

D-704-20



- Barricades placed on roadway shall be on a moveable assembly. Signs placed on the roadway shall be placed on skid mounted assemblies.
- The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
- The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 MPH below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 MPH. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
- 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.
- Existing speed limit signs within a reduced speed zone shall be covered.
- 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.

- The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
- Type H construction sign traffic control shall have the speed limit signs covered or removed once the loose aggregate has been removed.
- The contractor shall install the G20-1b-60 sign when work is suspended for winter.
- 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.
- G20-55-96 sign is not required if work is less than 15 days.

**KEY**

≡ Type III barricade

⊥ Sign

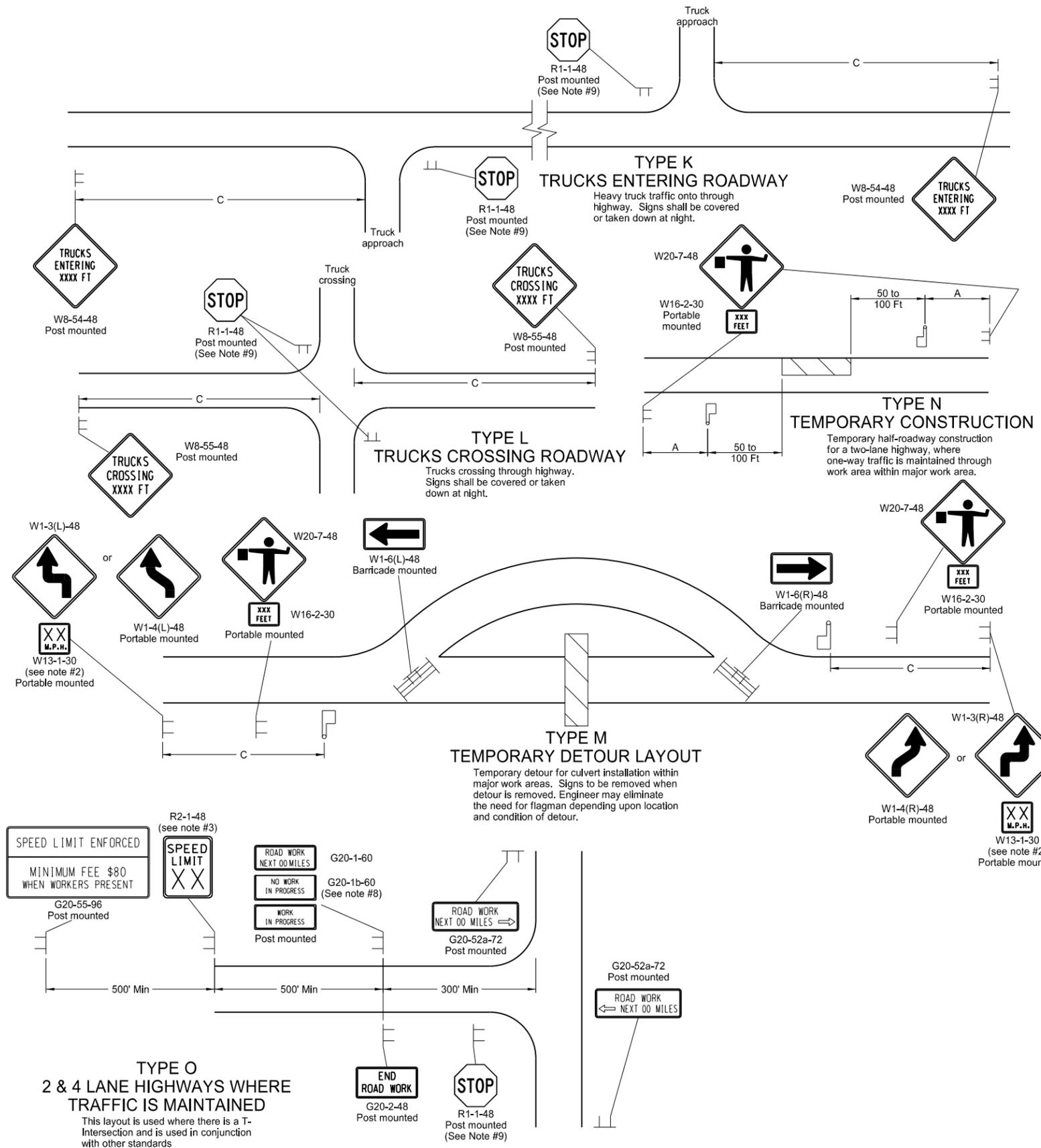
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60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

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# 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. Where necessary, safe speed to be determined by the Engineer.
  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 1/2 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. Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
  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. The contractor shall install the G20-1b-60 sign when work is suspended for winter.
  7. If existing stop sign is in place, a 48" stop sign is not required.
  8. G20-55-96 sign is not required if this standard is part of other traffic control layouts with this sign or the work is less than 15 days.

**KEY**

- Type III barricade
- Work area
- Sign
- Flagger

**ADVANCE WARNING SIGN SPACING**

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

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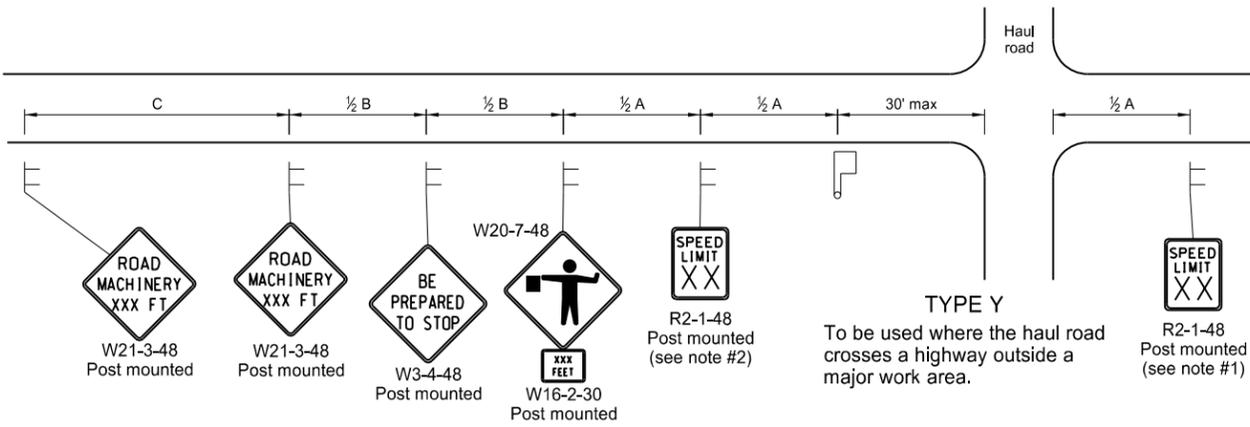
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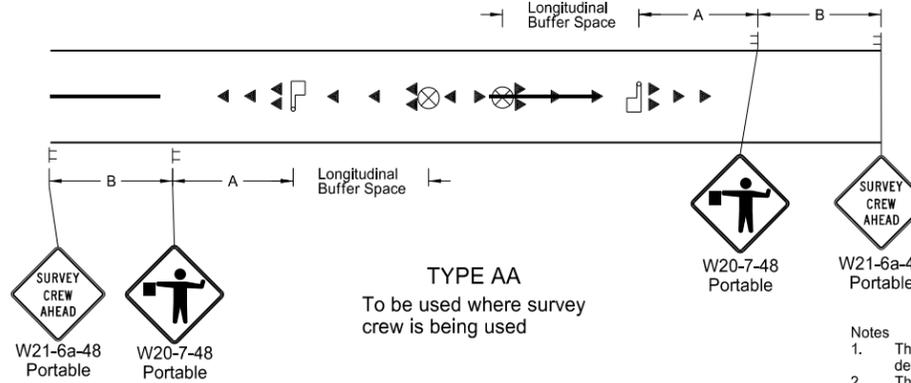
MISCELLANEOUS SIGN LAYOUTS

D-704-26



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

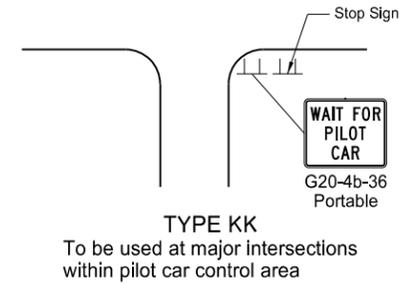
R2-1-48  
Post mounted  
(see note #1)



**TYPE AA**  
To be used where survey crew is being used

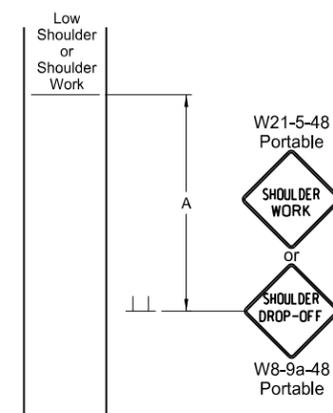
W21-6a-48  
Portable

W20-7-48  
Portable

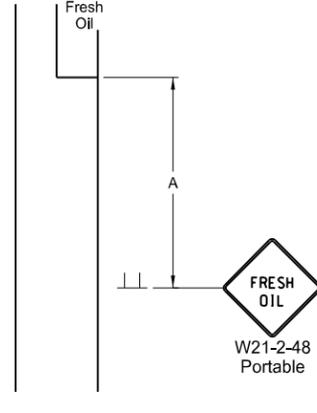


**TYPE KK**  
To be used at major intersections within pilot car control area

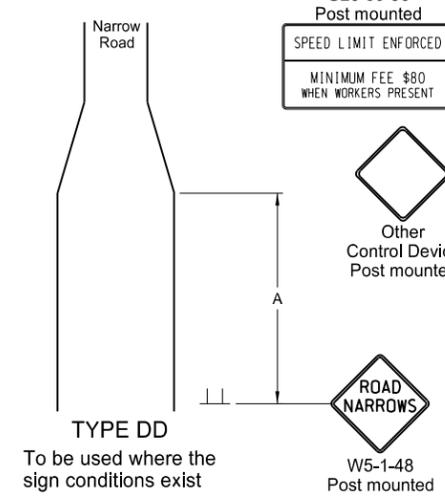
- Notes
- The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
  - The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
  - 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.
  - Existing speed limit signs within a reduced speed zone shall be covered.
  - The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
  - 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.
  - 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

G20-55-96  
Post mounted  
SPEED LIMIT ENFORCED  
MINIMUM FEE \$80  
WHEN WORKERS PRESENT

Other  
Control  
Device  
Post mounted

W3-5-48  
Post mounted

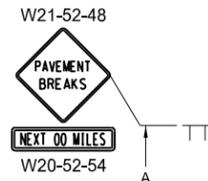
R2-1-48  
(see note #2)

R2-1a-24  
Post mounted

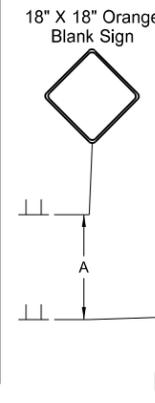
W5-1-48  
Post mounted

R2-1a-24  
Post mounted

**TYPE Z**  
To be used where speed zone is needed

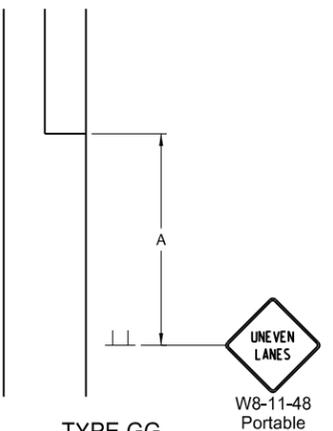


**TYPE JJ**  
To be used where there is a break in the pavement. These signs may be skid mounted or post mounted and shall be installed when conditions exist and removed when not applicable.

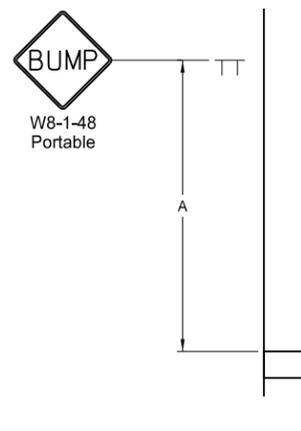


Longitudinal Buffer Space	
*Speed (mph)	Length Min (feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

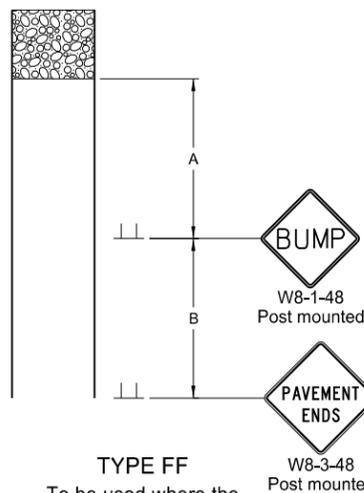
\* Posted speed, off-peak 85th percentile speed prior to work starting, or the anticipated operating speed in mph.



**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

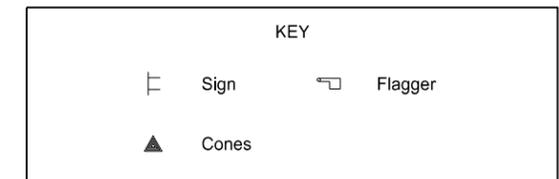
W8-3-48  
Post mounted

W8-1-48  
Post mounted

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

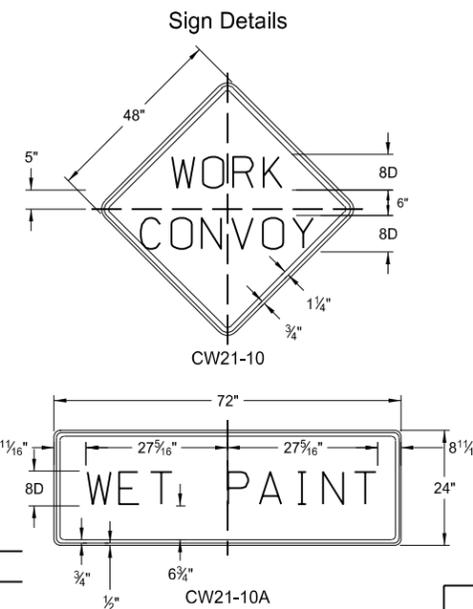
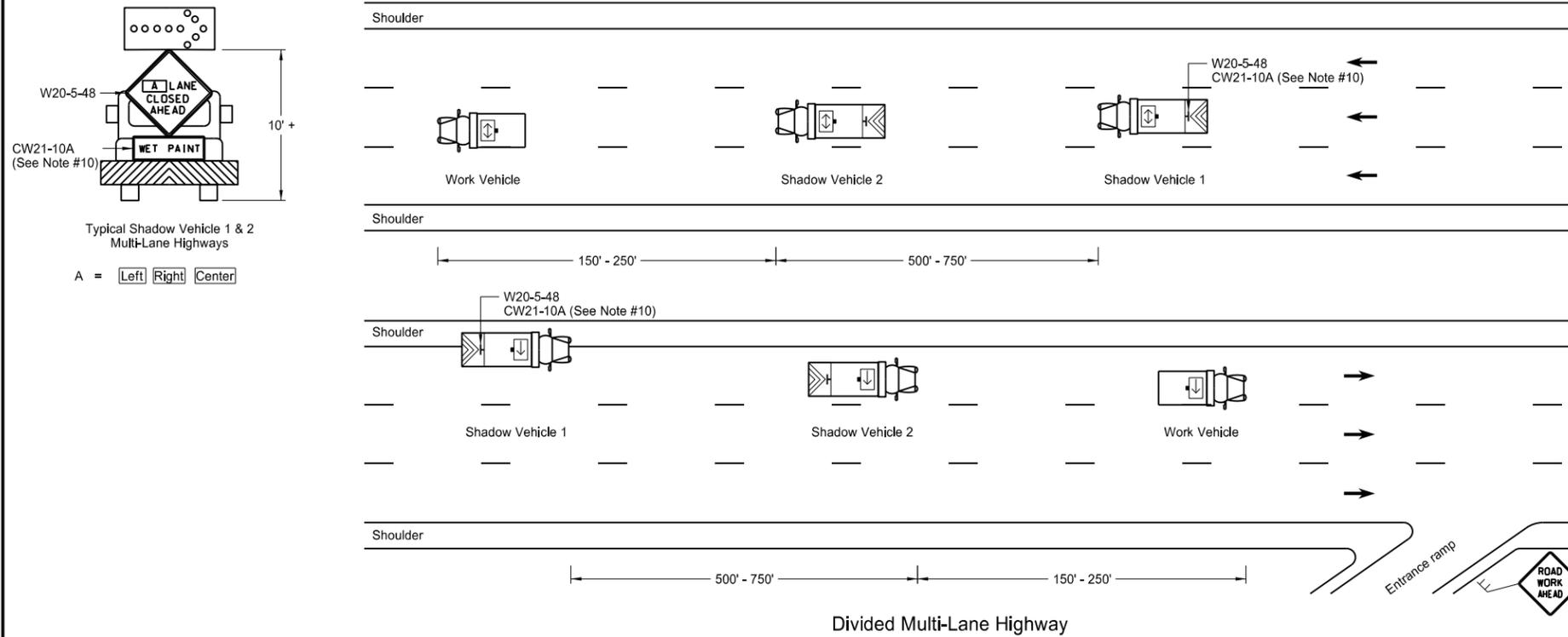
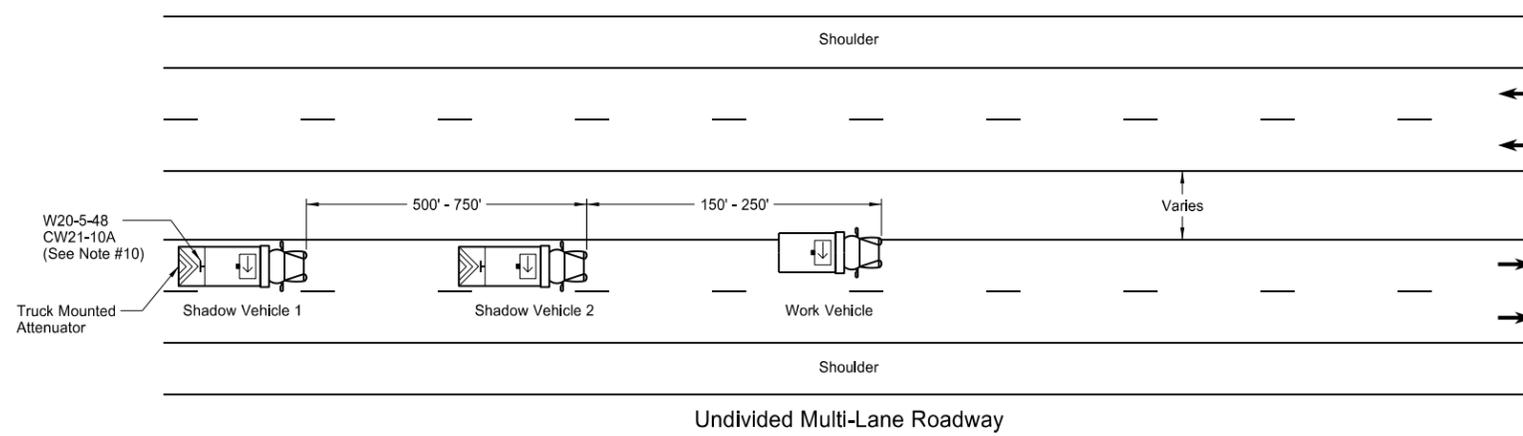
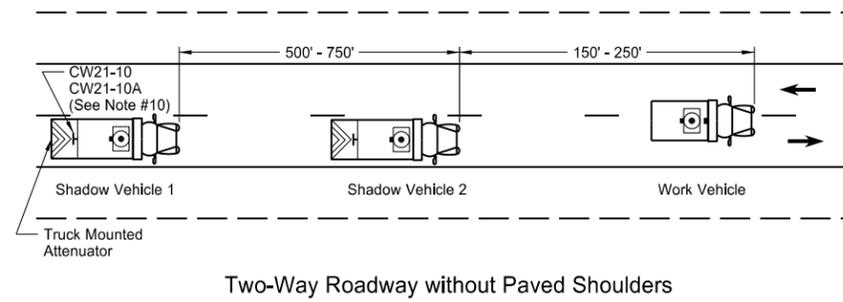
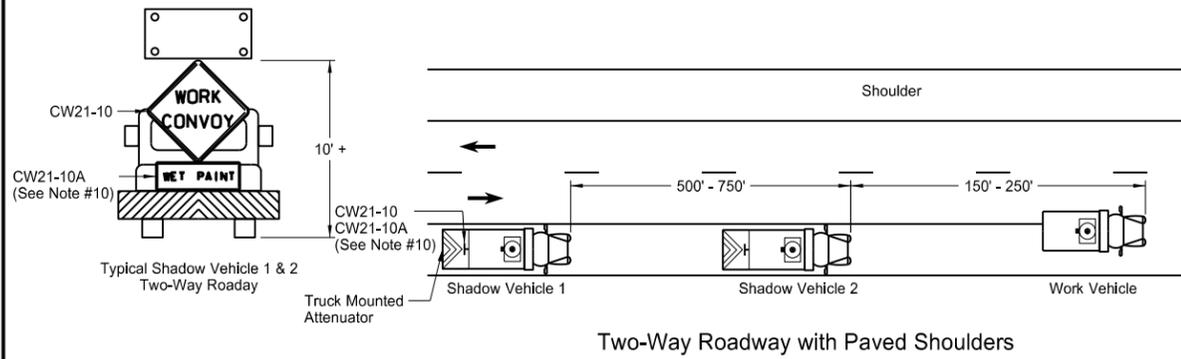
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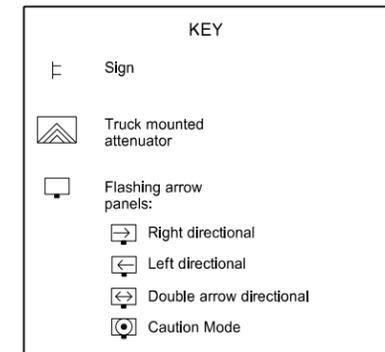


# TRAFFIC CONTROL PLAN FOR MOVING OPERATIONS

D-704-27



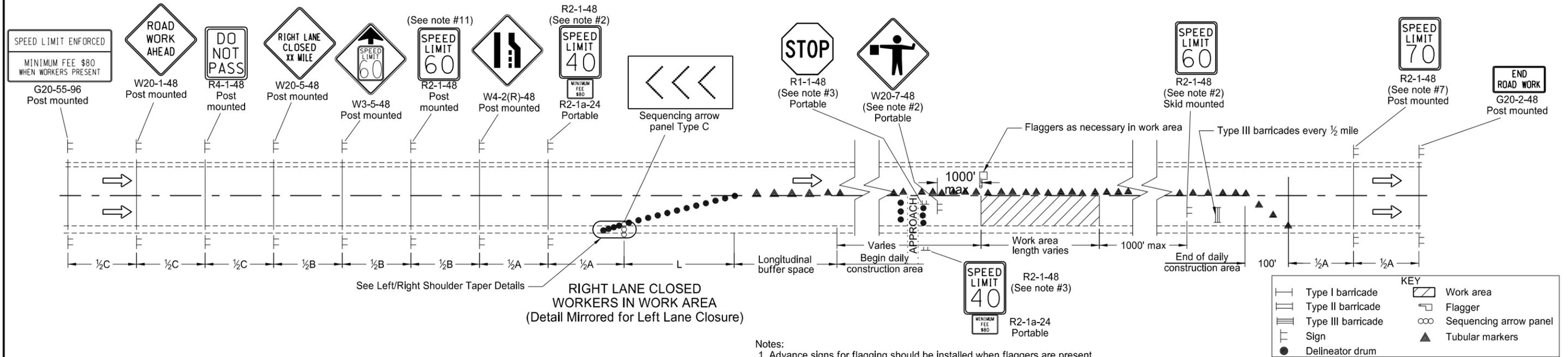
- Notes
1. If the contractor chooses to place more vehicles in the convoy than are shown, these vehicles shall have the truck mounted attenuator and shall be at the contractor's expense.
  2. Shadow and work vehicles shall display yellow rotating beacons or strobe lights unless otherwise stated elsewhere 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.



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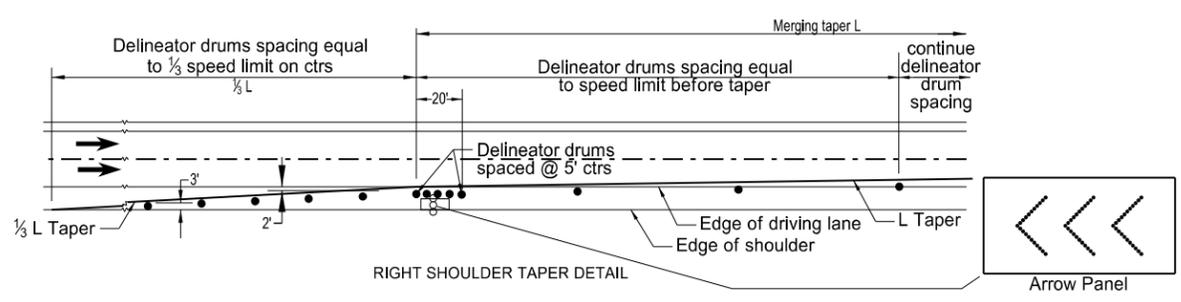
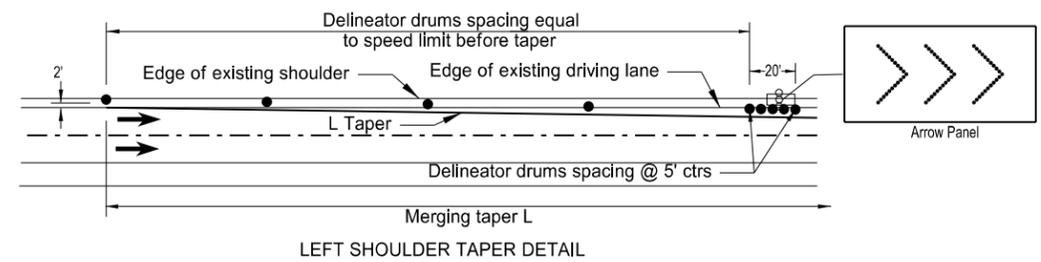
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SIGN LAYOUT FOR ONE LANE CLOSURE



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

- Notes:
- Advance signs for flagging should be installed when flaggers are present.
  - 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 1/2A 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.
  - 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.
  - 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.
  - 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".
  - 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).
  - The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
  - Existing speed limit signs within a reduced speed zone shall be covered.
  - 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.
  - The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 mph. Where speed limits are to be reduced more than 30 mph, a second speed limit sign shall be installed with the desired speed reduction, but shall not exceed 30 mph. The second speed limit sign shall be placed at 1/2B.
  - The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Specifications.
  - 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.

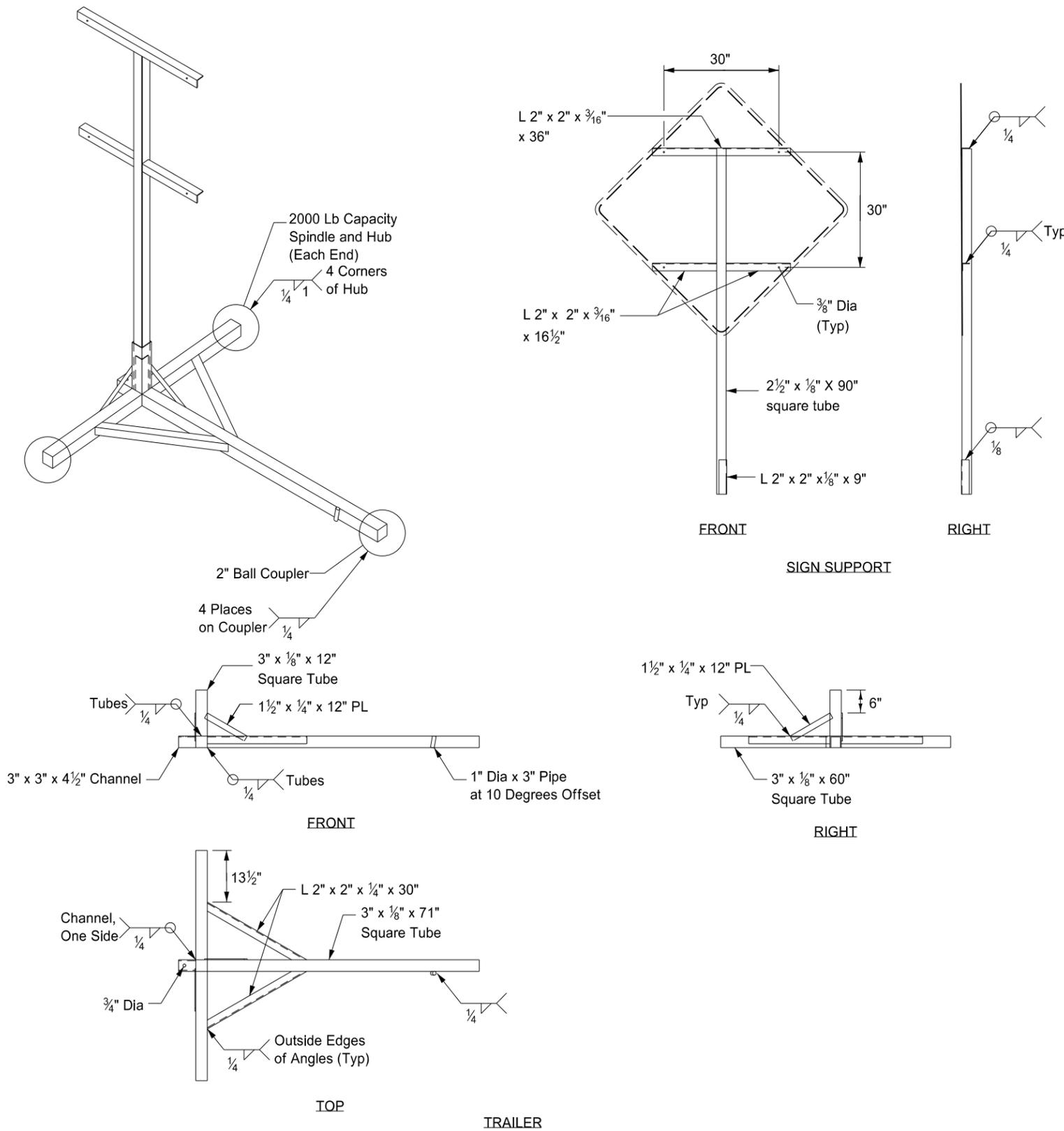
ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway 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

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PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



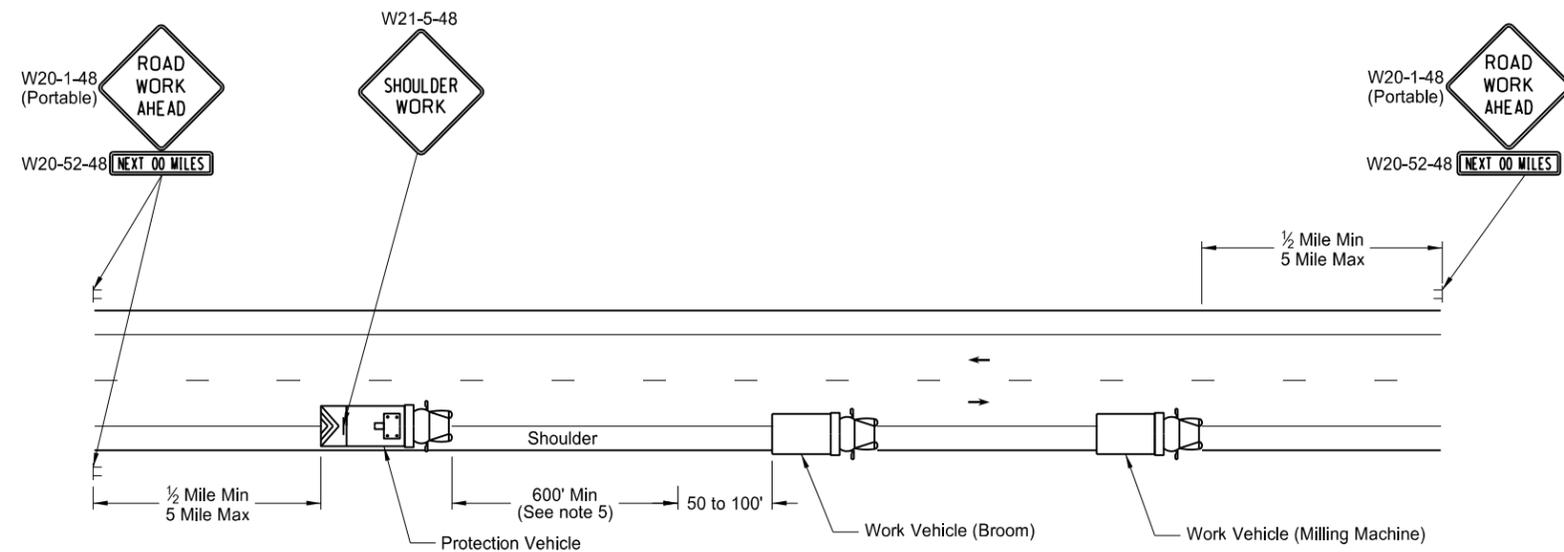
Notes:

- 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.

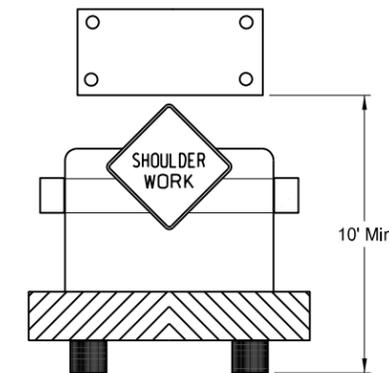
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
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MOBILE OPERATION  
Grinding Shoulder Rumble Strips



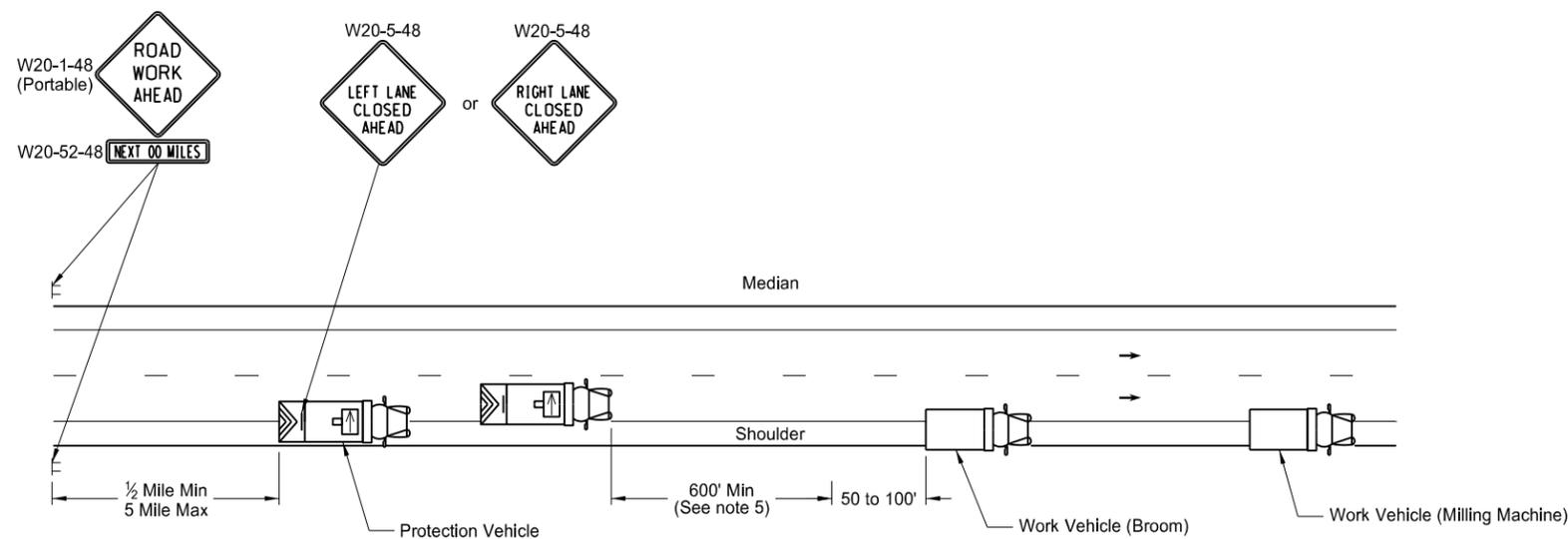
TWO LANE - TWO WAY ROADWAY



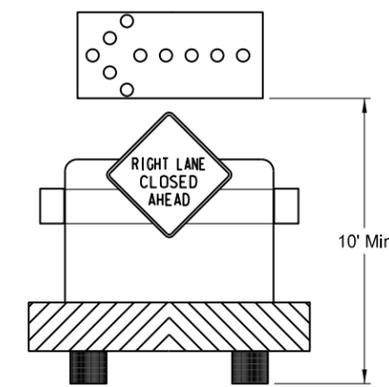
TWO LANE - TWO WAY ROADWAY  
Typical Protection Vehicle with  
Flashing Arrow Panel In Caution Mode

Notes:

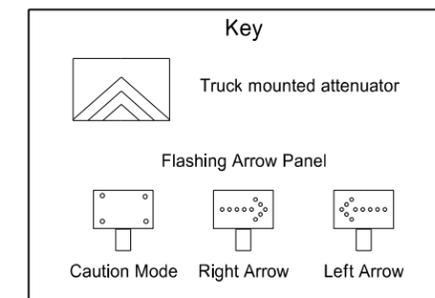
1. If the contractor chooses to place more vehicles in the convoy than are shown, these vehicles shall have the truck mounted attenuator and shall be at the contractors expense.
2. Vehicles shall have a rotating, flashing, oscillating or strobe lights.
3. Flashing arrow panels shall be Type B or Type 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

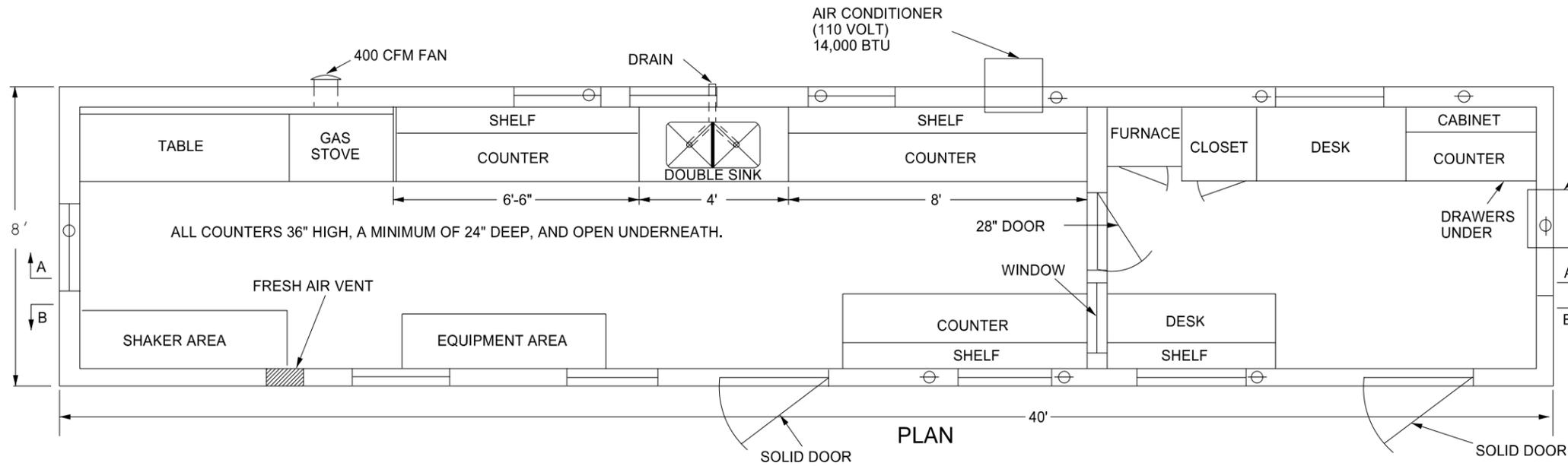


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11-15-12	
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DATE	CHANGE

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FIELD LABORATORY

D-706-1



AIR CONDITIONER (110 VOLT) 8,000 BTU

NOTES:  
 There shall be a minimum of six exterior ventilated casement or double hung windows. The minimum total area of opening shall be 34 square feet. The number, size, and location of windows may be adjusted to fit conditions. Suggested locations are shown on drawing.

The sink shall be double compartment stainless steel. Each compartment shall be a minimum of 16"x14"x10" deep. The sink shall be drained to an outside waste line. A trap is not required. Water service lines shall be copper or plastic having a diameter of 1/2 inch.

The lab shall be equipped with an exhaust fan capable of removing inside air at a rate of 400 CFM.

The fresh air vent shall be hinged to open or close manually.

24" x 48" table shall be provided capable of holding a 200 lb. masonry saw. The table shall have a minimum clearance of 36" overhead.

The water supply tank shall have a capacity of 500 gallons.

Steps shall be provided for each of two entrance doors. Steps for each area shall be made of, or covered with, a material providing for a non-slip surface. They shall be heavy duty steps that are capable of withstanding heavy loadings and extensive use.

The pressure tank on the pump shall be 20 gallon capacity.

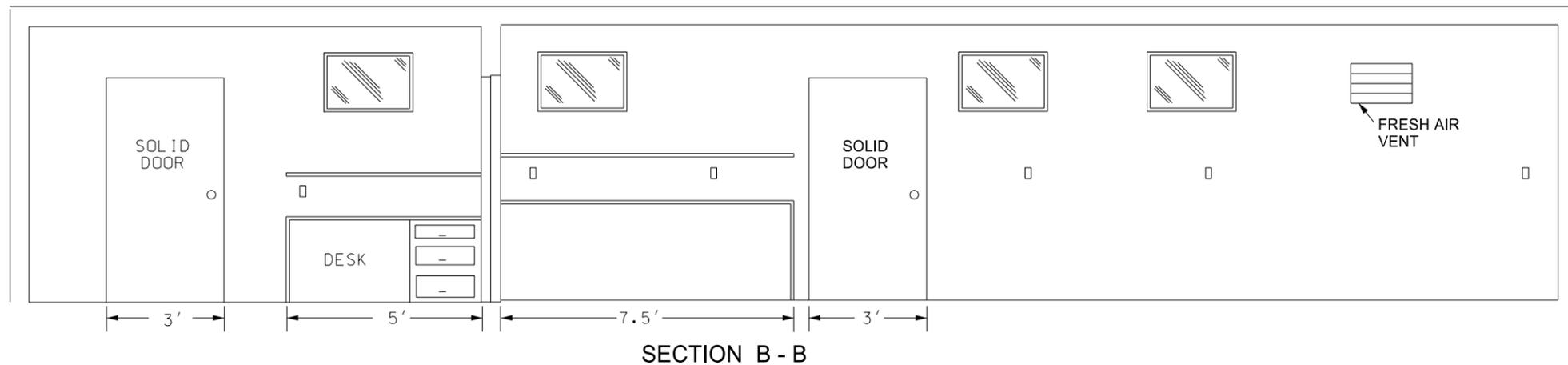
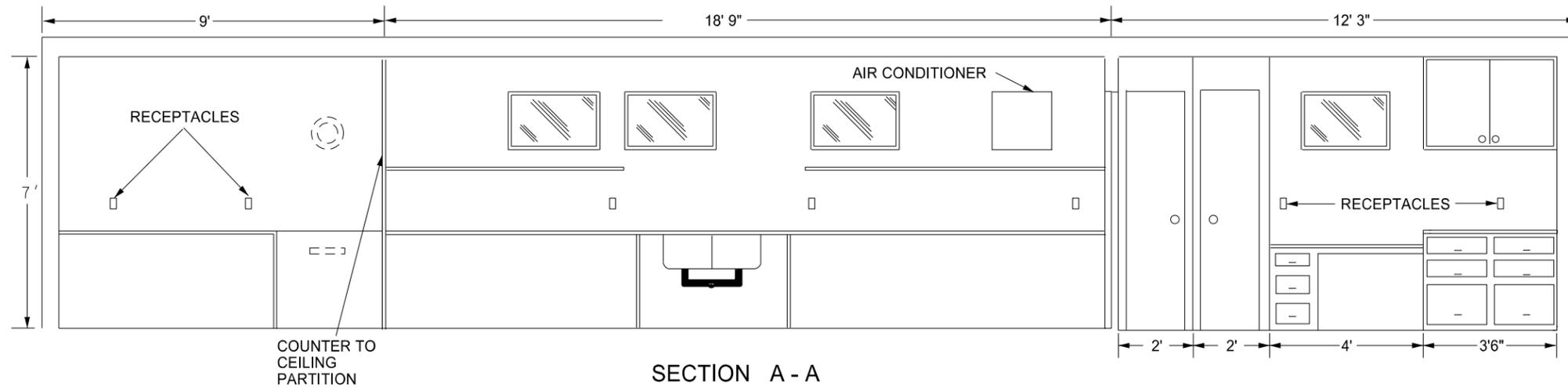
Locks, latches, and hinges for main doors shall be heavy duty type to withstand the intense use in service.

The wall between the office and the work area shall be properly insulated to prevent the transmission of heat & noise.

The floor beneath the marshal area shall be heavily reinforced.

The lab shall be equipped with steel cable tie downs and ground anchors at each corner of the lab.

Electrical service entrance shall be wired for 100 amps, and have separate circuits for air conditioners. Convenience outlets shall have a minimum spacing of four feet in counter areas.

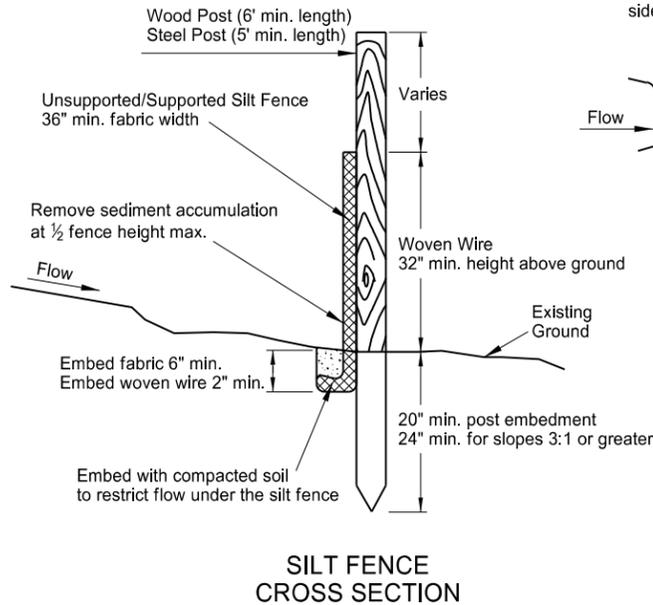
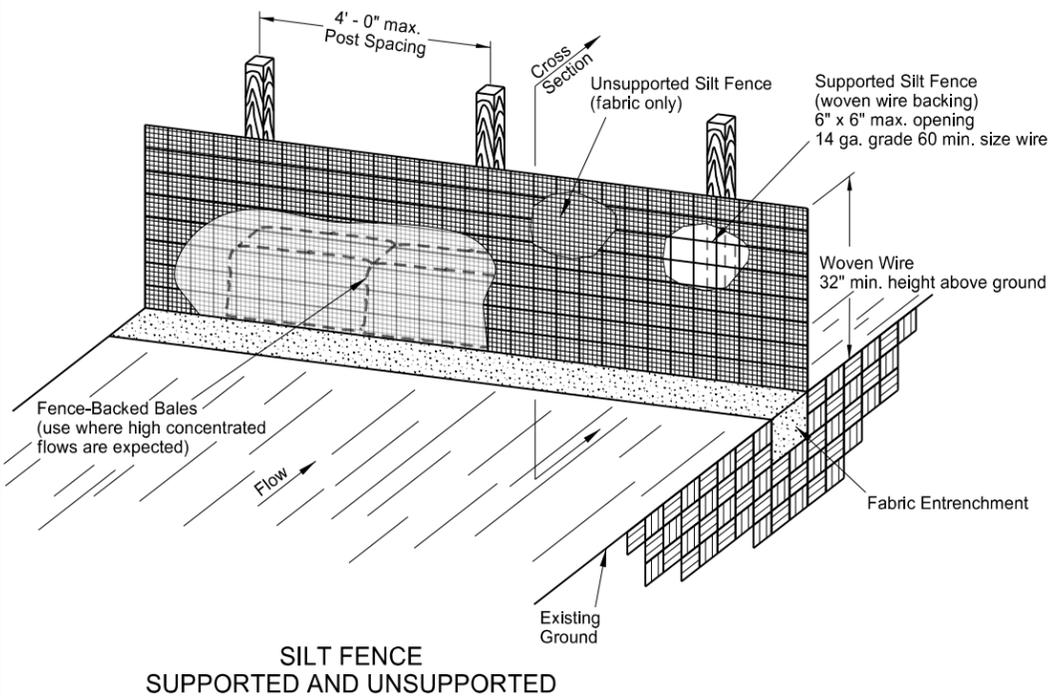
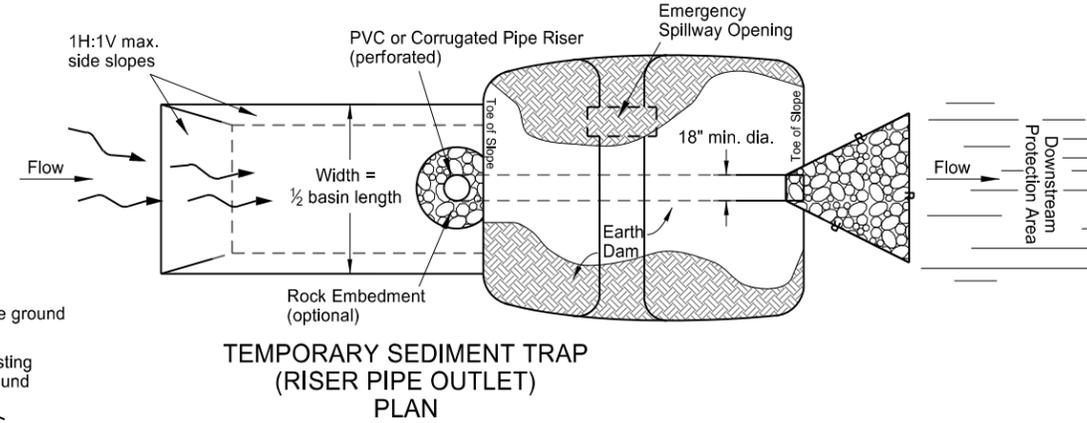
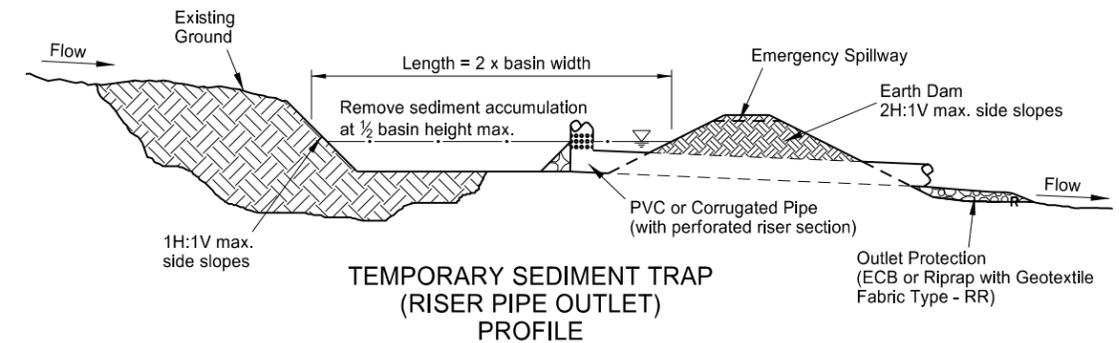
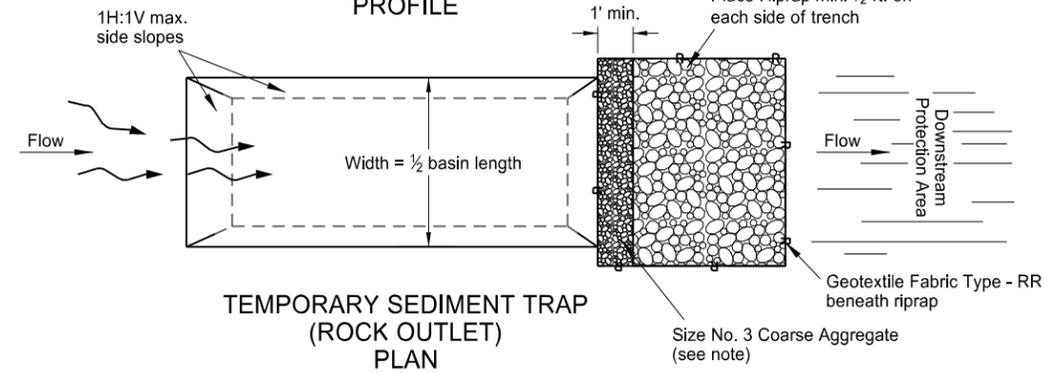
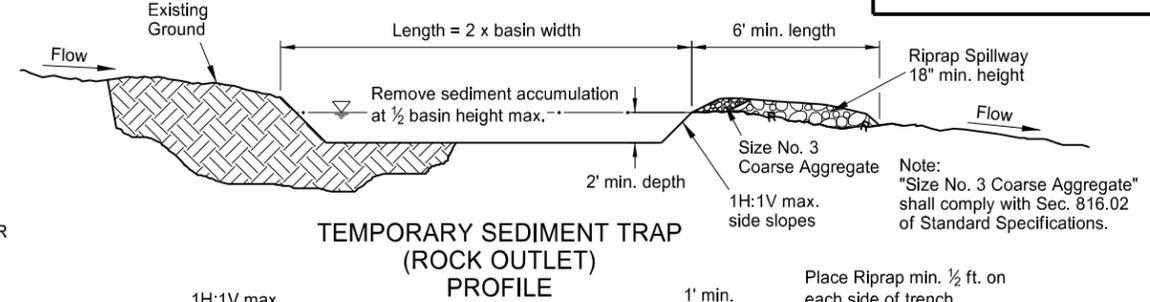
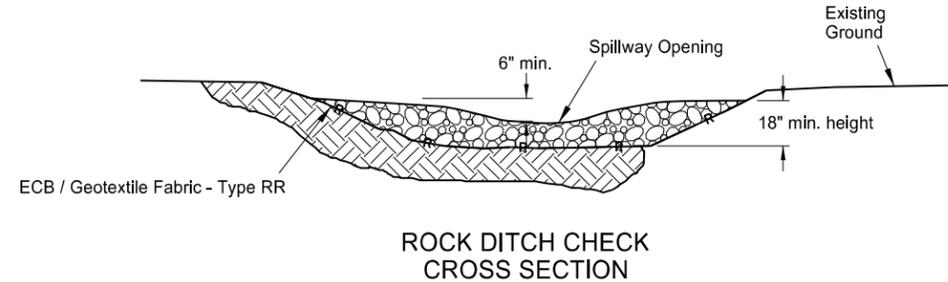
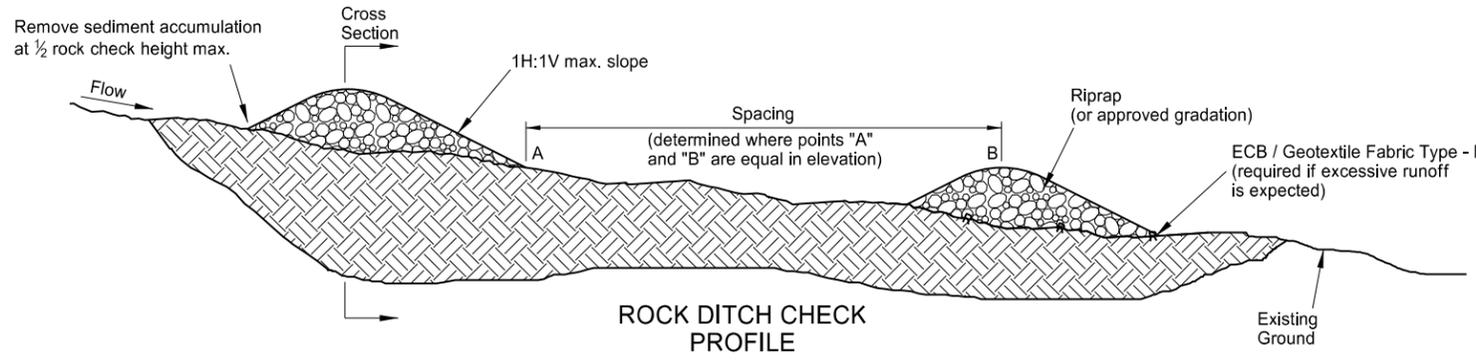


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# EROSION AND SILTATION CONTROLS

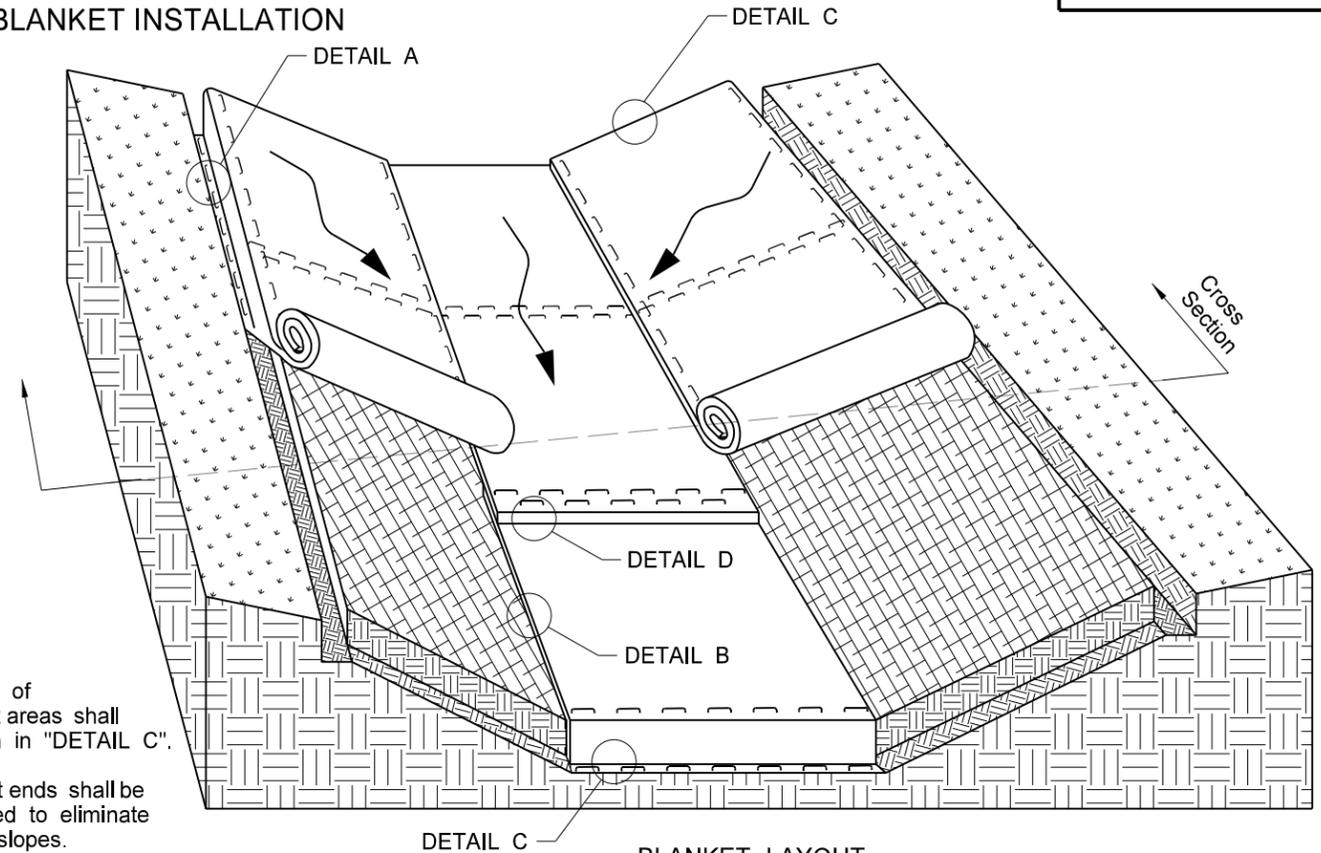
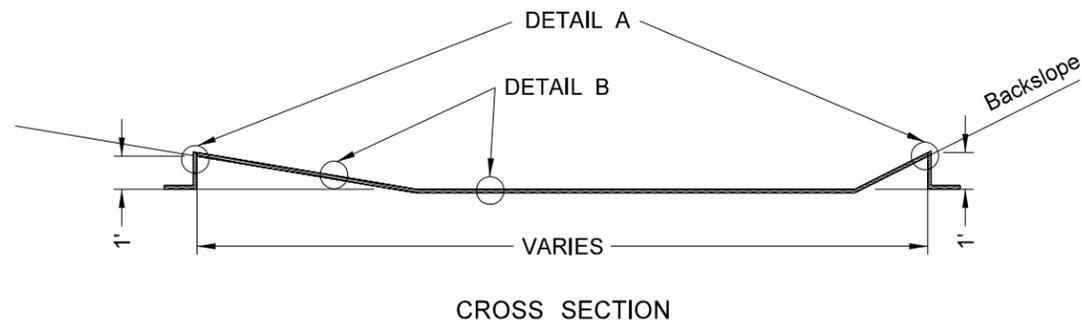
D-708-2



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10-03-13	
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DATE	CHANGE

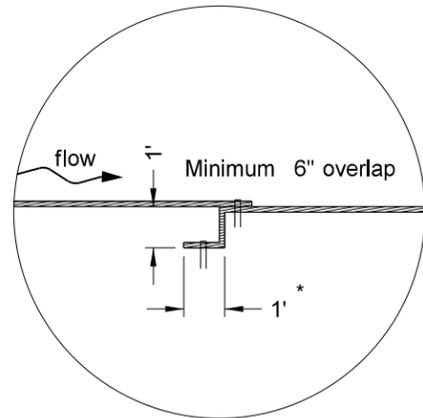
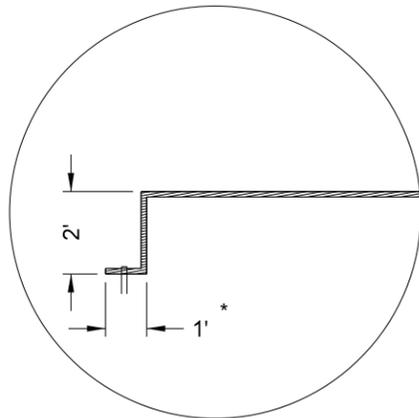
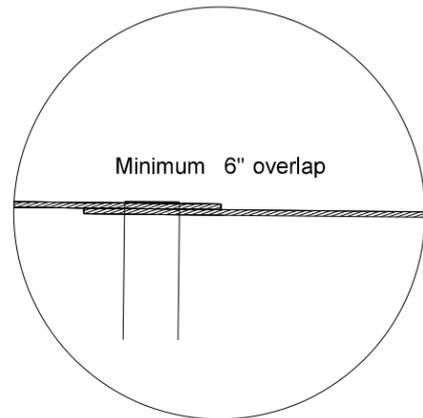
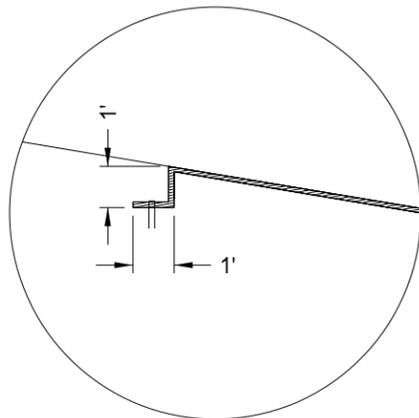
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EROSION AND SILTATION CONTROL  
EROSION CONTROL BLANKET INSTALLATION



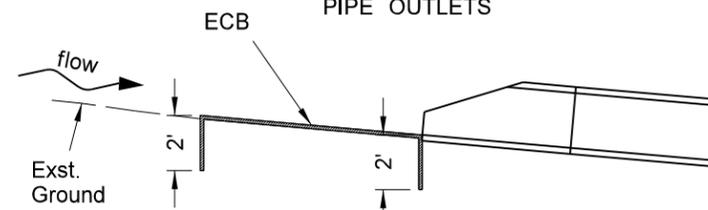
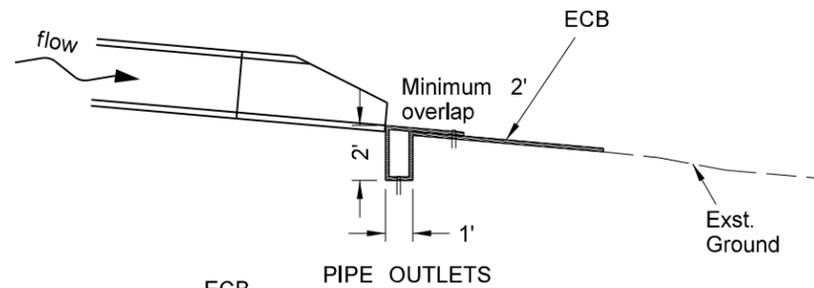
Notes:  
Beginning and ending of erosion control blanket areas shall be installed as shown in "DETAIL C".  
Erosion control blanket ends shall be entrenched and stapled to eliminate undermining on side slopes.

CHANNEL OR SLOPE INSTALLATION



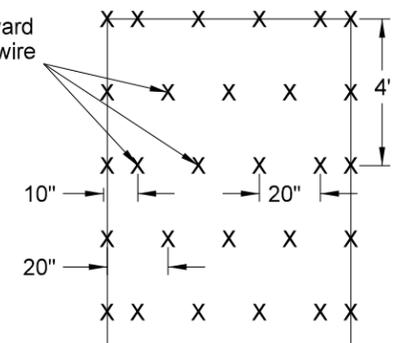
\* This tie may be placed ahead or back.

DETAILS  
CHANNEL OR SLOPE INSTALLATION



INSTALLATION AT PIPE ENDS

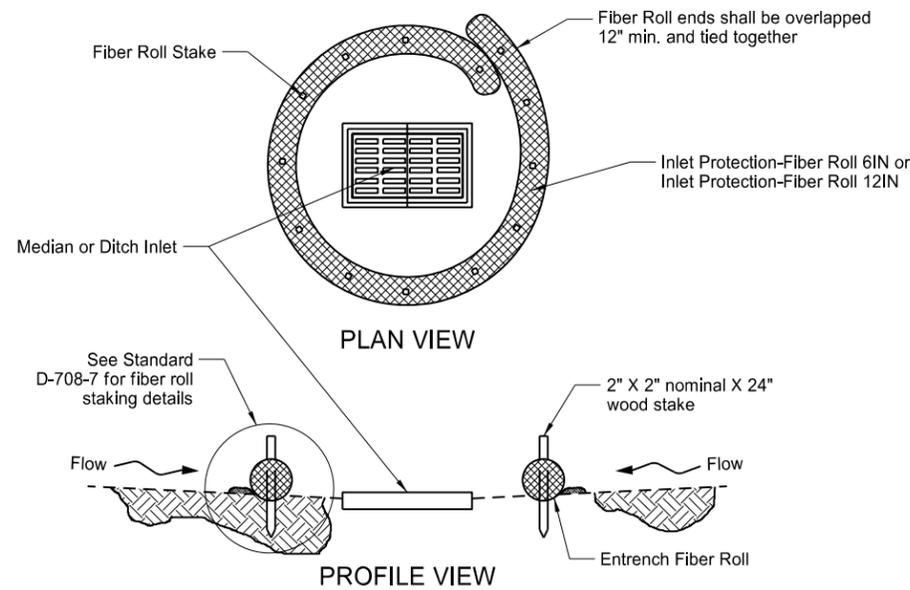
3.8 staples per square yard using 8-inch 11 gauge wire "u" staples.



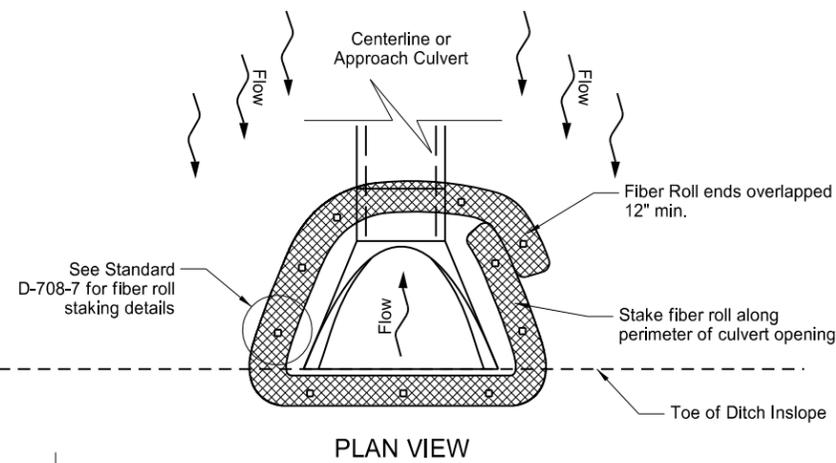
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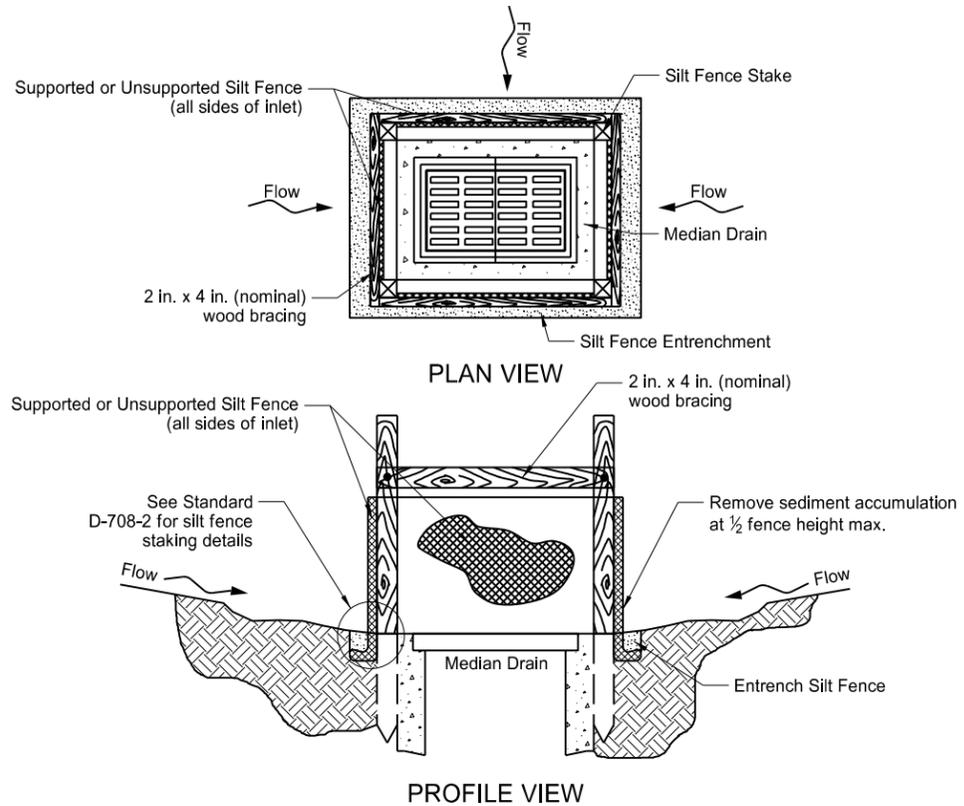
EROSION AND SILTATION CONTROLS  
MEDIAN OR DITCH INLET PROTECTION



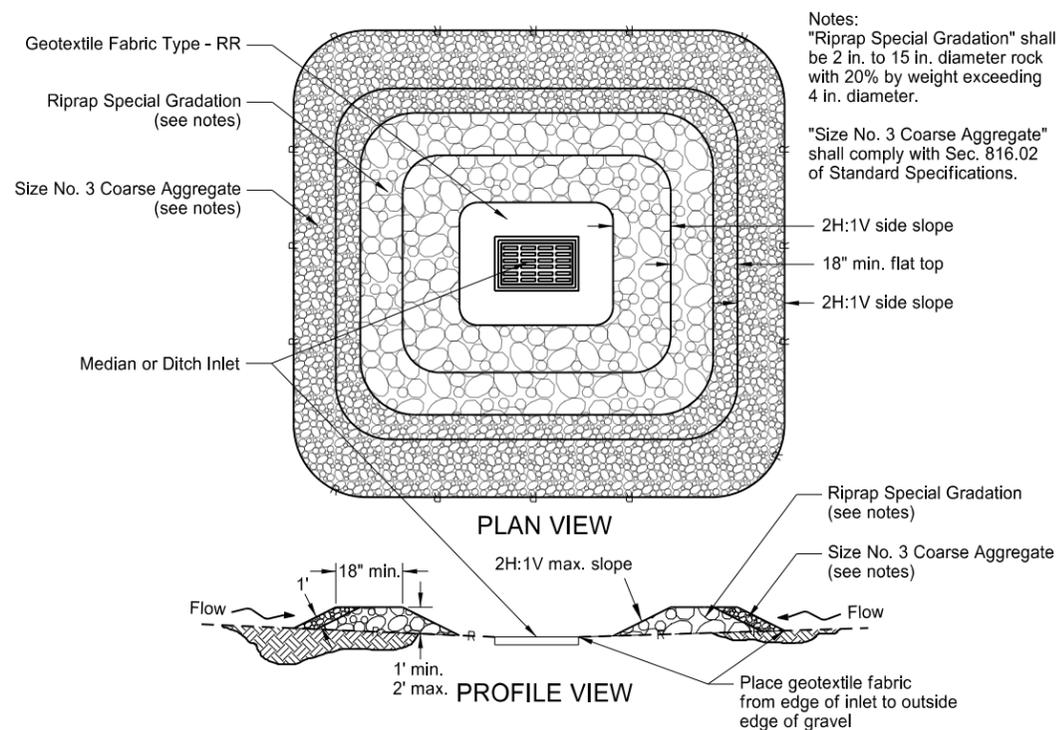
FIBER ROLL PROTECTION  
(MEDIAN OR DITCH INLET)



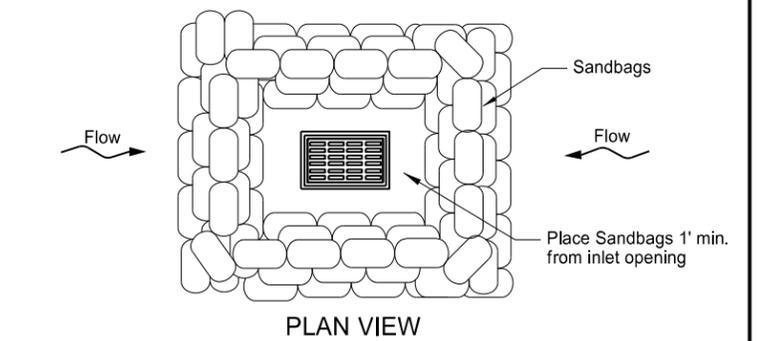
FIBER ROLL PROTECTION  
(INLET OF CULVERT)



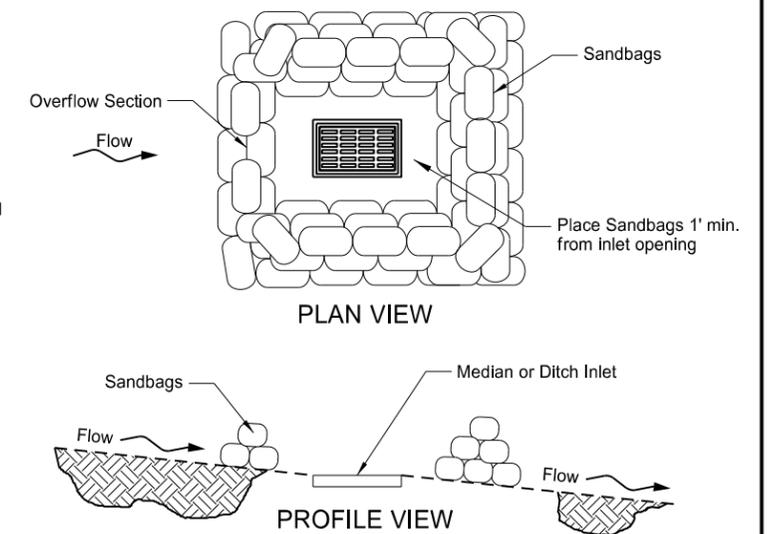
SILT FENCE PROTECTION  
(MEDIAN OR DITCH INLET)



GRAVEL INLET PROTECTION  
(MEDIAN OR DITCH INLET)



SANDBAG PROTECTION  
(LOW POINT)

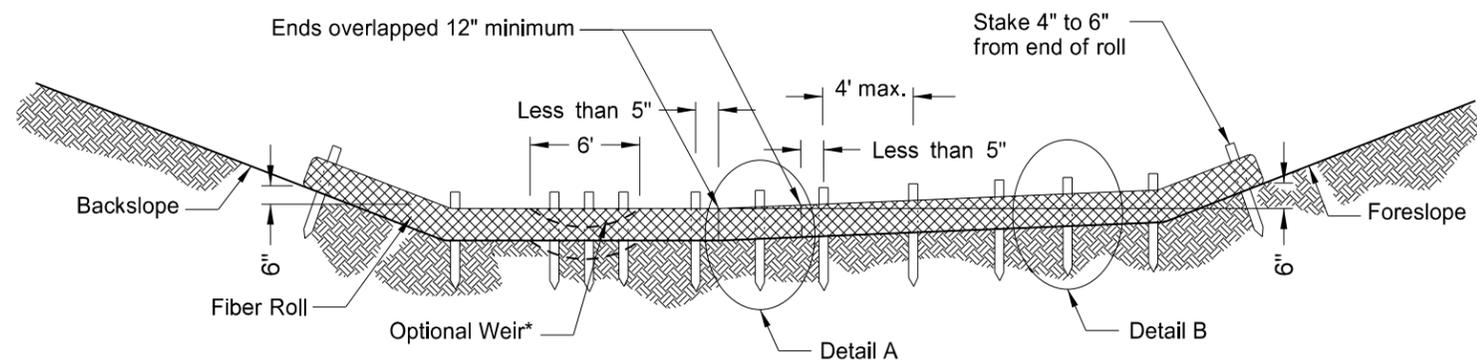


SANDBAG PROTECTION  
(ON SLOPE)

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

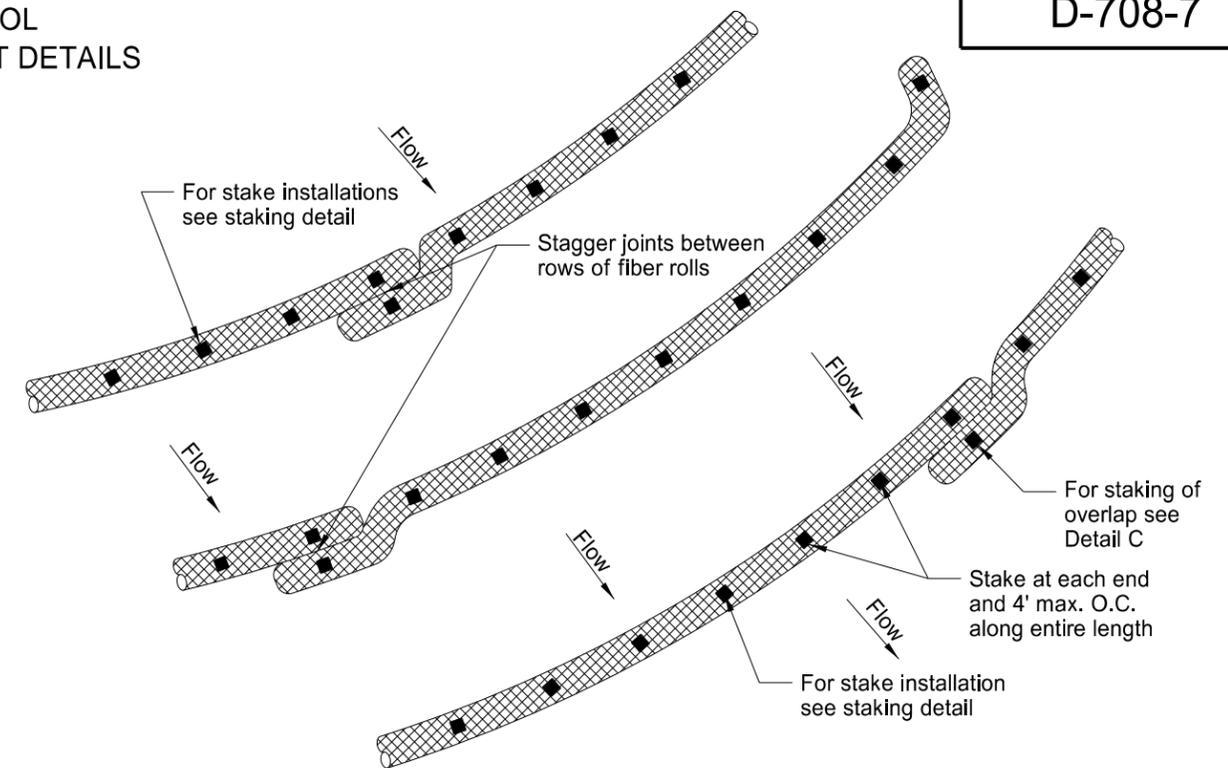
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EROSION CONTROL  
FIBER ROLL PLACEMENT DETAILS

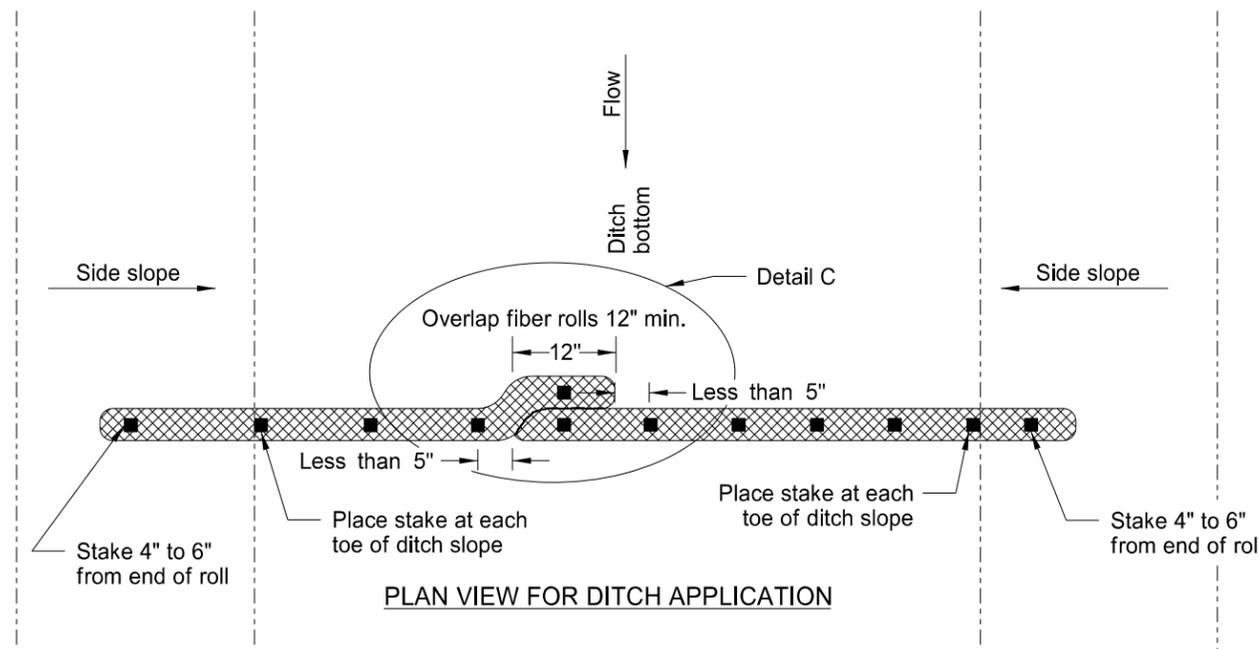


\*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back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

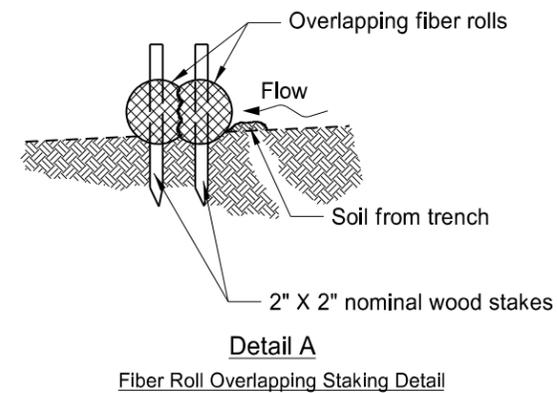
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



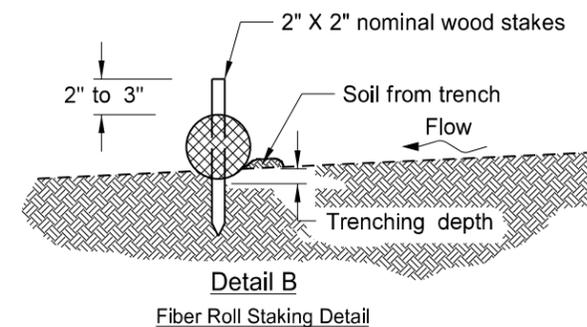
PLAN VIEW FOR SLOPE APPLICATION



PLAN VIEW FOR DITCH APPLICATION



Detail A  
Fiber Roll Overlapping Staking Detail



Detail B  
Fiber Roll Staking Detail

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

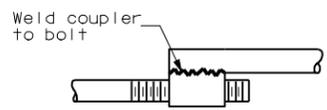
NOTE: Runoff must not be allowed to run under or around roll.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-18-10	
REVISIONS	
DATE	CHANGE
06-10-13	Added plan view for ditch and slope application, Added table with values for stake and trench dimensions.
10-04-13	Revised fiber roll overlap detail.

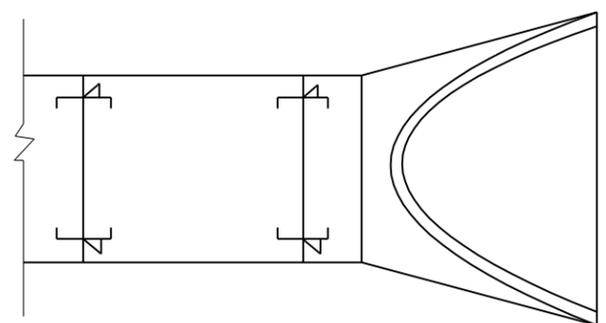
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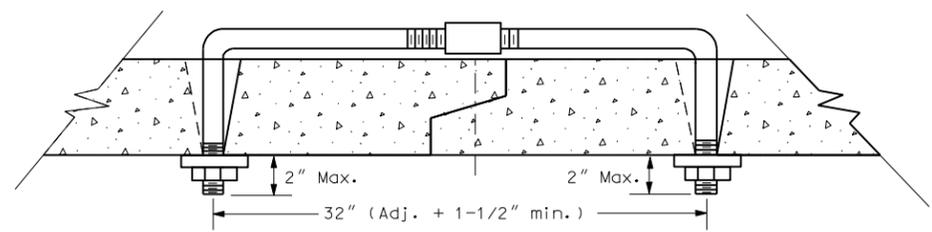
# CONCRETE PIPE TIES



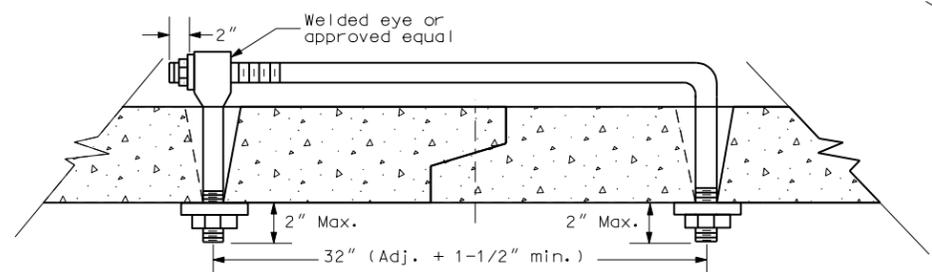
TOP VIEW



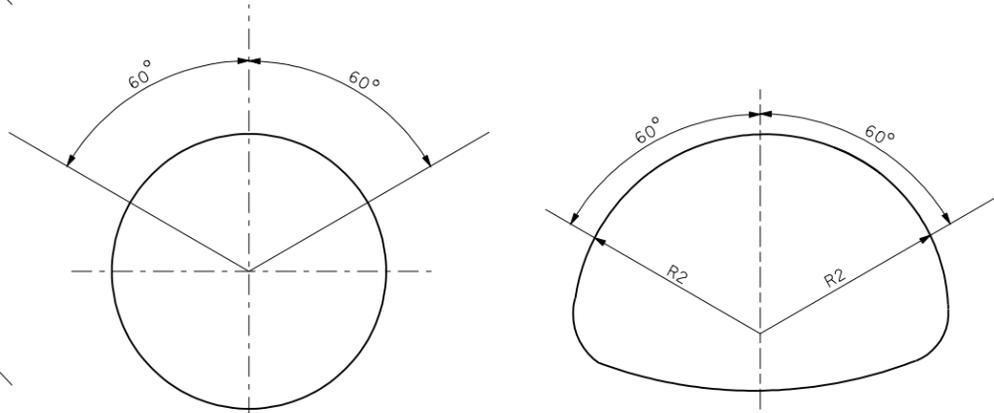
REQUIRED SIZE OF TIE BOLTS					
Pipe Size (Inches)	Thread Dia.	Pipe Size (Inches)	Thread Dia.	Pipe Size (Inches)	Thread Dia.
12	5/8" (See note 2)	30	3/4"	72	1"
15		33		78	
18		36		84	
21		42		90	
24		48		96	
27		54		102	
		60		108	
		66		120	
			132		



ADJUSTABLE TIE



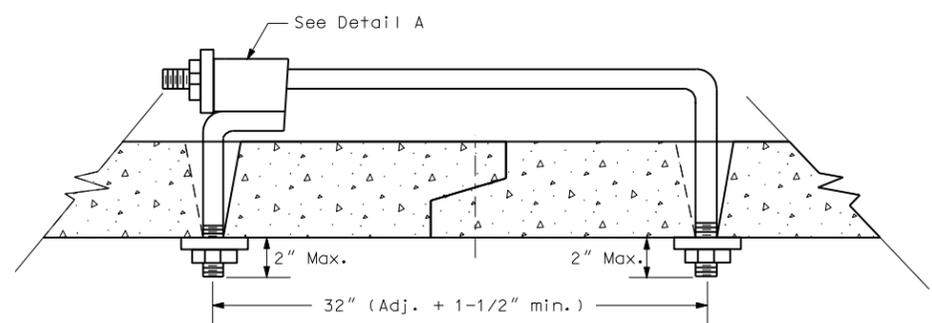
EYE BOLT TIE



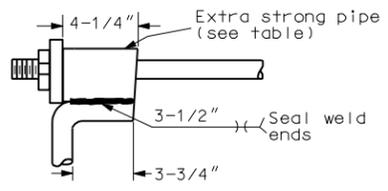
PLACEMENT OF HOLES

NOTES:

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

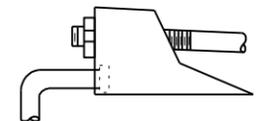


WELDED PIPE TIE

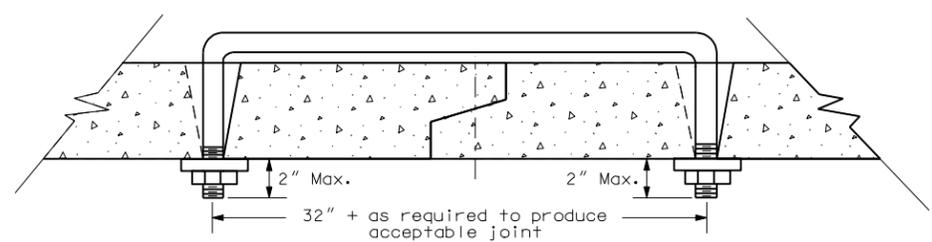


DETAIL A

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



OPTIONAL CANOPY TIE

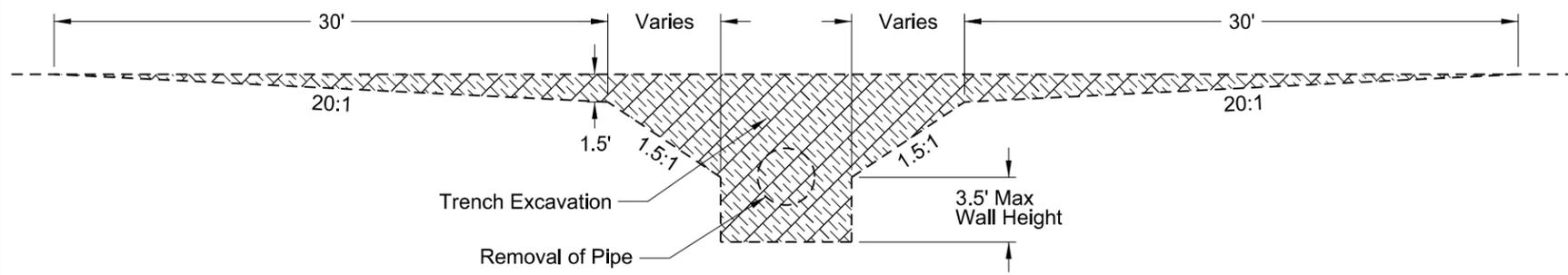


U BOLT TIE

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

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



EXCAVATION DETAIL

Pay Items

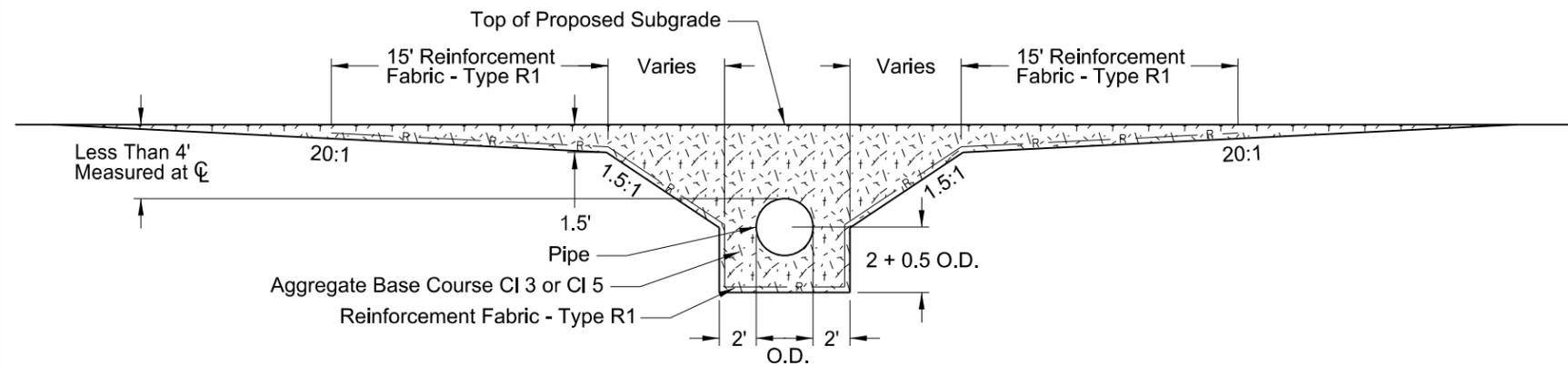
- 1) Pipe\*
- 2) Reinforcement Fabric - Type R1
- 3) Removal of Pipe (if required)

\*Included in Pipe Pay Item

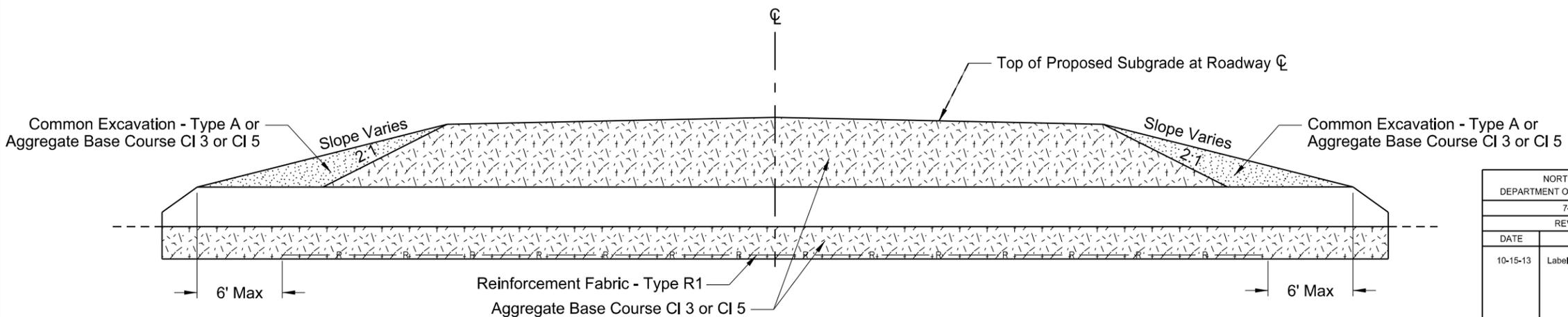
- 1) Pipe
- 2) Trench Excavation
- 3) Aggregate Base Course CI 3 or CI 5
- 4) Common Excavation - Type A

NOTES:

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



INSTALLATION DETAIL

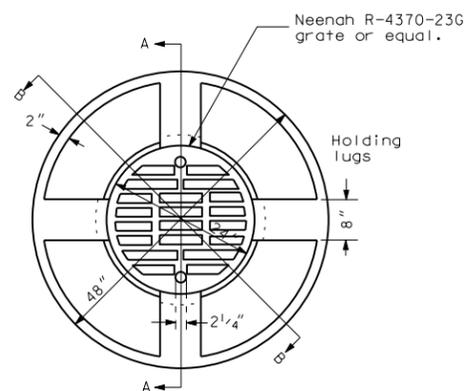


CROSS SECTION

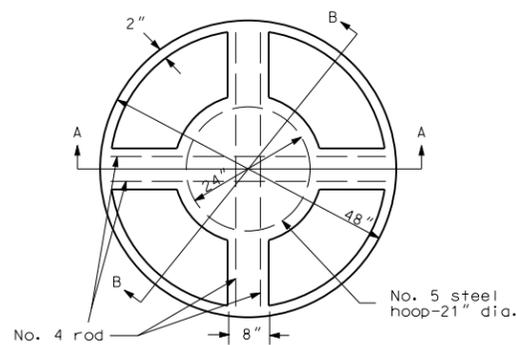
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-26-13	
REVISIONS	
DATE	CHANGE
10-15-13	Label Formatting

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Ron Homer,  
Registration Number  
PE-2087,  
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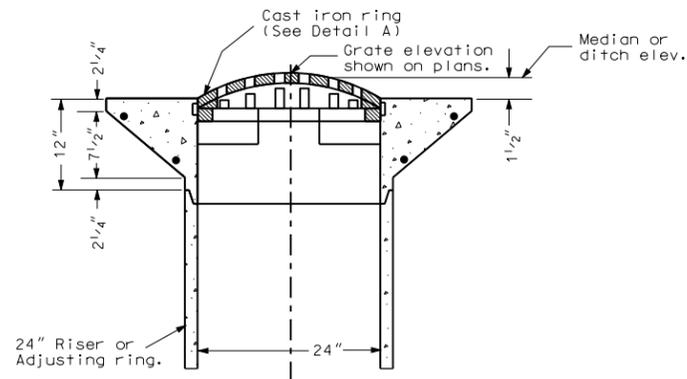
PRECAST CONCRETE MEDIAN DRAIN



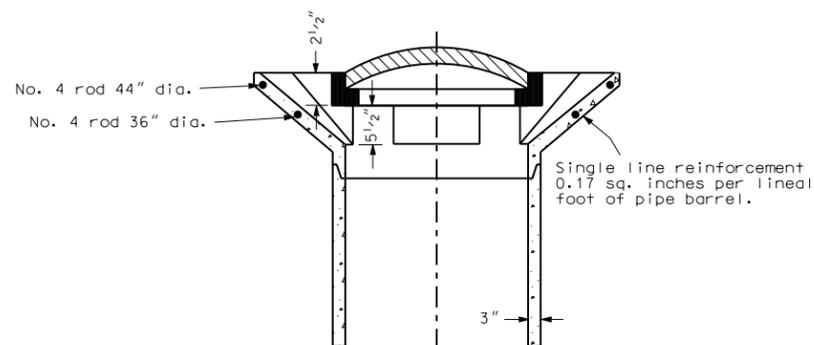
PLAN VIEW



PLAN VIEW

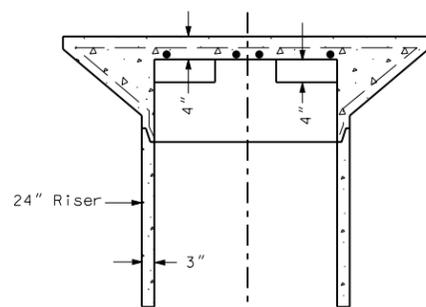


SECTION A-A

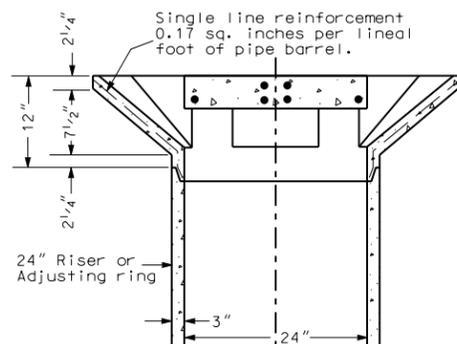


TYPE A

SECTION B-B

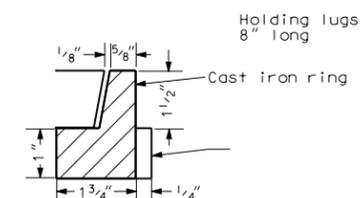


SECTION A-A

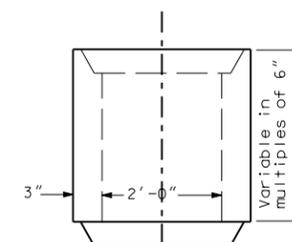


TYPE B

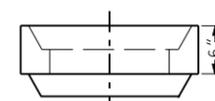
SECTION B-B



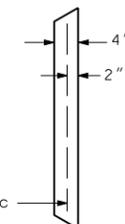
DETAIL A



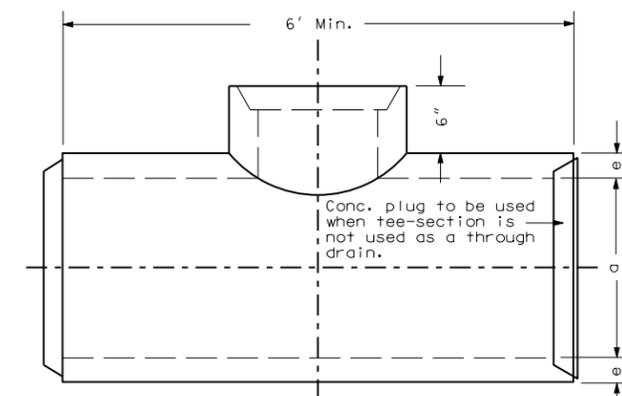
RISER SECTION



ADJUSTING RING

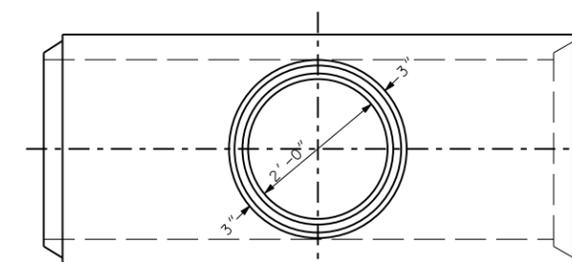


CONC. PLUG



SIDE VIEW

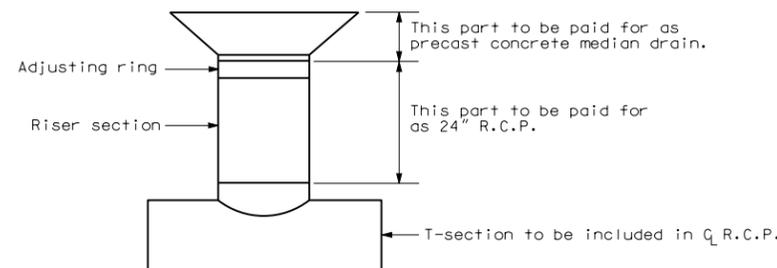
a = Diameter of drainage pipe  
e = Wall thickness of drainage pipe



PLAN VIEW

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

T - SECTION



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

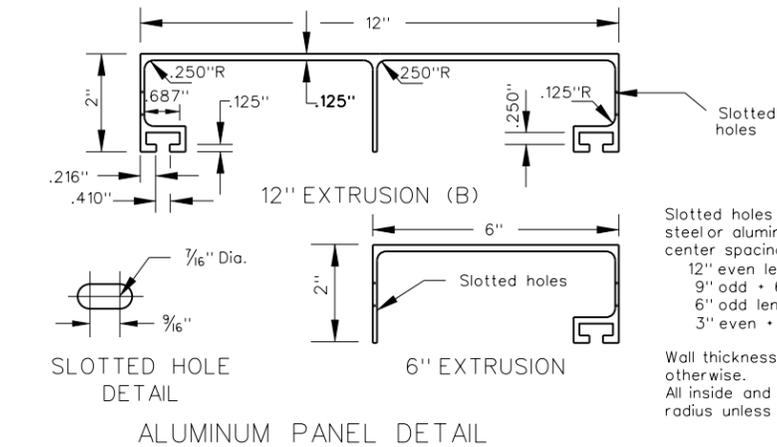
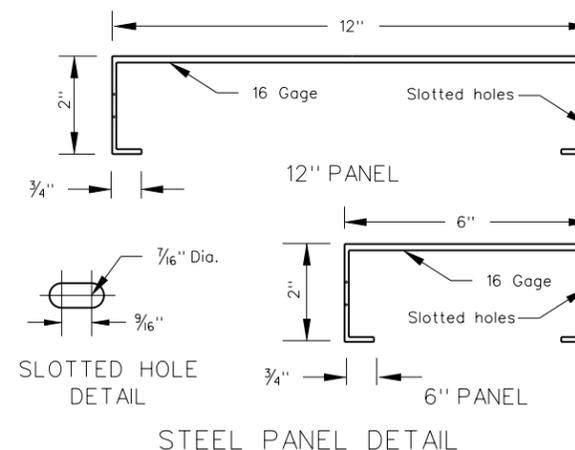
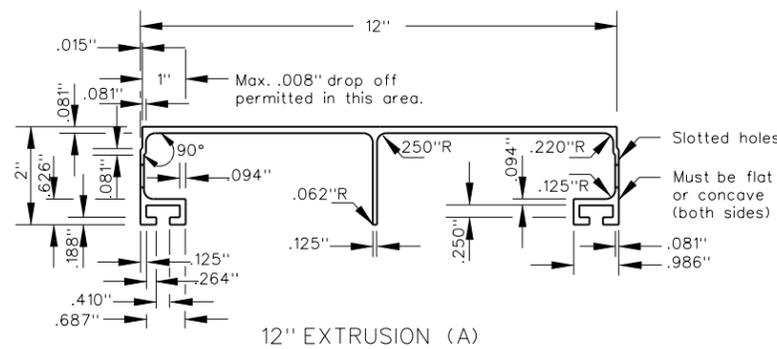
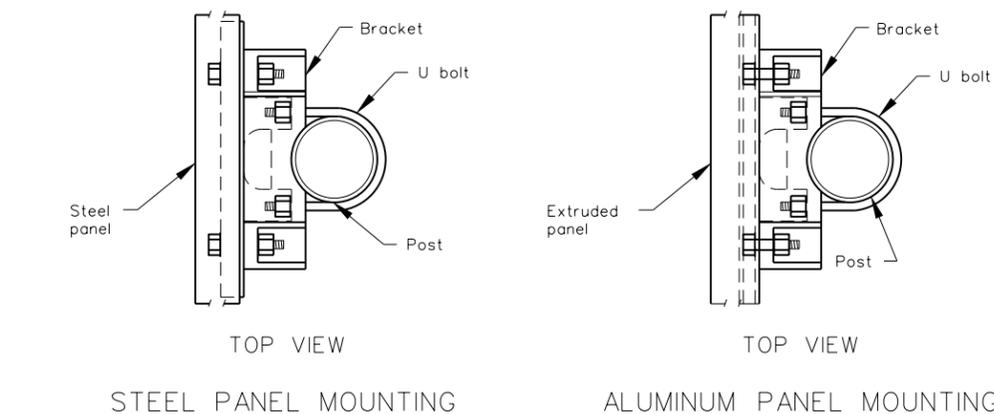
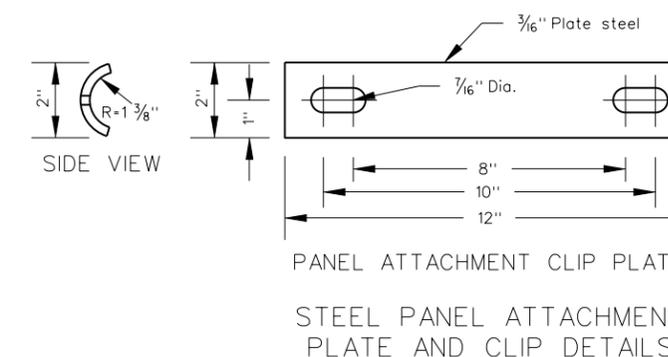
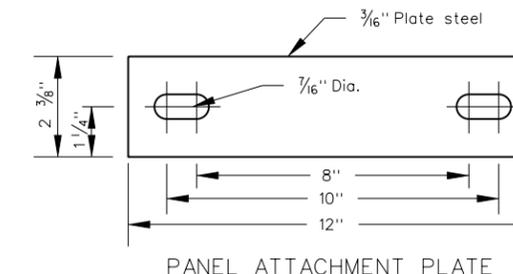
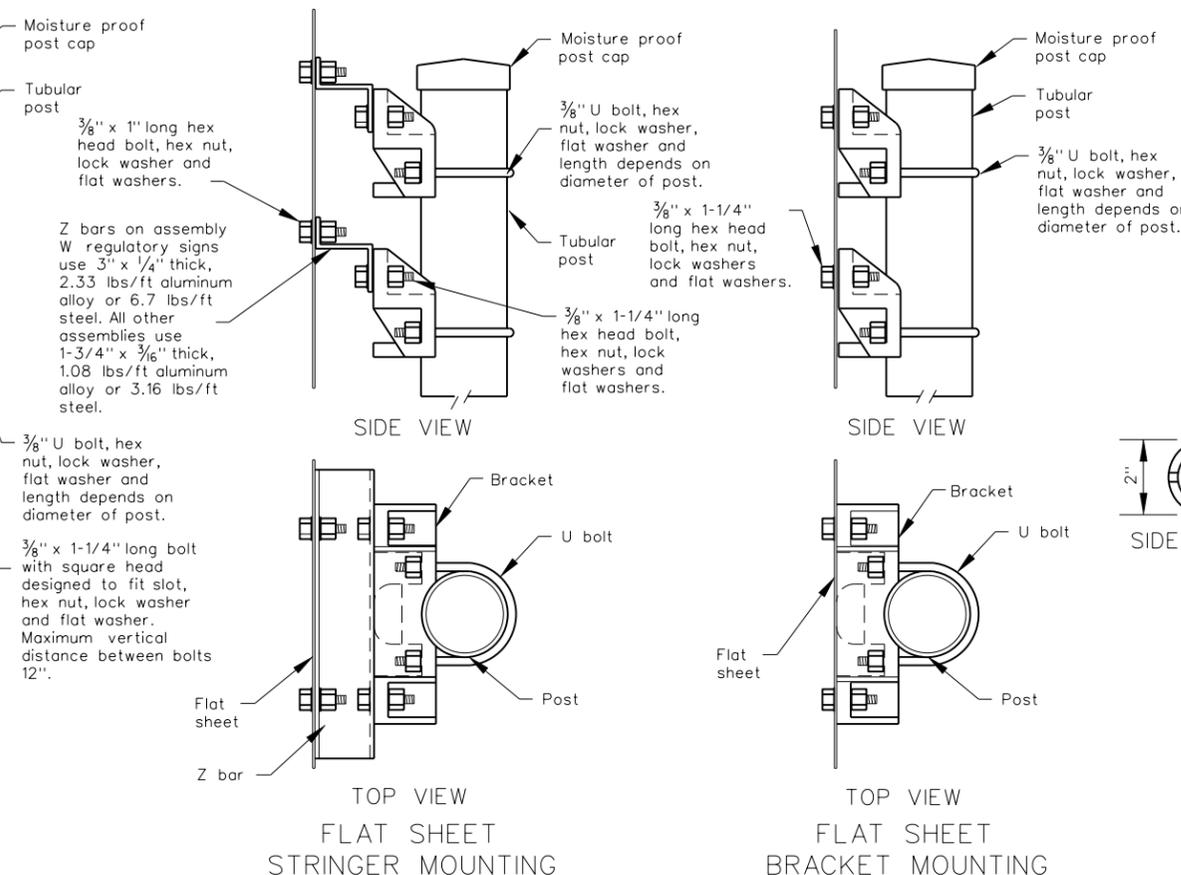
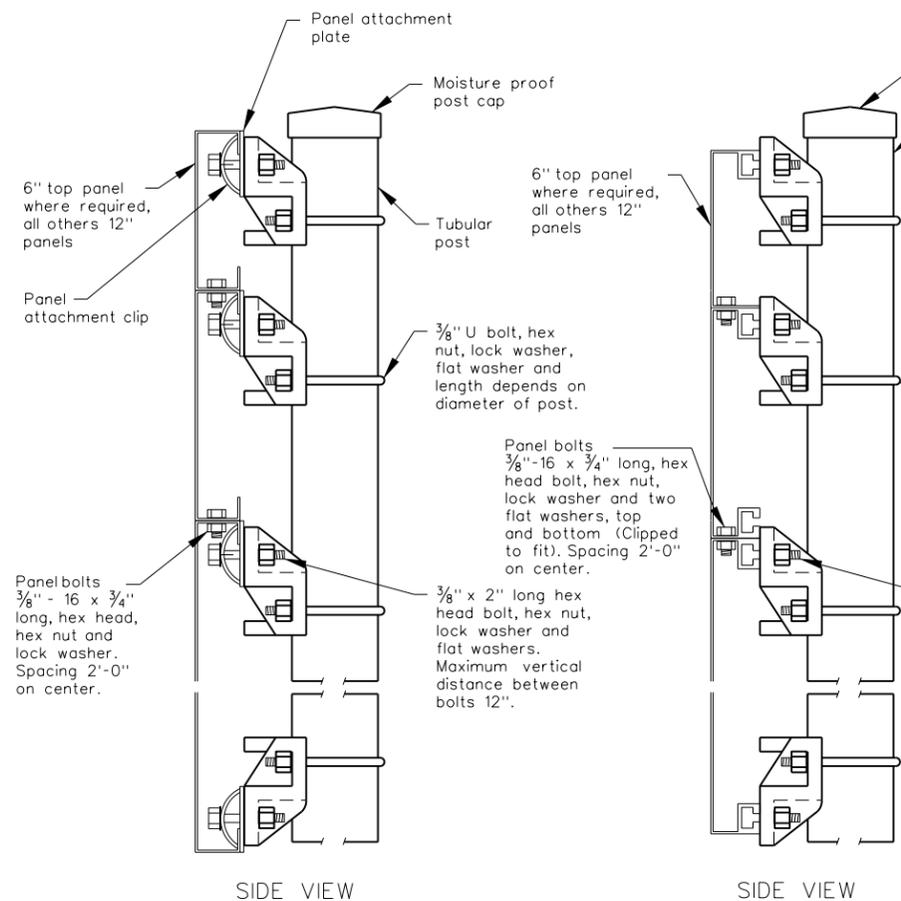
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**MARK S. GAYDOS**  
Registration Number  
PE- 4518 ,  
on 12/01/04 and the original document is stored at the  
North Dakota Department  
of Transportation



MOUNTING, POST CAP AND PANEL DETAILS

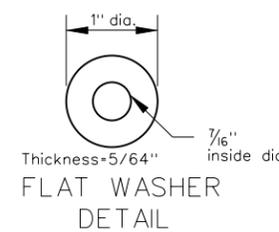
NOTE:

Mounting Bracket: See Std. D-754-8 for details.

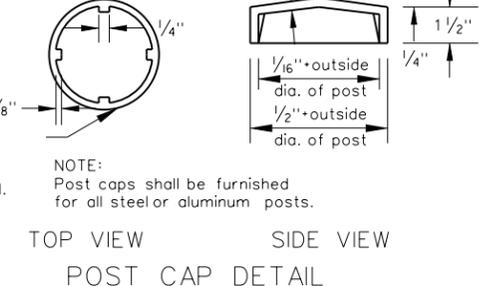


Slotted holes shall be punched in the steel or aluminum panels at 1'-0" on center spacing from end as listed below:  
12" even length panels 4'-0" etc.  
9" odd + 6" length panels 5'-6" etc.  
6" odd length panels 5'-0" etc.  
3" even + 6" length panels 4'-6" etc.

Wall thickness = .078" unless specified otherwise.  
All inside and outside corners = .031" radius unless specified otherwise.



Note: In lieu of cast post cap a 1/8" plate welded all the way around may be used.

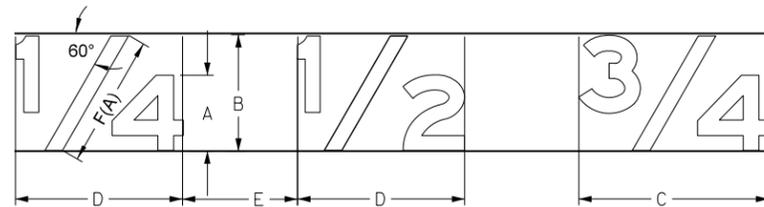


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-15-94	
REVISIONS	
DATE	CHANGE
02-29-00	Flat washers
03-12-01	Layout revision
12-01-04	PE Stamp added

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Registration Number **PE- 4518**,  
on 12/01/04 and the original document is stored at the North Dakota Department of Transportation

LETTER AND ARROW DETAILS FOR VARIABLE LENGTH SIGNS

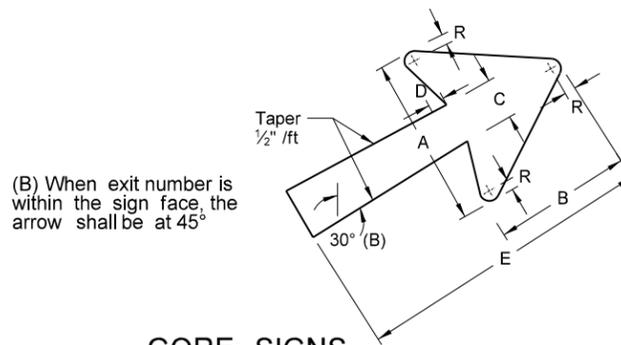
D-754-9



SIZE OF THE FRACTION IS DETERMINED AS FOLLOWS:

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

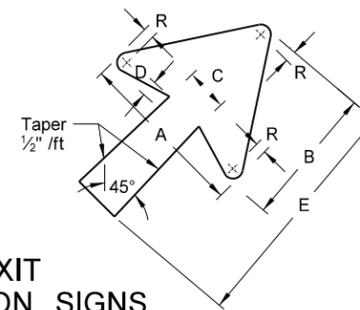
(A) Diagonal stroke of fraction is to be centered optically.



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

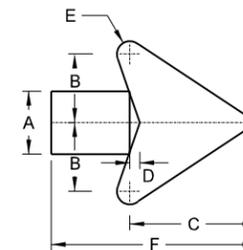
GORE SIGNS

"EXIT" LETTER SIZE (Upper Case)	A	B	C	D	E	R
8"	15 1/8"	11 1/16"	3 3/4"	1 5/16"	25"	13 1/16"
10" - 13 1/3"	18 1/4"	14"	4 1/2"	1 1/2"	30"	3/4"



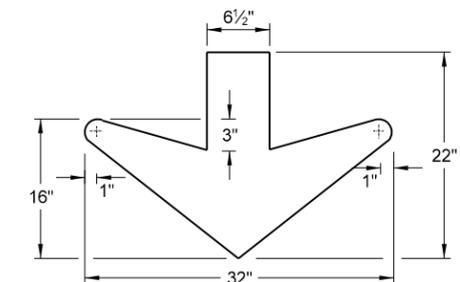
EXIT DIRECTION SIGNS

LETTER SIZE (Upper Case)	A	B	C	D	E	R
8"	15 1/8"	11 1/16"	3 3/4"	1 5/16"	17"	13 1/16"
10" - 13 1/3"	18 1/4"	14"	4 1/2"	1 1/2"	20"	3/4"
16" - 20"	22 1/4"	17"	5 3/8"	1 3/4"	25"	1"

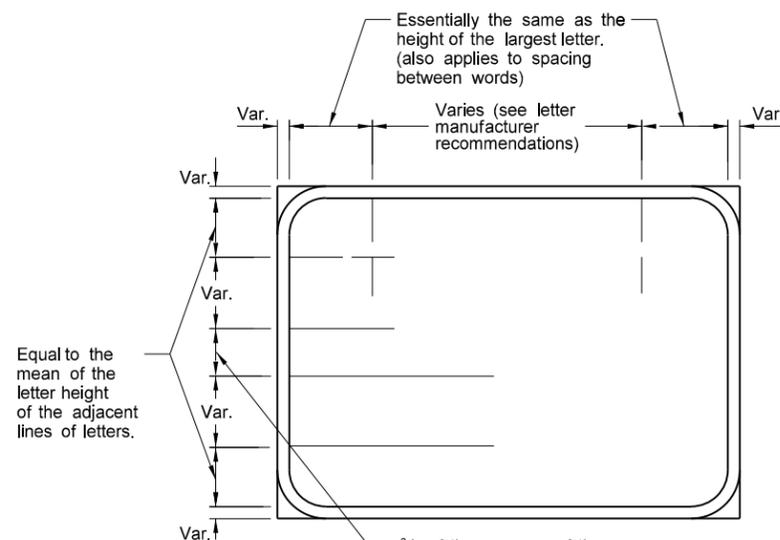


DISTANCE AND DESTINATION SIGNS

LETTER SIZE (Upper Case)	A	B	C	D	E	F
6"	2 3/4"	3"	5 1/16"	7/16"	9/16"	9"
8"	3 1/2"	4"	7 1/8"	9/16"	1 1/16"	12"
12"	5 1/4"	6"	10 5/8"	1 3/16"	1 1/16"	18"



DOWN ARROW



TYPICAL SPACING

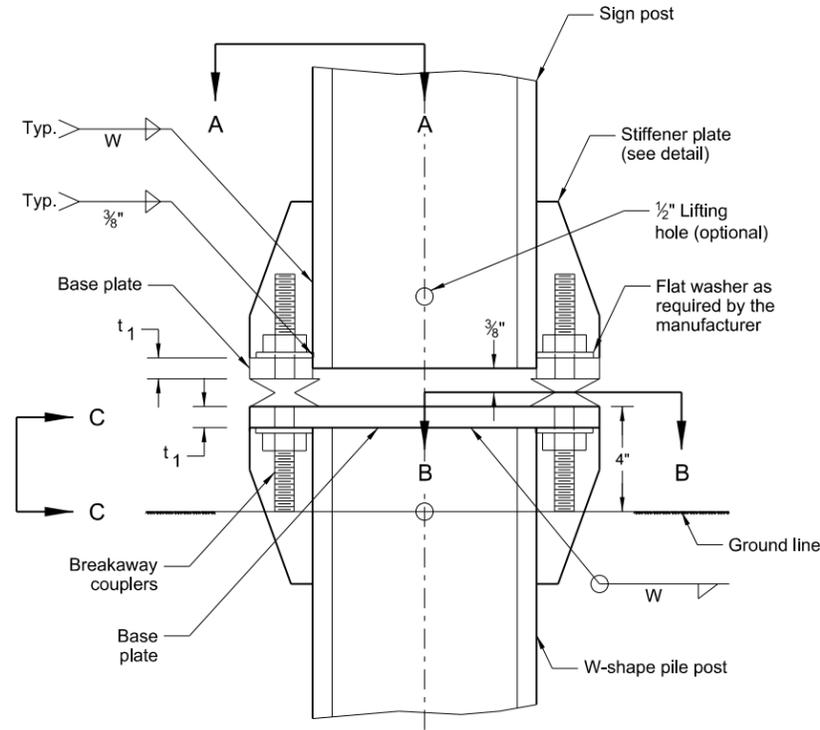
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-3-11	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 08/03/11 and the original document is stored at the North Dakota Department of Transportation

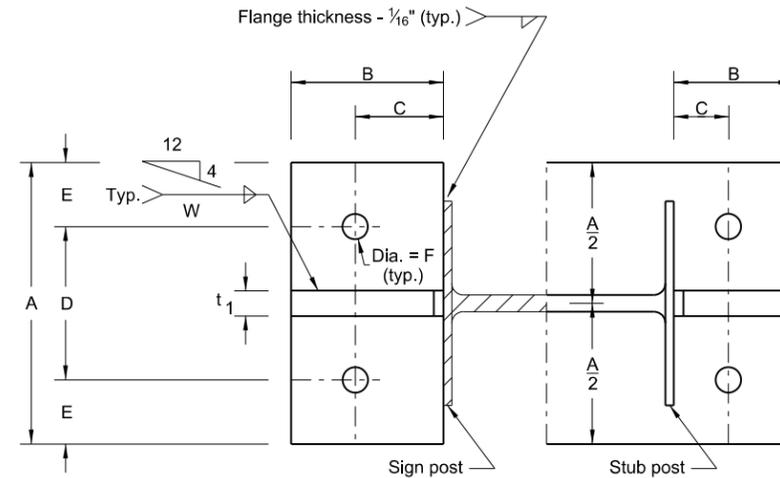
### Breakaway Coupler System Structural Details for W-Shape Supports

**Notes:**

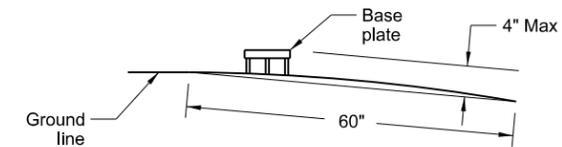
- In lieu of the breakaway base system shown on standard D-754-13 the breakaway coupling system may be used. The breakaway coupling system shall be manufactured from material meeting the requirements of ASTM A325 fasteners with the special requirements as specified by DENT BREAKAWAY IND., INC. which meets the requirements of NCHRP Report 350.
- Structural steel shall conform to Sec. 894.05B.6. High strength bolts shall conform to ASTM - A325. Refer to "Sign Summary" sheet for specific data on each individual sign installation.
- Assembly procedure will be according to the manufacturer's recommendations.



Sign Post and Stub Post  
Elevation



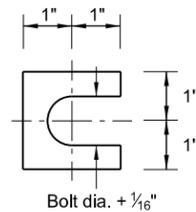
Section A - A      Section B - B  
(See Table for Dimensions)



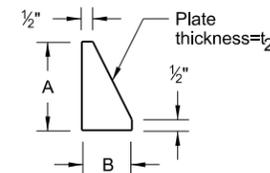
Section C - C

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

Sections shown are for installations on right shoulder and in gore. Plate slot bevels are opposite hand from that shown for installations on left shoulder.

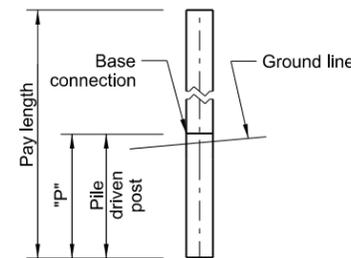


Shim Detail



Stiffener Plate Detail  
(See Table for Dimensions)

Furnish 2 - .012"± thick and 2 - .032"± thick shims per post. Shims shall be fabricated from brass shim stock or strip conforming to ASTM B36.



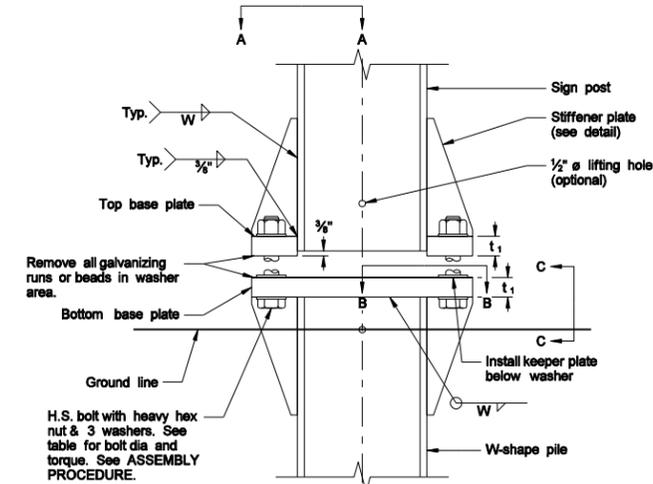
W-Shape - Pile Footing

W-Shape Post & Pile Size	Base Connection Data										W-Shape Pile Post "P"
	Bolt Size	A	B	C	D	E	t <sub>1</sub>	t <sub>2</sub>	W	F	
W4X13	3/4" x 5 1/4"	6"	2 1/2"	1 1/2"	3 1/2"	1 1/4"	1"	1/2"	1/4"	13/16"	14'
W5X16		6"	2 1/2"	1 1/2"	3 1/2"	1 1/4"	1"	1/2"	1/4"	13/16"	14'
W6X20	7/8" x 5 1/4"	8"	3"	1 3/4"	4"	2"	1 1/4"	1/2"	1/4"	15/16"	14'
W8X24		8"	3"	1 3/4"	4"	2"	1 1/4"	1/2"	1/4"	15/16"	14'
W8X28	1" x 5 1/4"	8"	3"	2"	4"	2"	1 1/2"	3/4"	5/16"	1 1/16"	14'

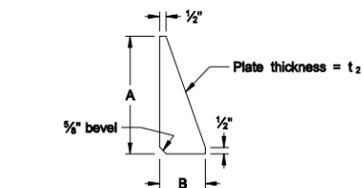
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-2013	
REVISIONS	
DATE	CHANGE

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Roger Weigel  
Registration Number  
PE-2930,  
on 10/4/13 and the original document is stored at the North Dakota Department of Transportation

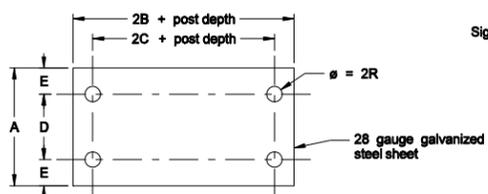
STRUCTURAL DETAILS  
W-SHAPE SUPPORTS



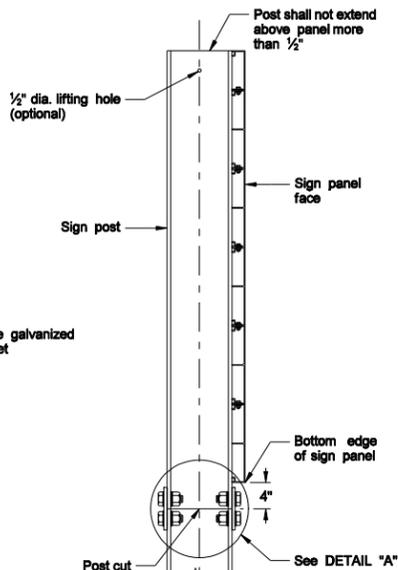
SIGN POST ELEVATION



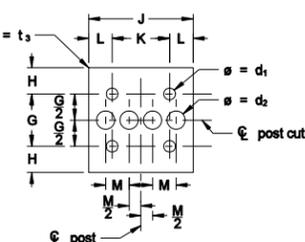
STIFFENER PLATE DETAIL



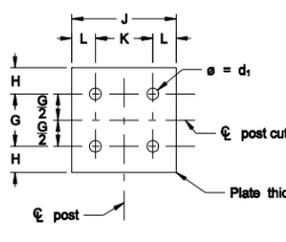
KEEPER PLATE



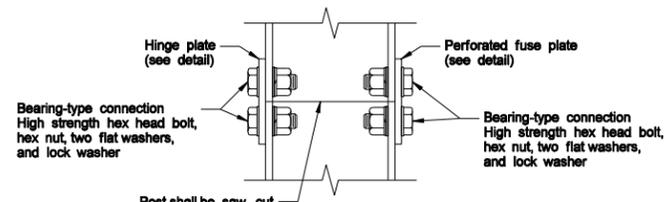
FUSE JOINT  
(SIDE VIEW)



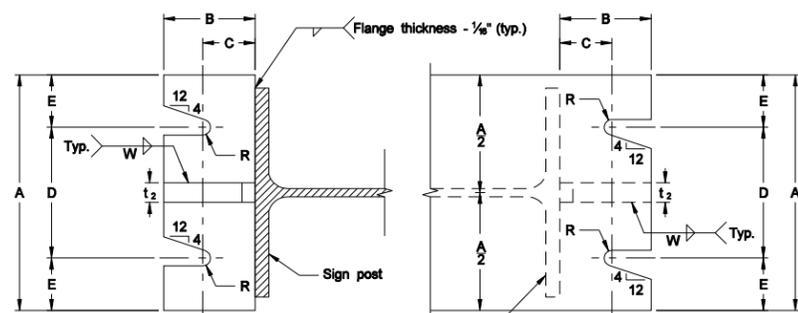
PERFORATED FUSE  
PLATE DETAIL



HINGE PLATE  
DETAIL



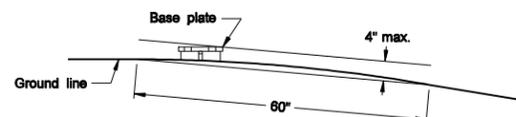
DETAIL "A"



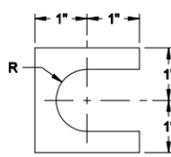
SECTION A-A

SECTION B-B

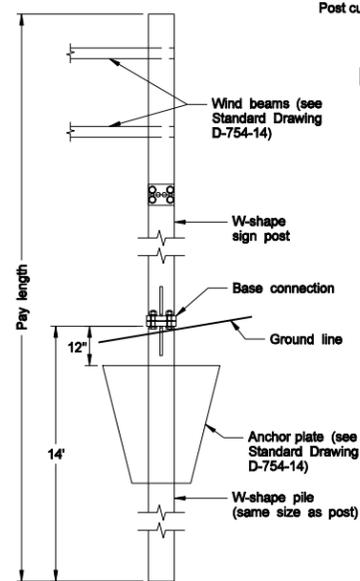
Sections shown are for installations on right shoulder and in gore. Installations on the left shoulder shall have the plate slot bevels reversed.



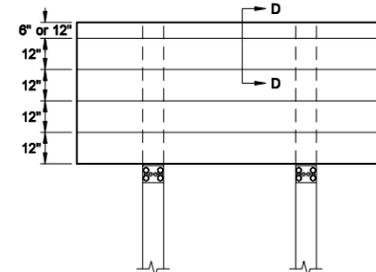
SECTION C-C



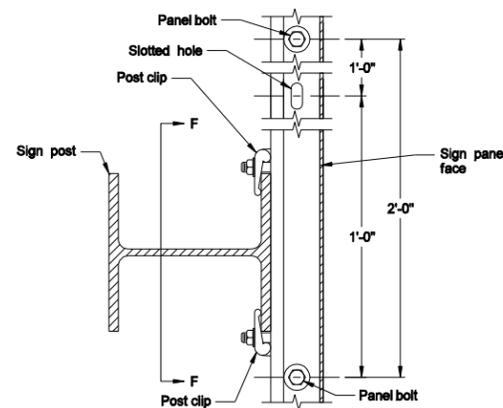
SHIM DETAIL



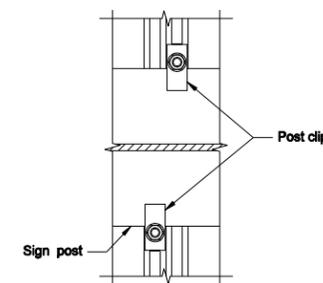
SIGN SUPPORT DETAIL



TYPICAL PANEL MOUNTING

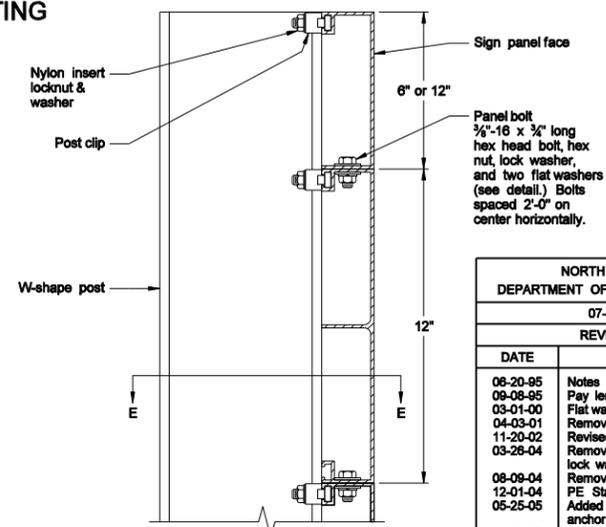


SECTION E-E

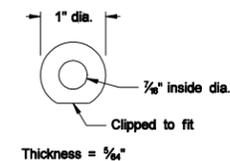


SECTION F-F

Note: Post clips shall be installed on both sides of each post at each panel joint as indicated.



SECTION D-D



FLAT WASHER DETAIL

W-SHAPE POST AND PILE SIZE	BASE CONNECTION DIMENSIONS										FUSE AND HINGE PLATE DIMENSIONS									
	BOLT SIZE AND TORQUE	A	B	C	D	E	t <sub>1</sub>	t <sub>2</sub>	W	R	G	H	J	K	L	M	d <sub>1</sub>	d <sub>2</sub>	t <sub>3</sub>	BOLT DIA.
W4x13	3/4" ø x 3 1/2" Torque = 600 in-lb	6"	2 1/2"	1 1/2"	3 1/2"	1 1/4"	1"	1/2"	1/4"	5/32"	2"	1 1/4"	4"	2 1/4"	7/8"	1"	1 1/8"	3/4"	3/8"	5/8"
W5x16	3/4" ø x 3 1/2" Torque = 600 in-lb	6"	2 1/2"	1 1/2"	3 1/2"	1 1/4"	1"	1/2"	1/4"	5/32"	2 1/2"	1 1/4"	5"	2 3/4"	1 1/8"	1 1/8"	1 1/8"	7/8"	3/8"	3/4"
W6x20	7/8" ø x 4 1/4" Torque = 800 in-lb	8"	3"	1 3/4"	4"	2"	1 1/4"	1/2"	1/4"	5/32"	2 1/2"	1 1/4"	6"	3 1/2"	1 1/4"	1 3/8"	1 3/8"	1 1/8"	3/8"	3/4"
W8x24	7/8" ø x 4 1/4" Torque = 800 in-lb	8"	3"	1 3/4"	4"	2"	1 1/4"	1/2"	1/4"	5/32"	2 1/2"	1 1/2"	6 1/2"	3 1/2"	1 1/2"	1 1/2"	1 5/8"	1 1/4"	1/2"	7/8"
W8x28	1" ø x 5" Torque = 1000 in-lb	8"	3"	2"	4"	2"	1 1/2"	3/4"	5/16"	7/32"	2 1/2"	1 1/2"	6 1/2"	3 1/2"	1 1/2"	1 5/8"	1 1/8"	1 1/8"	1/2"	1"
W8x31	1 1/8" ø x 5" Torque = 1200 in-lb	9"	3 1/2"	2"	5"	2"	1 1/2"	3/4"	5/16"	9/32"	3"	1 1/4"	8"	5 1/2"	1 1/4"	2"	1 1/8"	1 1/2"	1/2"	1"
W10x39	1 1/8" ø x 5" Torque = 1200 in-lb	9"	3 1/2"	2"	5"	2"	1 1/2"	3/4"	5/16"	9/32"	3"	1 1/4"	8"	5 1/2"	1 1/4"	1 7/8"	1 1/8"	1 1/8"	1/2"	1 1/8"

NOTES:

Structural steel shall conform to Section 894.05 B.6 of the Standard Specifications. High strength bolts shall conform to ASTM A-325.

Refer to "Sign Summary" sheet for specific data on each individual sign installation.

Perforated fuse plate shall be installed on side of post facing traffic.

All posts shall be saw cut. Plates may be sheared or flame cut using a mechanically guided cutting torch in accordance with Section 754.03 E.6.b of the Standard Specifications. Edge preparation shall be in accordance with Section 754.03 E.6.c of the Standard Specifications.

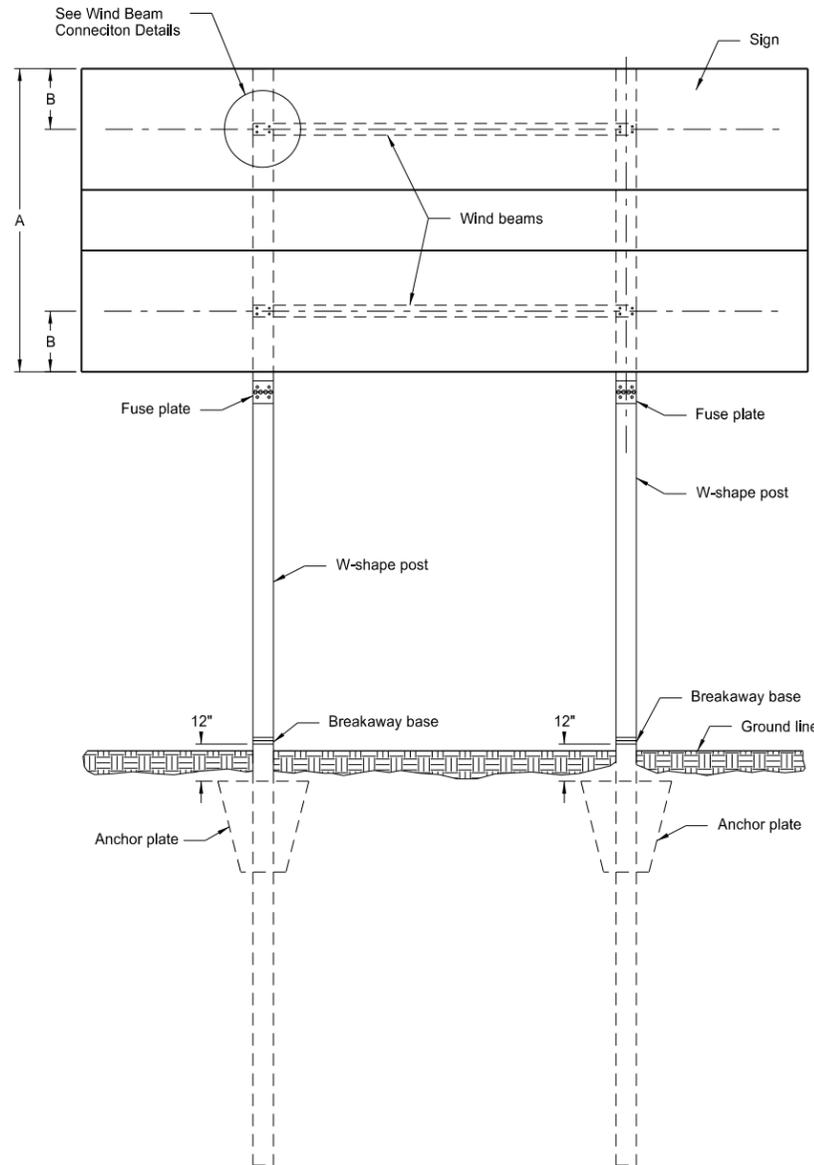
ASSEMBLY PROCEDURE:

1. Assemble base plates together with bolts and with one flat washer between top base plate and the keeper plate.
2. Shim as required to plumb post.
3. Tighten all base connection bolts the maximum possible with 12" to 15" wrench to bed washers and shims and to clean bolt threads.
4. Loosen each bolt in turn and retighten in a systematic order to the prescribed torque (see table.)
5. Assemble perforated fuse and hinge plates to post with bolts and with one flat washer and lock washer under nut. Tighten all bolts the maximum possible with a 12" to 15" wrench to bed washers and shims and to clean bolt threads. Loosen, and retighten bolts in a systematic order.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION 07-15-94	
REVISIONS	
DATE	CHANGE
06-20-95	Notes
09-08-95	Pay length
03-01-00	Flat washers
04-03-01	Remove splice plate
11-20-02	Revised note
03-26-04	Removed lock tile and added lock washer
06-09-04	Removed stub post
12-01-04	PIE Stamp added
05-25-05	Added wind beams and anchor plates
04-23-07	Revised details and notes

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WIND BEAMS AND ANCHOR PLATES  
FOR W-SHAPE SUPPORTS



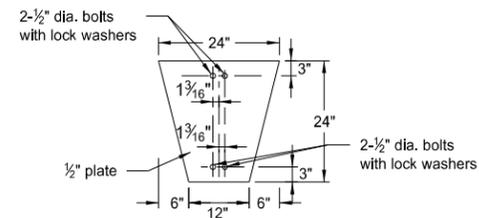
ASSEMBLY DETAIL  
FOR WIND BEAMS  
AND ANCHOR PLATES

Notes:

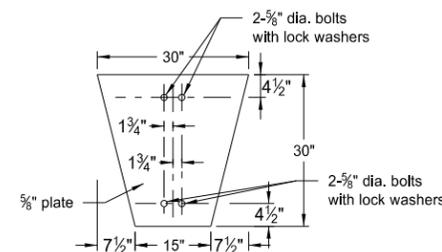
The B distance is calculated by the following formula,  $B=A/4$ .

The wind beam shall conform to Section 894.05 B.6 of the Standard Specifications.

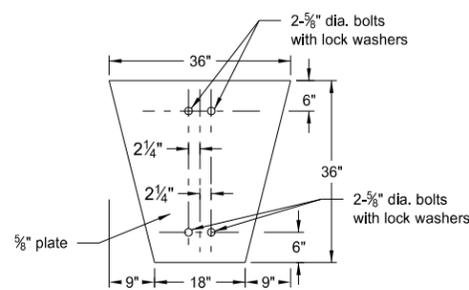
The bolts shall conform to requirements of ASTM A307 and galvanized according to ASTM A153.



W4-13 & W5-16

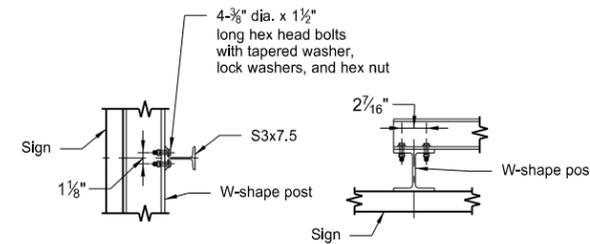


W6-20, W8-24 & W8-28

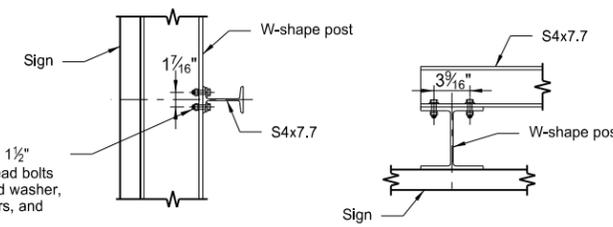


W8-31 & W10-39

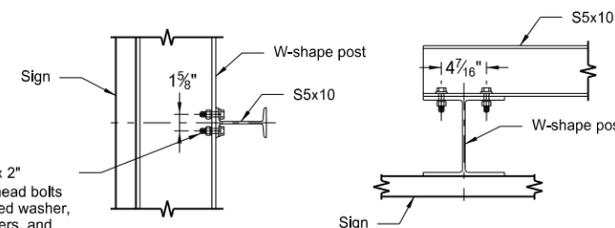
ANCHOR PLATE DETAILS



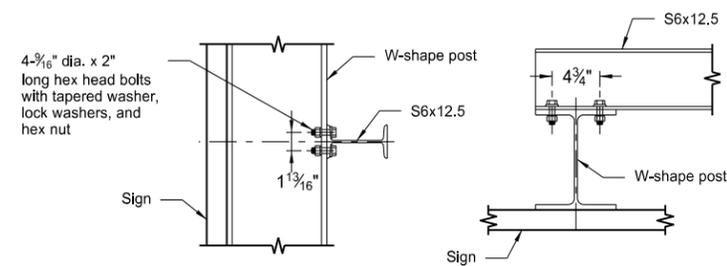
End View Top View  
W4-13 & W5-16



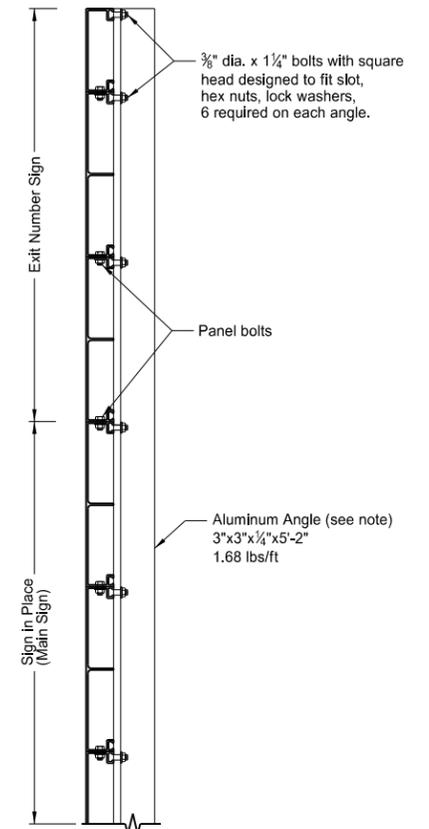
End View Top View  
W6-20, W8-24 and W8-28



End View Top View  
W8-31



End View Top View  
W10-39  
WIND BEAM CONNECTION DETAILS



ASSEMBLY DETAIL FOR  
EXIT NUMBER SIGNS

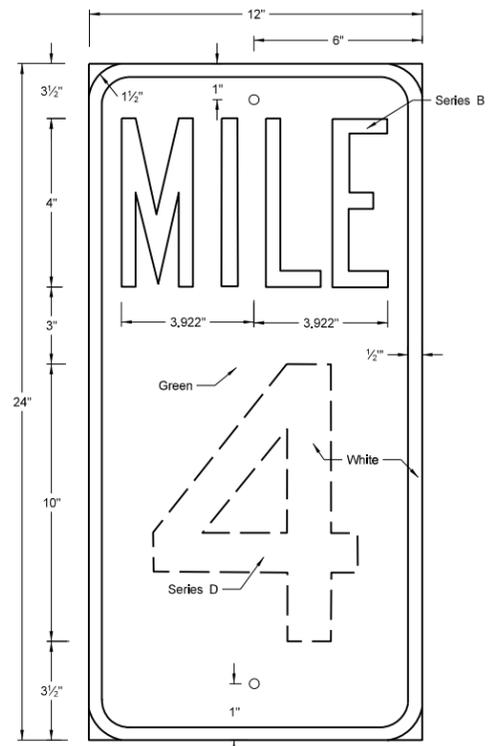
Note: Two aluminum angles required on each sign. The distance between angles varies depending on post spacing of sign in place. Angles shall be placed as near as possible to posts. The Engineer shall determine the exact location.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
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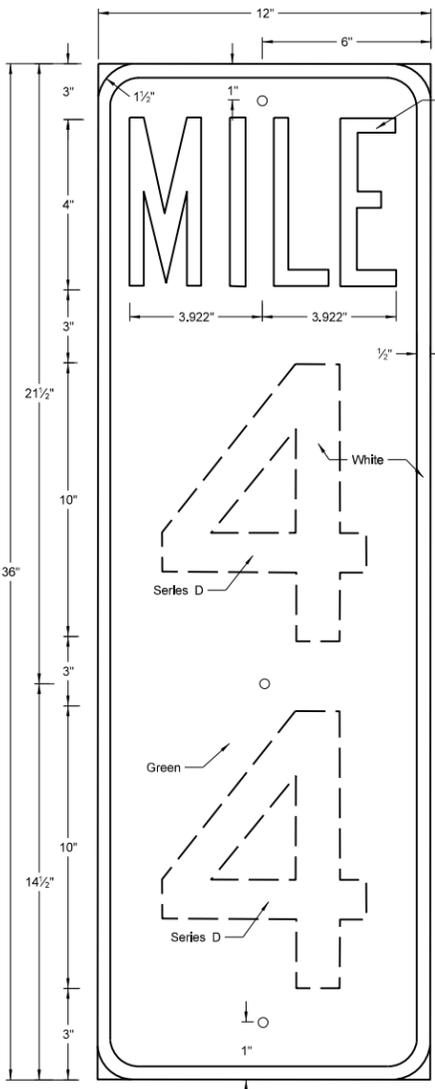
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(EXPRESSWAY-FREEWAY USE) MILE POSTS

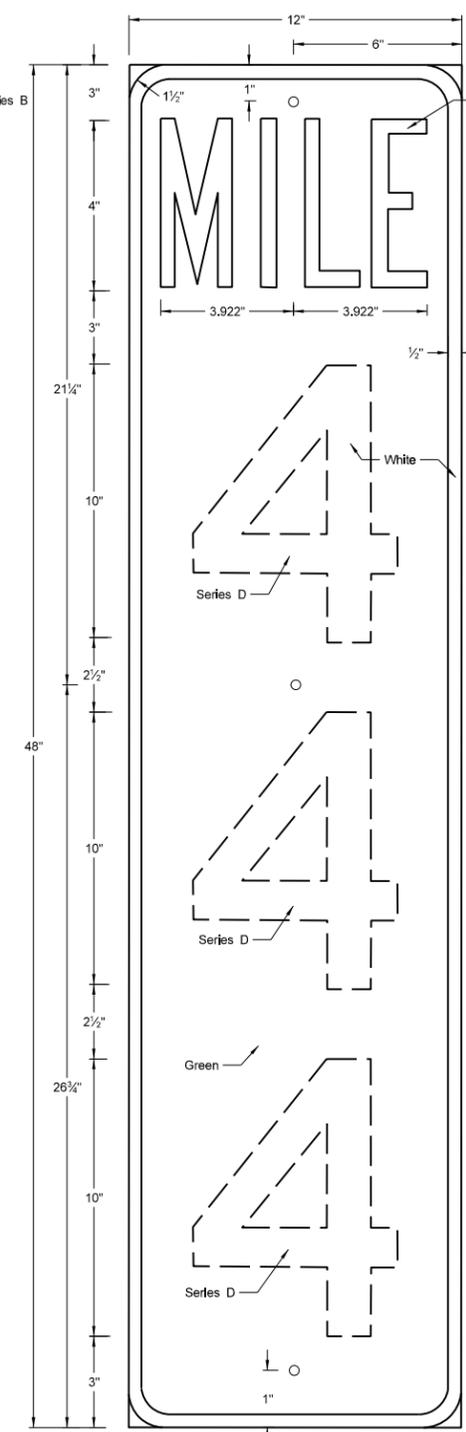
D-754-20



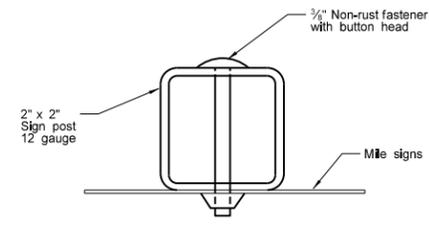
TYPE A  
Area = 2.00 S.F.



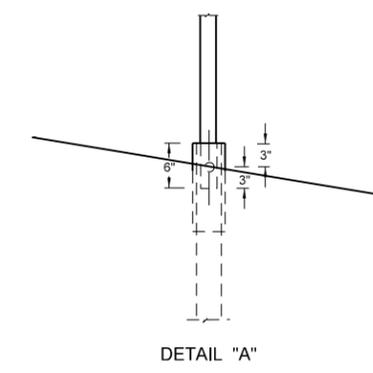
TYPE B  
Area = 3.00 S.F.



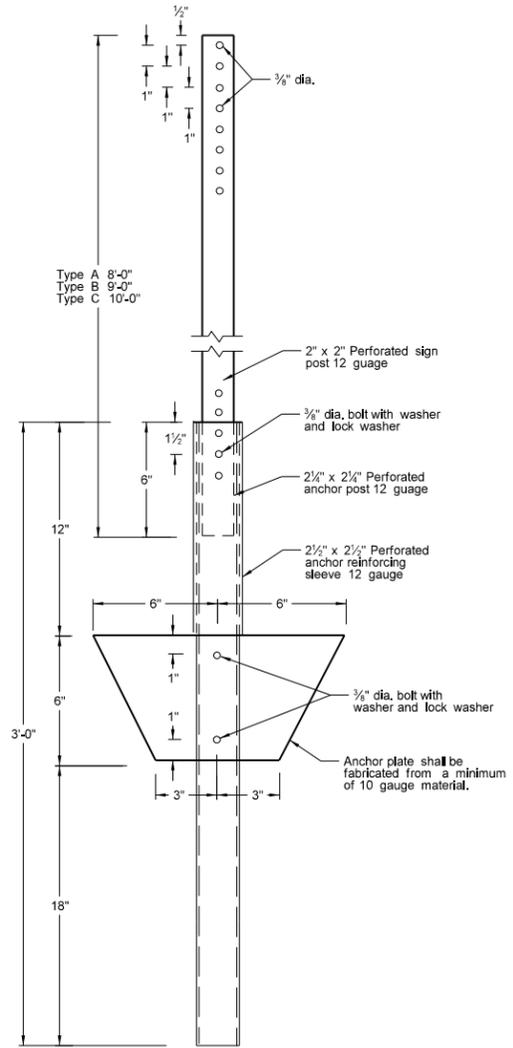
TYPE C  
Area = 4.00 S.F.



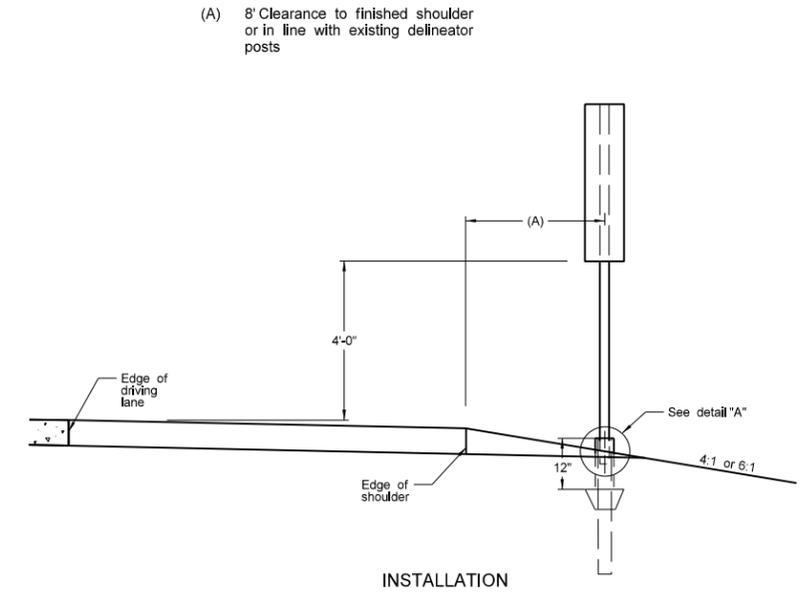
ASSEMBLY DETAIL



DETAIL "A"



POST AND ANCHOR PLATE DETAIL



INSTALLATION

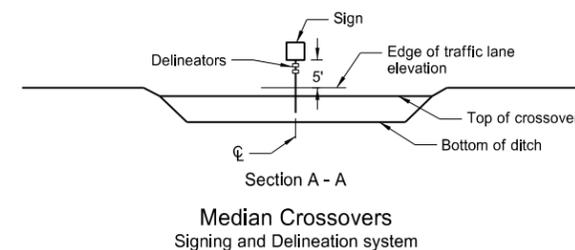
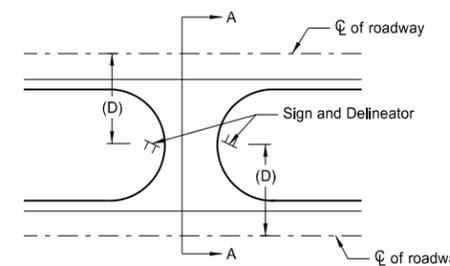
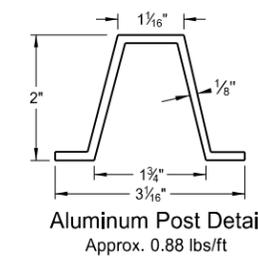
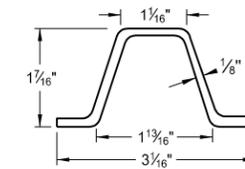
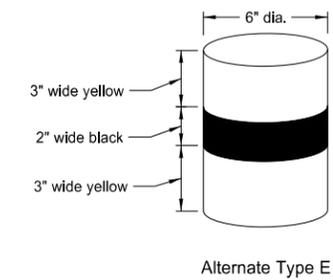
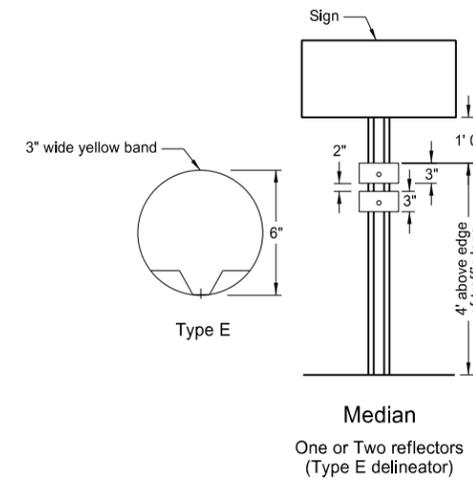
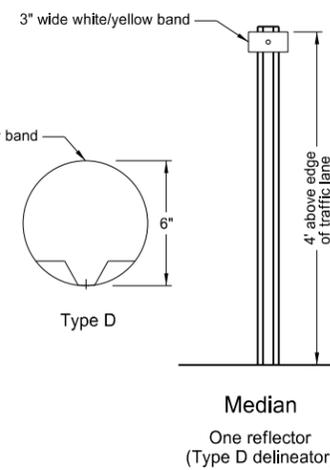
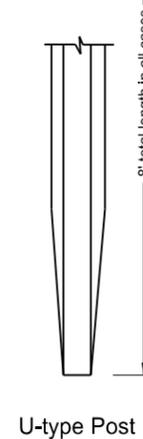
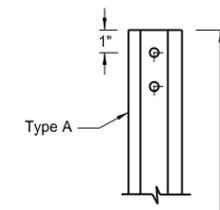
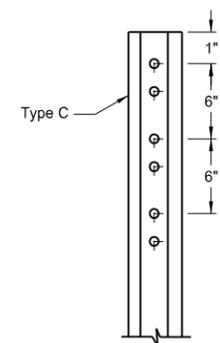
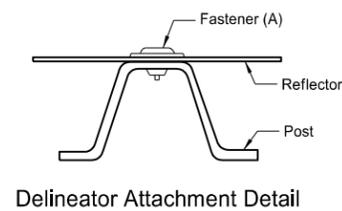
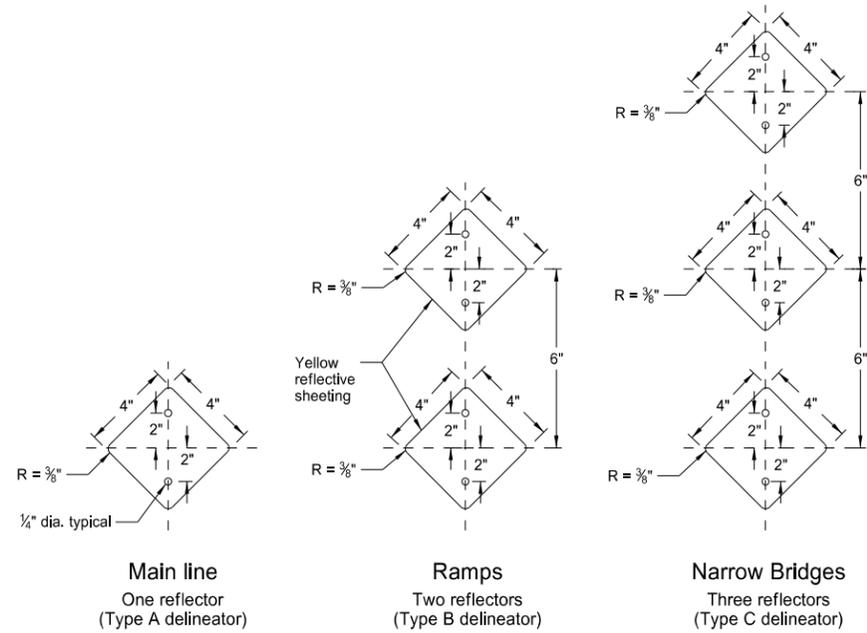
(A) 8' Clearance to finished shoulder or in line with existing delineator posts

NOTES:  
Installation: Posts shall be installed along right shoulder in line with delineators.  
Mile Sign Backing: Backing shall be fabricated of 0.080 aluminum. Sheeting shall conform to section 894.01 of the Standard Specifications.  
Posts: Posts shall conform to section 894.05 of the Standard Specifications.  
Fasteners: The mile signs shall be attached to the post by tension pin type fastener or other suitable vandal resistant non-rust fastener.  
Reflective Sheeting: Sheeting shall conform to section 894.02 (Type IIIA) of the Standard Specifications.  
Numbers: Numbers shall be of the series shown and may be screened or applied copy. Screening and reflective sheeting for applied copy shall conform to section 754 & 894 of the Standard Specifications.

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



Delineator Details  
Type A, B, and C

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

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

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

Material: Reflective material shall be ASTM Type IX.

Type E

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

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

Material: Reflective material shall be Type IX.

(A) The fastener shall be 3/8" dia. with flat washer having a min. outside dia. of 1 3/16". Fasteners shall be tension pin type or other non-rust vandal resistant fastener.

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

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

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

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

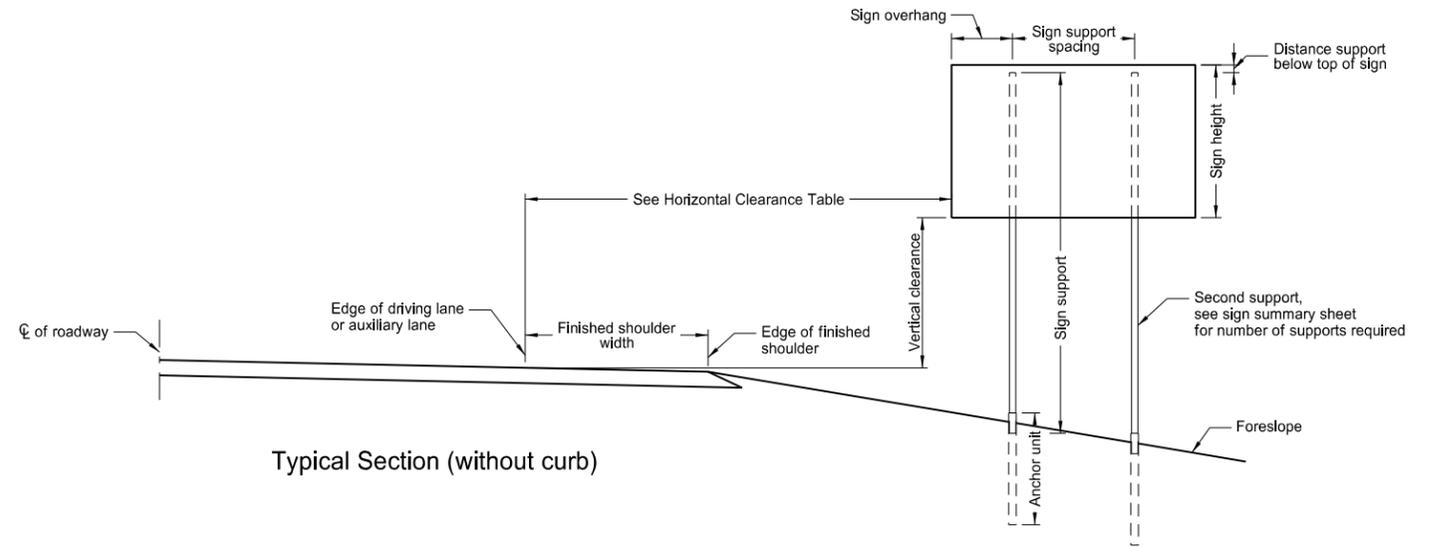
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# PERFORATED TUBE ASSEMBLY DETAILS

D-754-23

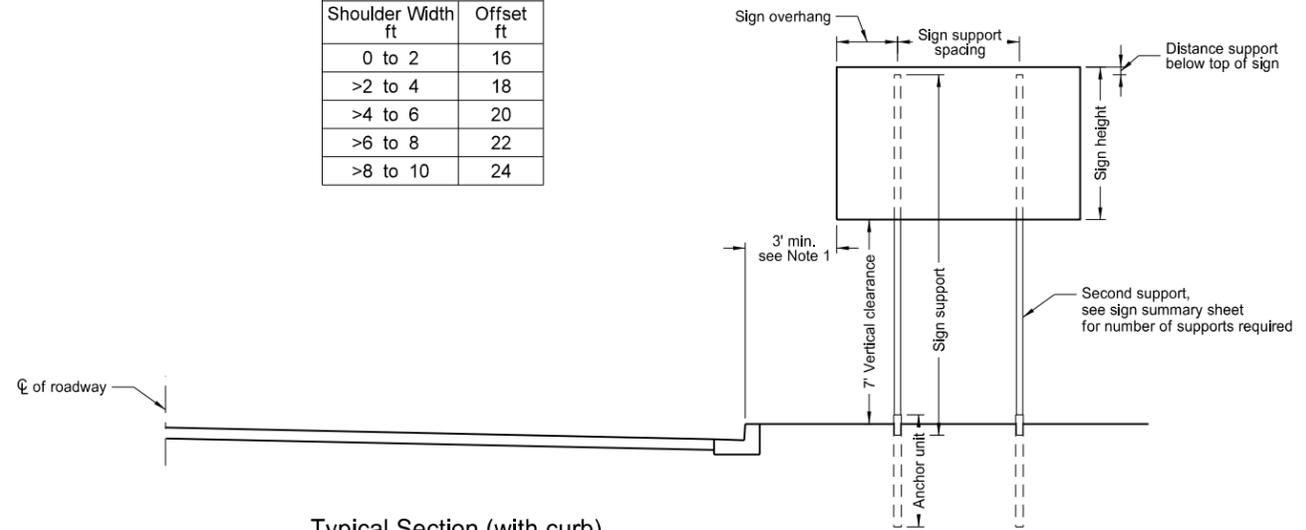
**Notes:**

1. Curbed Roadways: The clearance from the face of the curb should be 3' except where right of way or sidewalk width is limited, a minimum clearance of 2' shall be provided. The horizontal clearance may need to be increased to maintain a minimum sidewalk clear width of 4' from the sign support, not including any attached curb.
  2. Minimum vertical clearance: Signs installed at the side of the road in rural districts shall be at least 5' measured from the bottom of the sign to the edge of the driving lane or auxiliary lane. Where parking or pedestrian movements occur, the clearance to the bottom of the sign shall be at least 7'.
- Directional signs on expressways shall be installed with a minimum height of 7'. If the secondary sign is mounted below another sign, the major sign shall be installed at least 8' and the secondary sign shall be installed at least 5' above the edge of the driving lane.
- All route signs, warning signs, and regulatory signs on expressways shall be at least 7' above the edge of the driving lane.
- Adopt-a-highway signs installed on Freeways shall be at least 7' above the edge of the driving lane.
- The vertical clearance shall have a maximum height of 6" above the vertical clearance specified above.
3. Offset signs: Where signs are placed at least 30 feet or more from the edge of the traveled way, the height to the bottom of such sign shall be 5' above the edge of the driving lane.

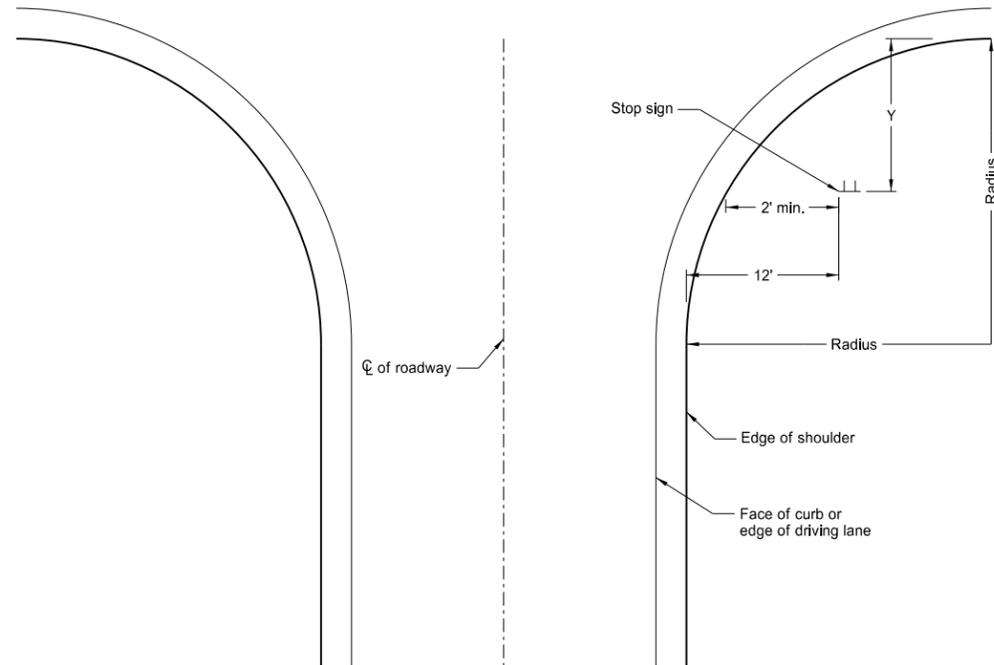


Typical Section (without curb)

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



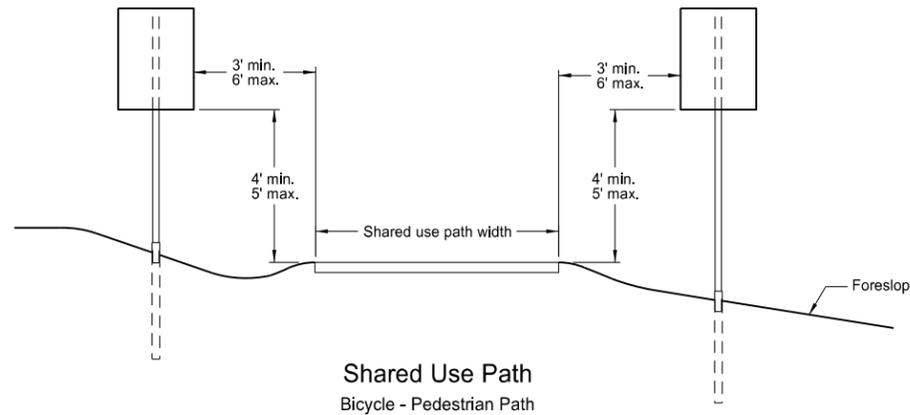
Typical Section (with curb)  
Residential or Business District



Stop Sign Location  
Wide Throat Intersection

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

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



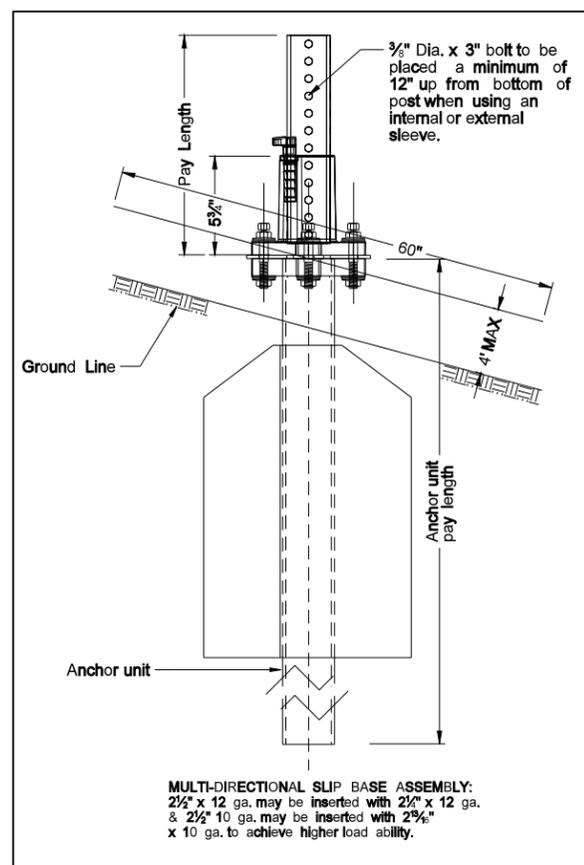
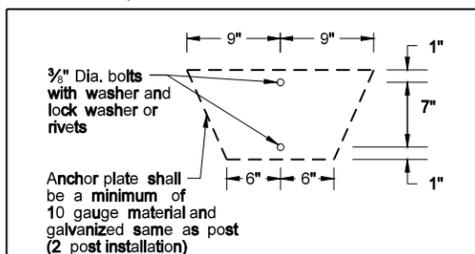
Shared Use Path  
Bicycle - Pedestrian Path

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

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 Roger Weigel  
 Registration Number  
 PE-2930,  
 on 10/3/13 and the original document is stored at the  
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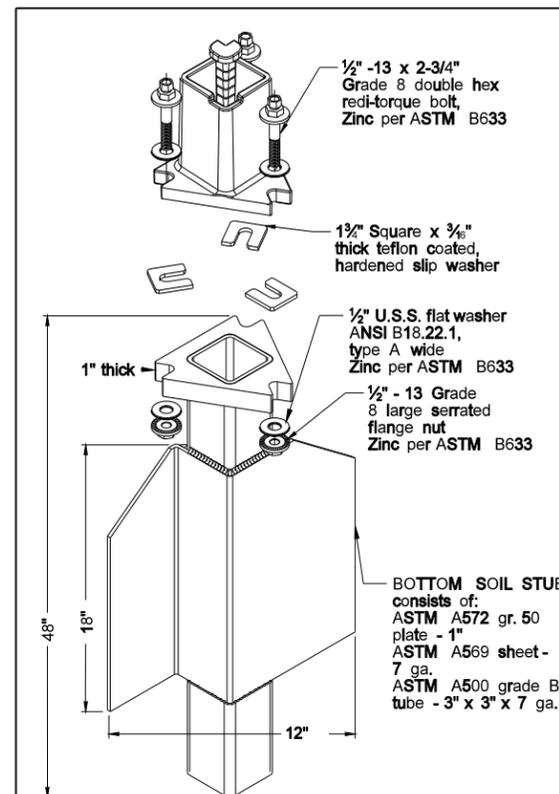
Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Gauge
1	2	12			No	2 1/2	12
1	2 1/2	12			No	2 1/2	12
1	2 1/2	12			(B)	3(C)	7
1	2 1/2	10			Yes		7
1	2 1/2	12	2 1/2(D)	12	Yes		7
1	2 1/2	12	2 1/2	12	Yes		7
2	2 1/2	10			Yes		7
2	2 1/2	12	2 1/2(D)	12	Yes		7
2	2 1/2	12	2 1/2	12	Yes		7
3 & 4	2 1/2	12			Yes		7
3 & 4	2 1/2	10			Yes		7
3 & 4	2 1/2	12	2 1/2	12	Yes		7
3 & 4	2 1/2	12	2 1/2(D)	12	Yes		7
3 & 4	2 1/2	10	2 1/2	10	Yes		7

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

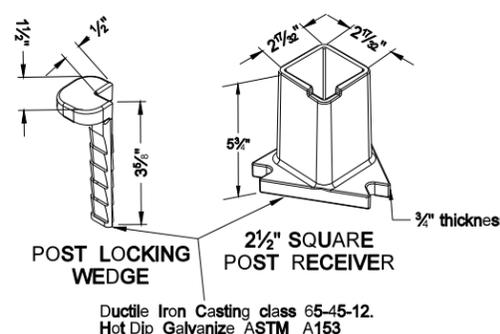


MULTI-DIRECTIONAL SLIP BASE ASSEMBLY:  
 2 1/2" x 12 ga. may be inserted with 2 1/2" x 12 ga. & 2 1/2" 10 ga. may be inserted with 2 3/8" x 10 ga. to achieve higher load ability.

Mounting Details Perforated Tube



SLIP BASE FOR 2 1/2" POST



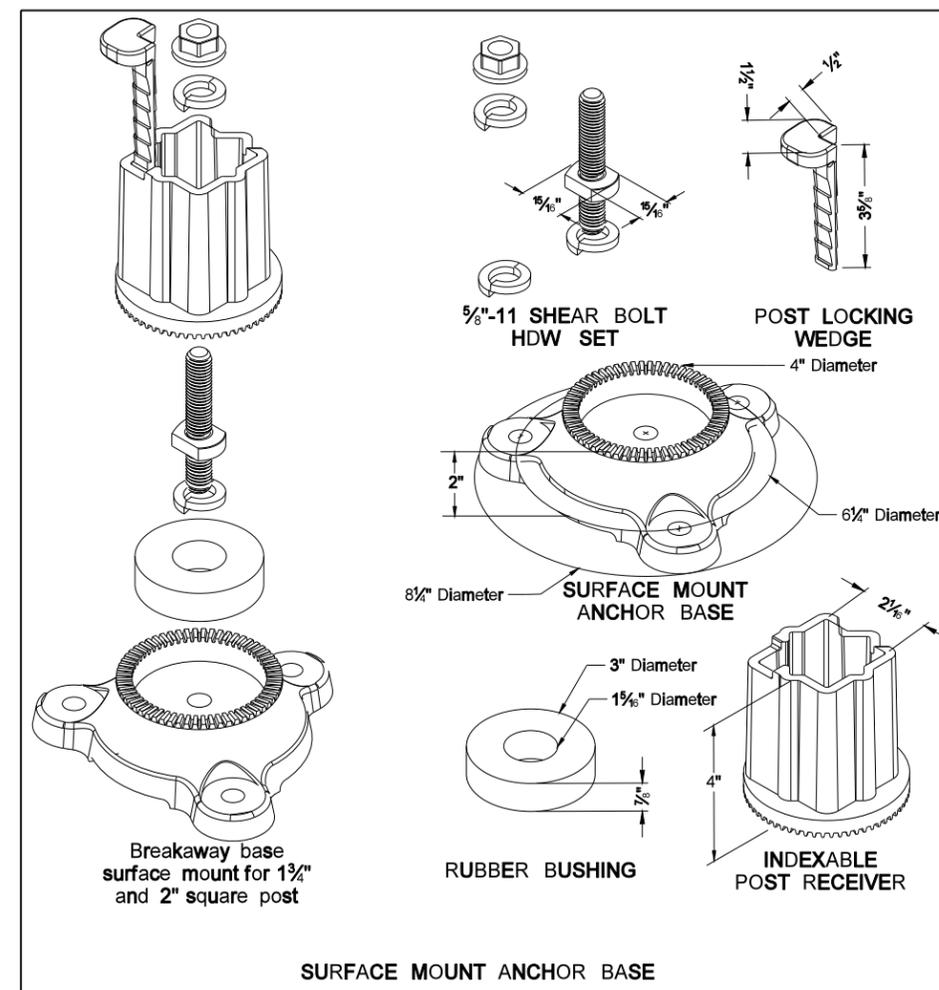
SLIP BASE DETAIL

Properties of Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness in.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In. <sup>4</sup>	Cross Sect. Area In. <sup>2</sup>	Section Modulus In. <sup>3</sup>
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2 1/2 x 2 1/2	0.105	12	2.773	0.561	0.695	0.499
2 3/8 x 2 3/8	0.135	10	3.432	0.605	0.841	0.590
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.783

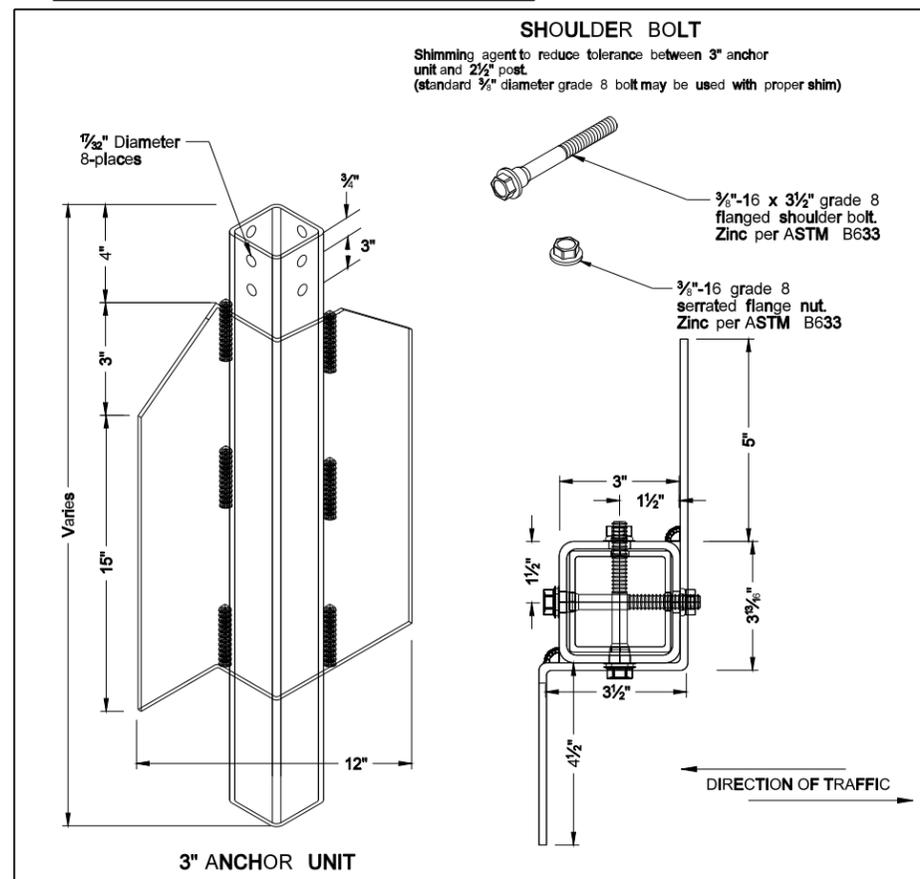
The 2 3/8" size 10 gauge is shown as 2.19" size on the plans; The 2 1/2" size is shown as 2.51" size on the plans.

NOTE:

- 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.
- Anchor material shall be 7 gauge H.R.P.O. Commercial quality ASTM A569 and 3" x 3" x 7" gauge ASTM A500 grade B. Anchor shall have a yield strength 43.9 KSI and tensile strength of 59.3 KSI. Anchor shall be hot dipped galvanized per ASTM A123/153. All tolerances on anchor unit and slip base bottom assembly are +/- 0.005" unless otherwise noted.
- When used in concrete sidewalk, anchor shall be the same concept without the wings.
- Four post signs shall have over 8" between the first and fourth posts.
- Installation procedures as per manufacturers recommendation.
- Concrete fasteners for surface mount breakaway base shall be a minimum 1/2" diameter x 4" grade 8.



SURFACE MOUNT ANCHOR BASE



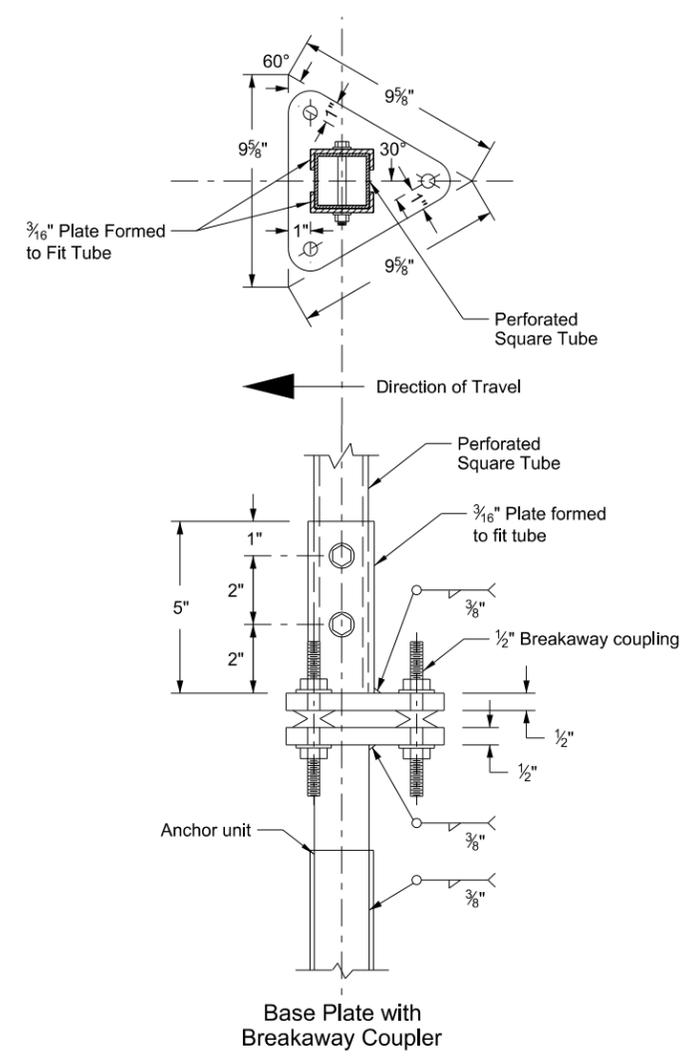
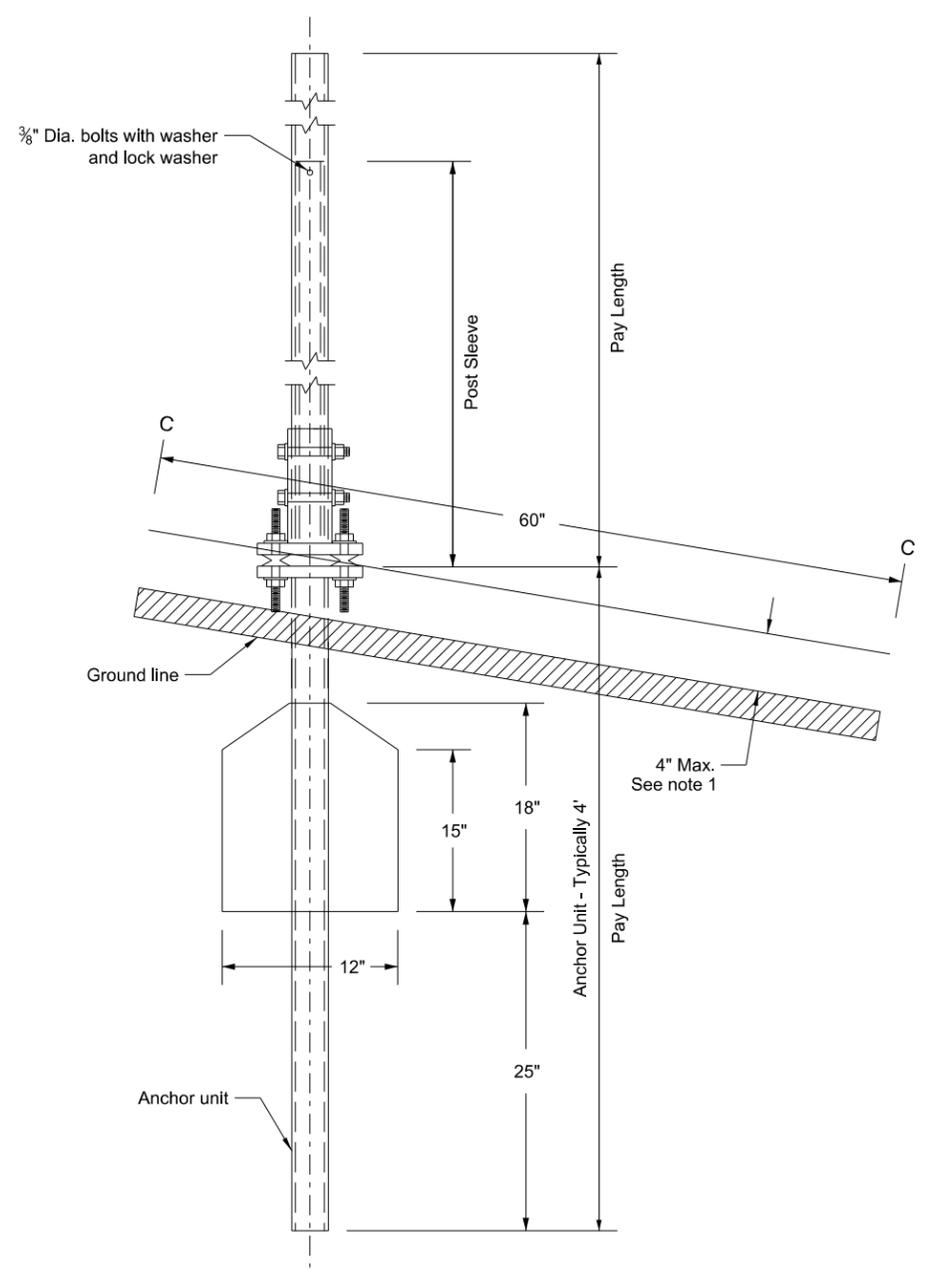
3" ANCHOR UNIT

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
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Breakaway Coupler System for Perforated Tubes

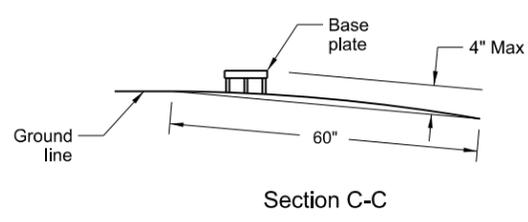
- Notes:
- 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.
  - Anchor unit shall be the same size as the post and shall have the same specification as the post.
  - Four post signs shall have over 8' between the first and fourth post.
  - In lieu of the breakaway base system on standard D-754-24 the breakaway coupling system may be used. The breakaway coupler system shall be manufactured from material meeting the requirements of ASTM A325 fasteners with the special requirements as specified by DENT BREAKAWAY IND., INC. which meets the test requirements of NCHRP Report 350.



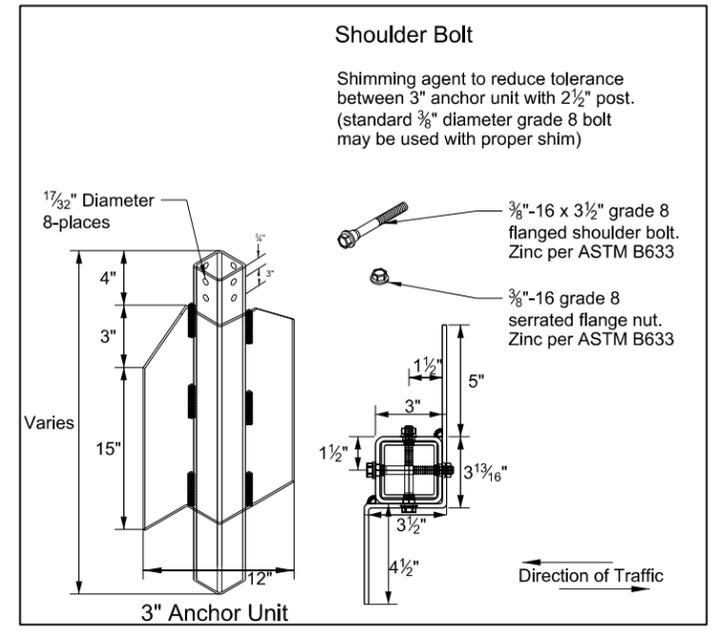
Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Gauge
1	2	12			No	2 1/4	12
1	2 1/4	12			No	2 1/2	12
1	2 1/2	12			(B)	3(C)	7
1	2 1/2	10			Yes		7
1	2 1/4	12	2	12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

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

(C) - 3" anchor unit



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



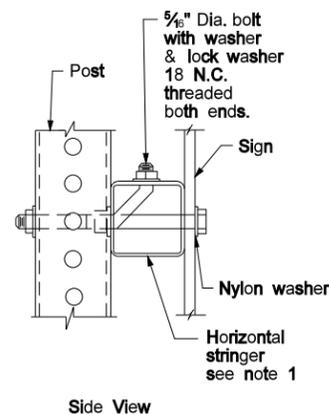
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-2013	
REVISIONS	
DATE	CHANGE

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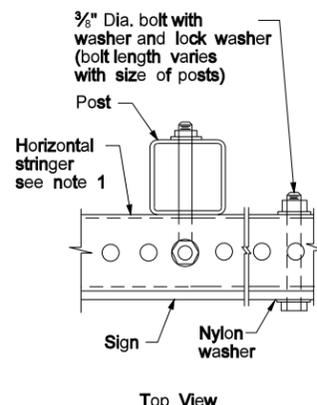
Mounting Details Perforated Tube

Note:

- Horizontal stringers - In lieu of perforated tubes, the contractor may substitute z bar stringers. The z bar stringers shall be 1 1/2" x 3/16" thick, 1.08 lbs./ft aluminum or 3.16 lbs./ft steel.
- Metal washers used on sign face shall have a minimum outside diameter of 5/8" ± 1/16" and 10 gauge thickness.
- No Parking Signs: All no parking signs with directional arrows shall be placed at a 30 to 45 degree angle with the line of traffic flow. No parking signs required at the above angles may have the support turned to the correct angle. If the no parking sign is placed with another sign that has to be placed at a 90 degree angle with the line of traffic flow, the detailed angle strap should be used to mount the no parking sign. Flat washers and lock washers shall be used with all nylon washers. Material used for the attachment strap shall be included in the price bid for "Flat sheet for signs."
- In lieu of using the bent bolt to attach the post to the stringer, the contractor may choose to punch the sign backing and place the bolt through the sign, the stringer and the post.
- 4" vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.

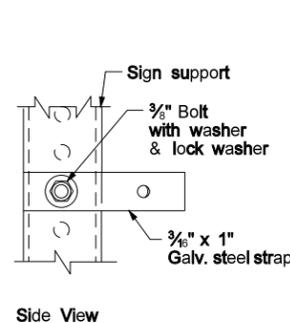


Side View

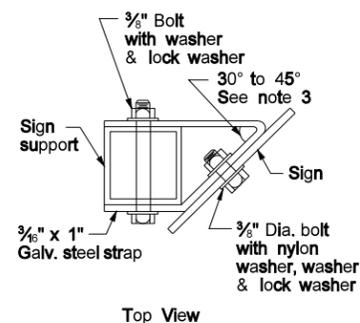


Top View

STRINGER MOUNTING  
(WITH STRINGER IN FRONT OF POST)

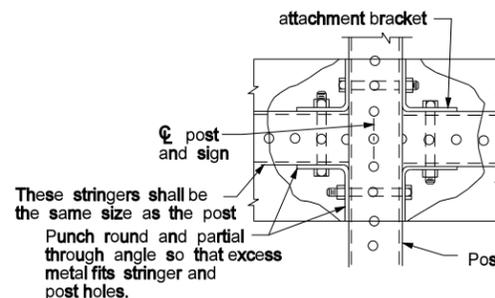


Side View



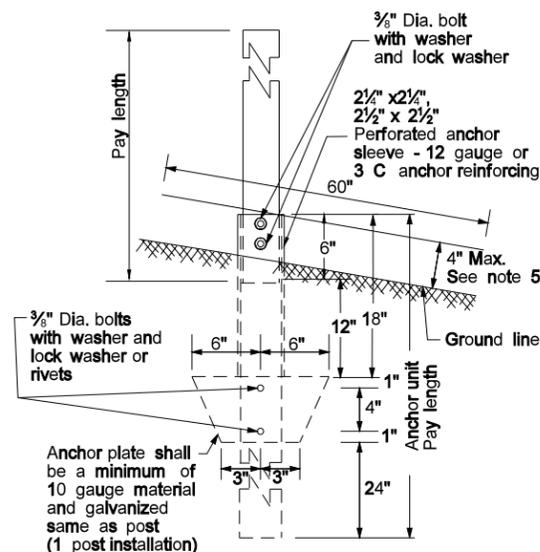
Top View

STRAP DETAIL

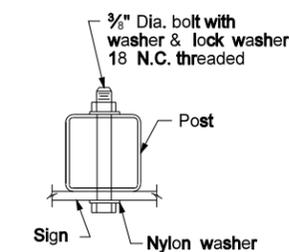
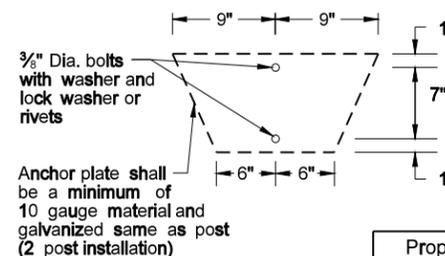


These stringers shall be the same size as the post. Punch round and partial through angle so that excess metal fits stringer and post holes.

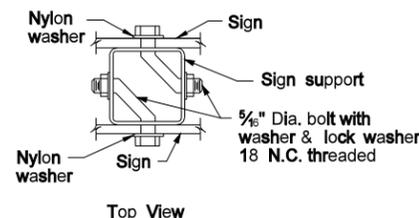
STREET NAME SIGNS  
AND ONE WAY SIGNS  
SINGLE POST ASSEMBLY  
ONE STRINGER OR  
BACK TO BACK MOUNTING



ANCHOR UNIT AND  
POST ASSEMBLY



BOLT MOUNTING



Top View

BACK TO BACK  
MOUNTING

Properties of Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In. <sup>4</sup>	Cross Sect. area In. <sup>2</sup>	Section Modulus In. <sup>3</sup>
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499
2 3/8 x 2 3/8	0.135	10	3.432	0.605	0.841	0.590
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.783

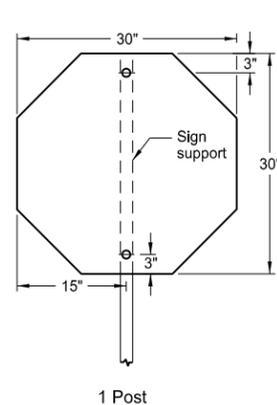
The 2 1/4" size 10 gauge is shown as 2.19" size on the plans.  
The 2 1/2" size is shown as 2.51" size on the plans.

Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Gauge
1	2	12			No	2 1/4	12
1	2 1/2	12			No	2 1/2	12
1	2 1/2	12			(B)	3(C)	7
1	2 1/2	10			Yes		7
1	2 1/4	12	2 1/2(D)	12	Yes		7
1	2 1/2	12	2 1/4	12	Yes		7
2	2 1/2	10			Yes		7
2	2 1/4	12	2 1/2(D)	12	Yes		7
2	2 1/2	12	2 1/4	12	Yes		7
3 & 4	2 1/2	12			Yes		7
3 & 4	2 1/2	10			Yes		7
3 & 4	2 1/2	12	2 1/4	12	Yes		7
3 & 4	2 1/4	12	2 1/2(D)	12	Yes		7
3 & 4	2 1/2	10	2 3/8	10	Yes		7

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

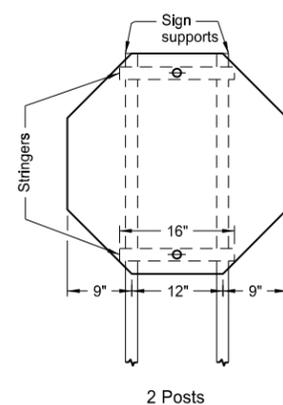
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DATE	CHANGE	

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

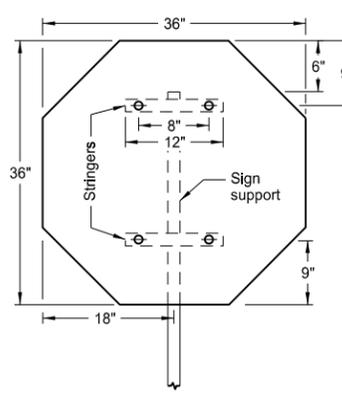


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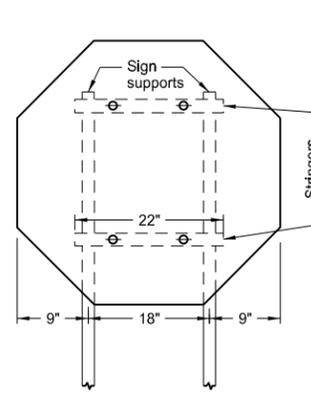
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2 Posts

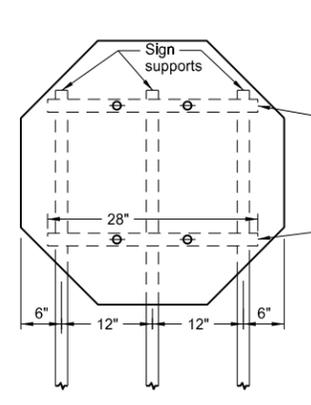


1 Post



2 Posts

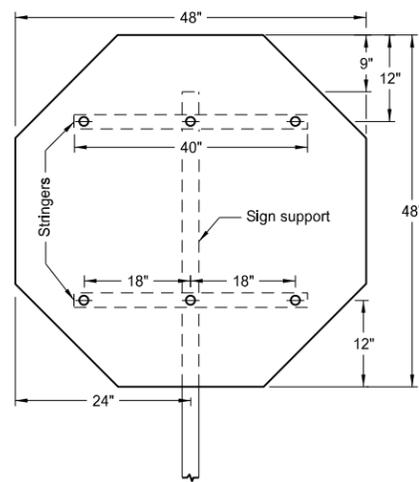
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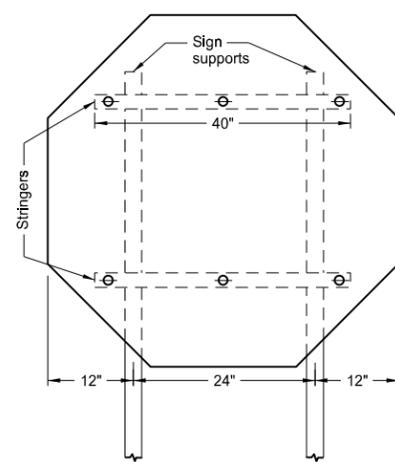
3 Posts

Notes:

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

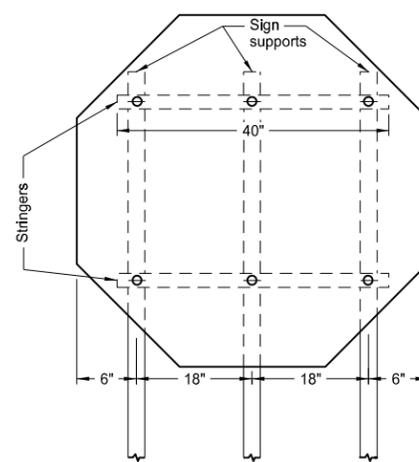


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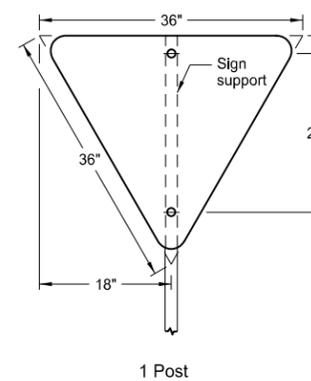


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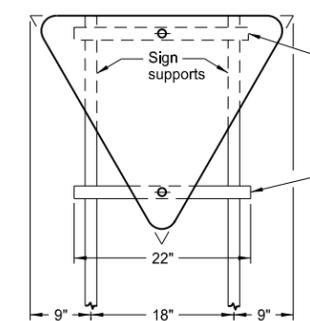
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3 Posts

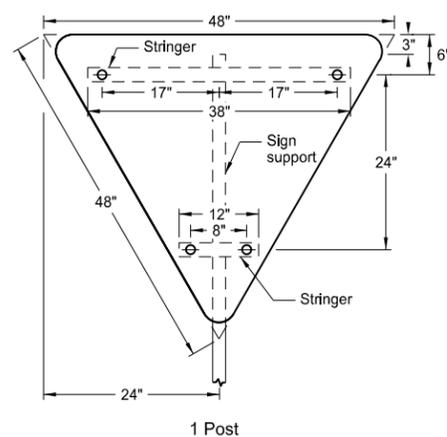


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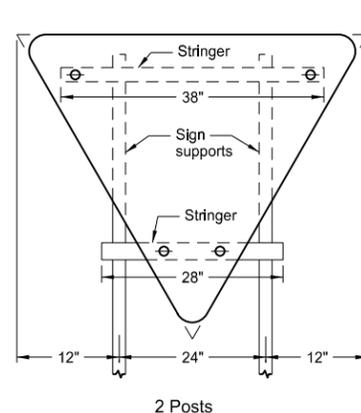


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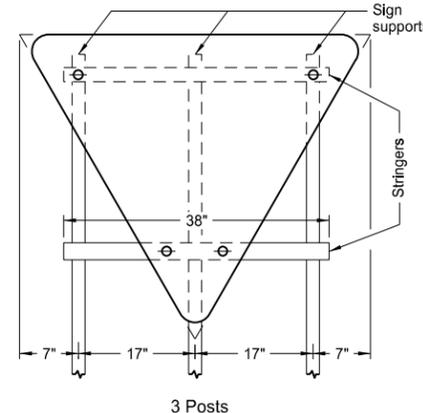


1 Post



2 Posts

Assembly No. 5

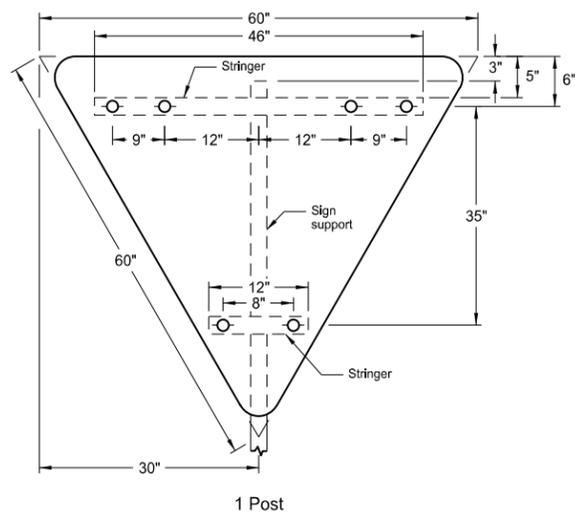


3 Posts

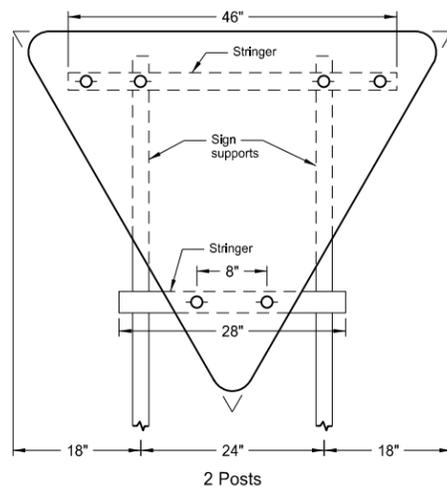
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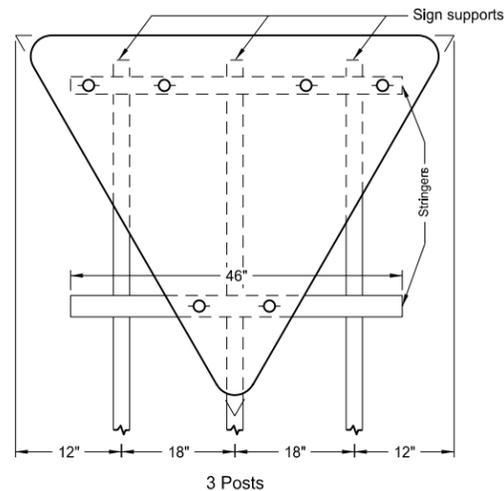
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION  
DETAILS REGULATORY, WARNING AND GUIDE SIGNS



1 Post



2 Posts

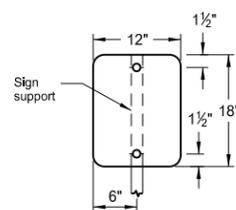


3 Posts

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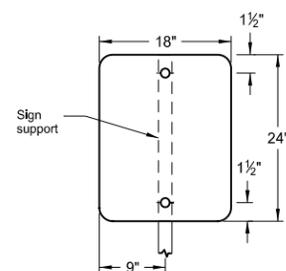
Notes:

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



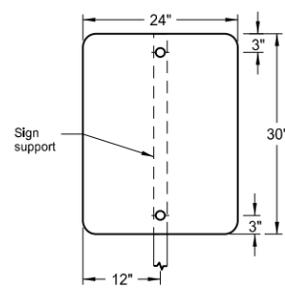
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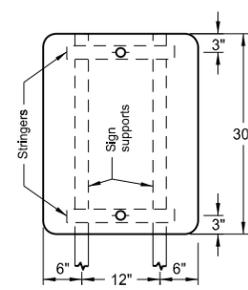
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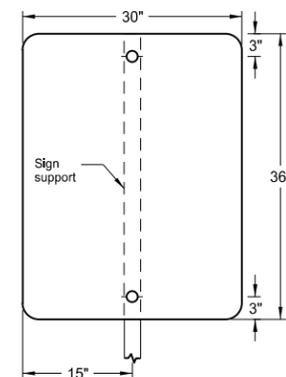


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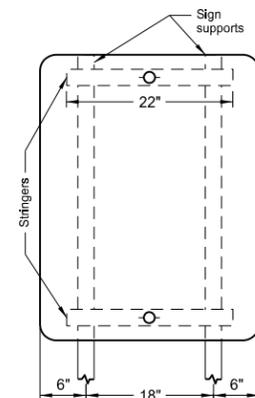
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2 Posts

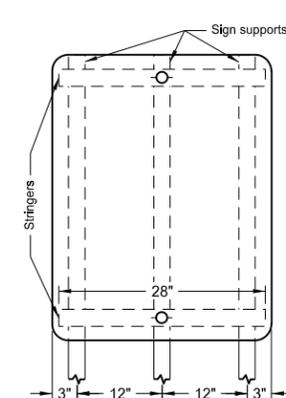


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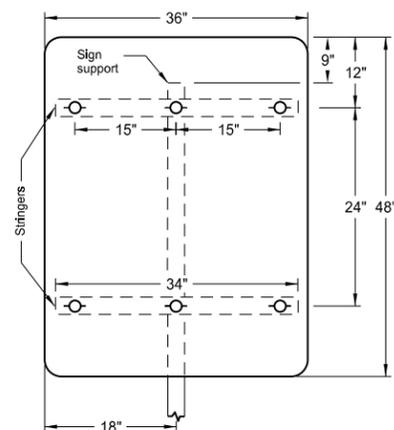


2 Posts

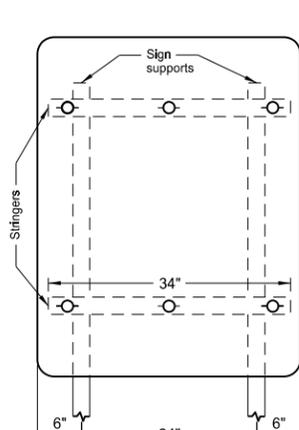
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3 Posts

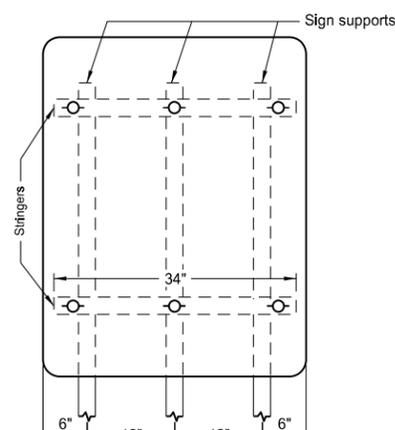


1 Post



2 Posts

Assembly No. 11

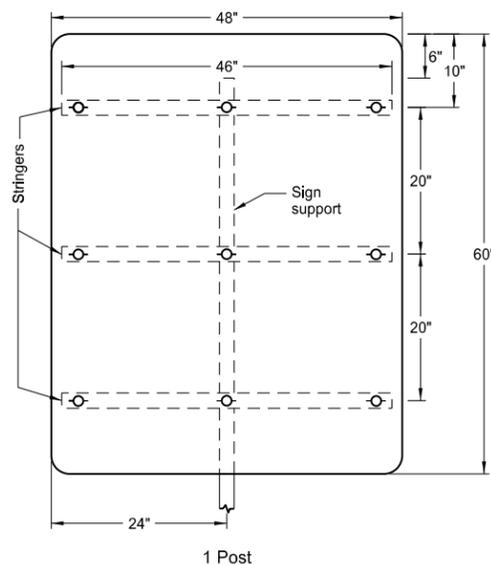


3 Posts

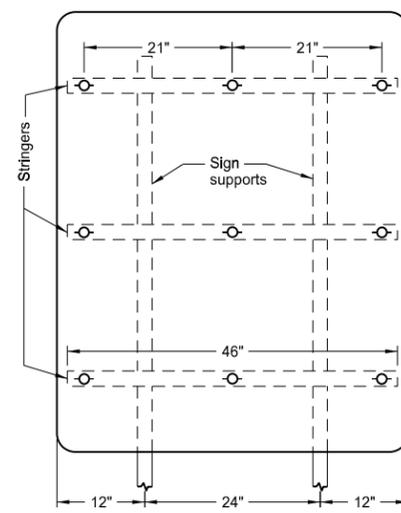
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SIGN PUNCHING, STRINGER AND SUPPORT LOCATION  
DETAILS REGULATORY, WARNING AND GUIDE SIGNS

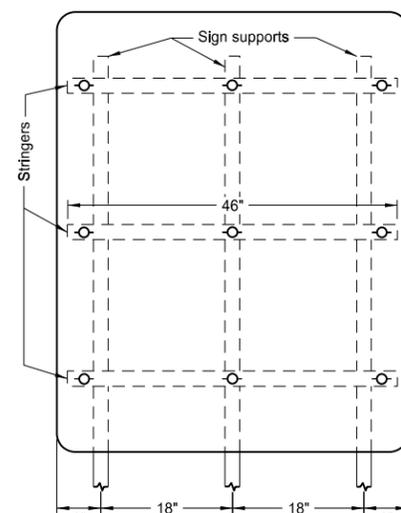


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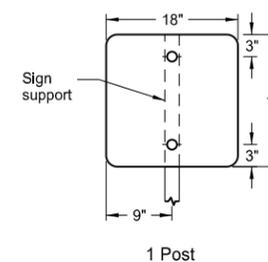


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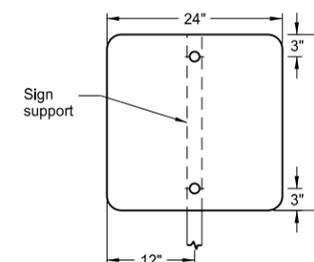


3 Posts



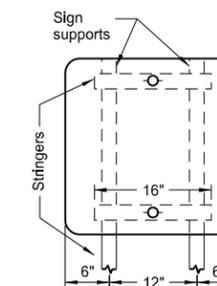
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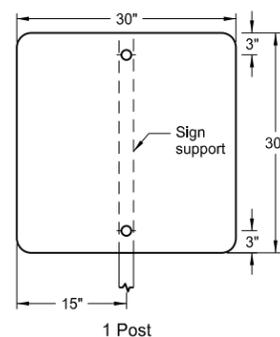


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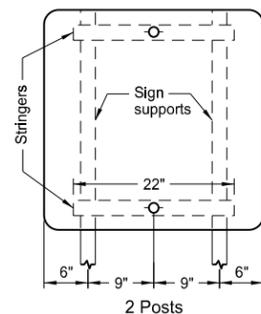


2 Posts

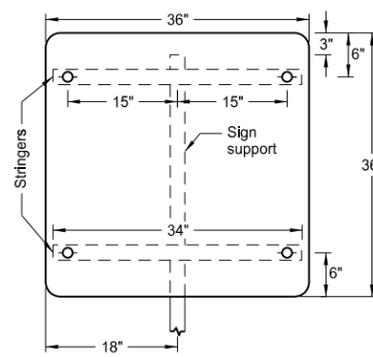


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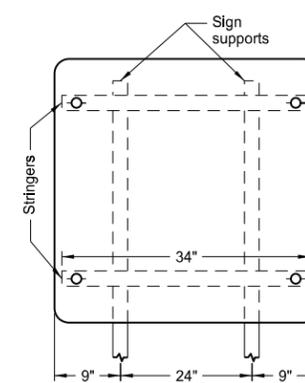
Assembly No. 15



2 Posts

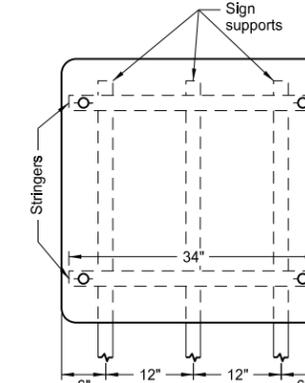


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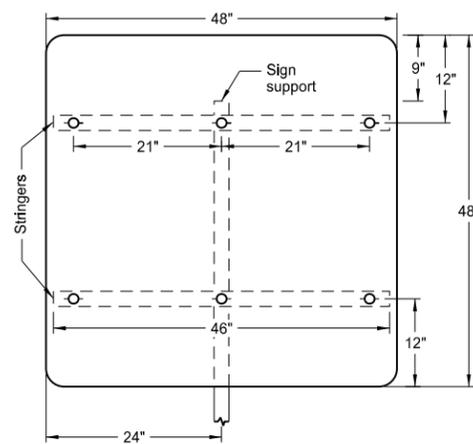


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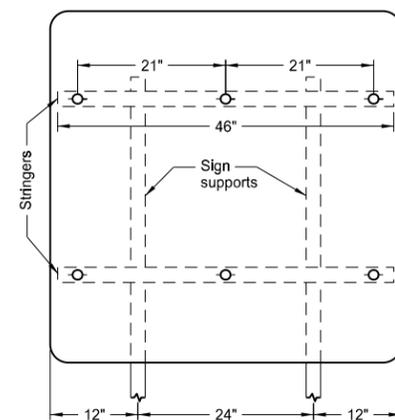
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3 Posts

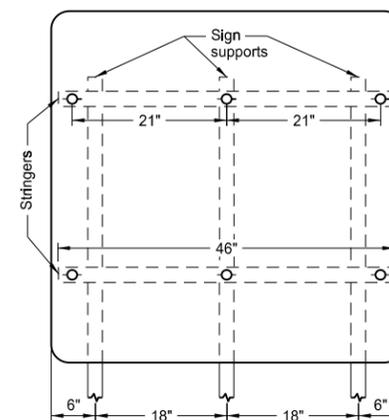


1 Post



2 Posts

Assembly No. 17



3 Posts

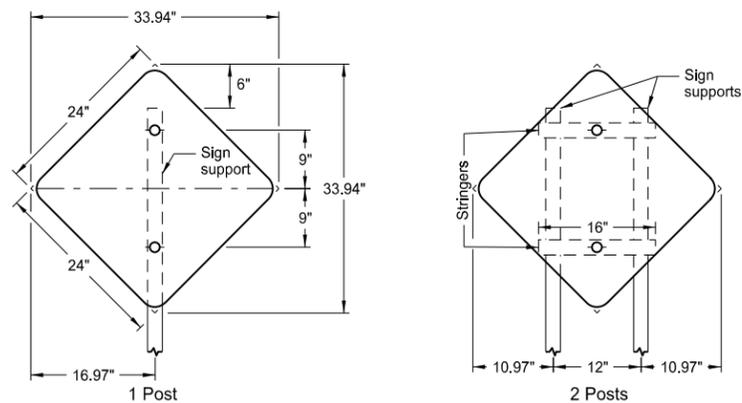
Notes:

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

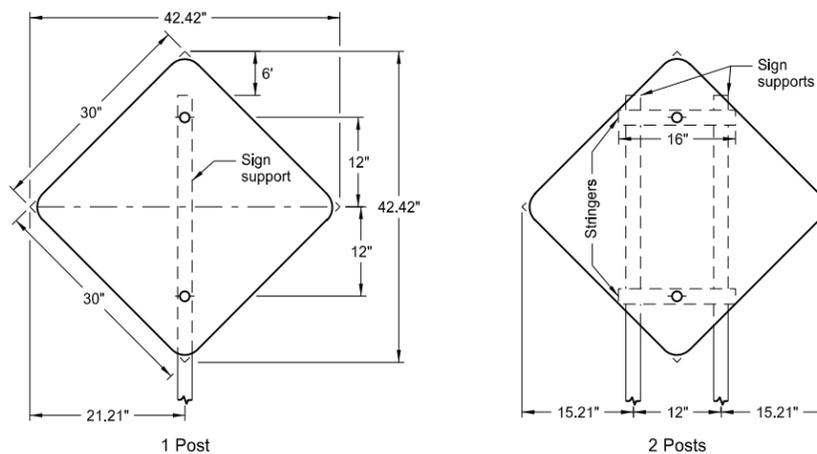
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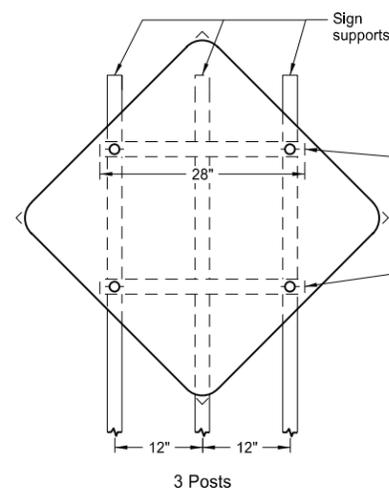
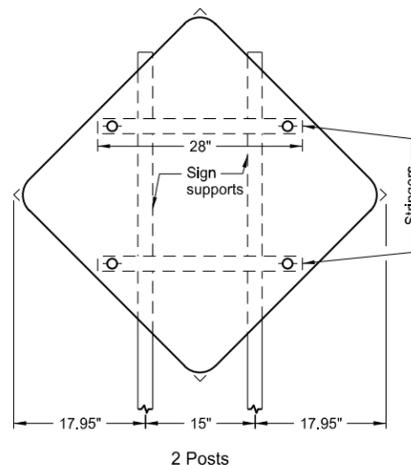
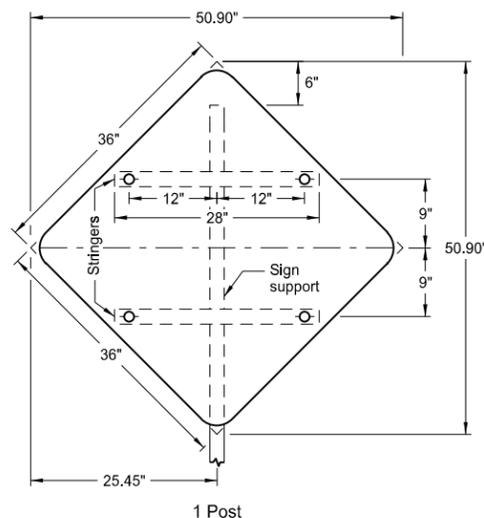
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION  
DETAILS REGULATORY, WARNING AND GUIDE SIGNS



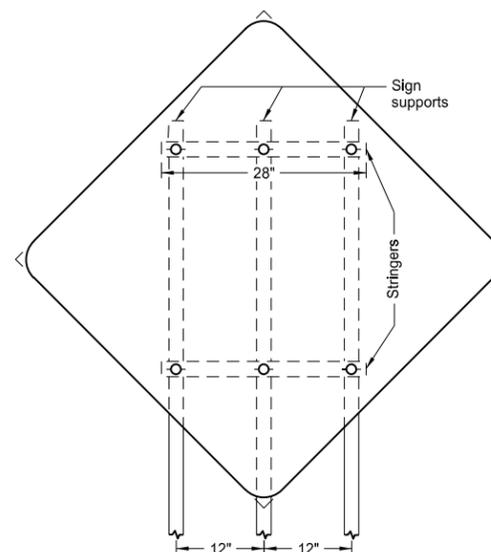
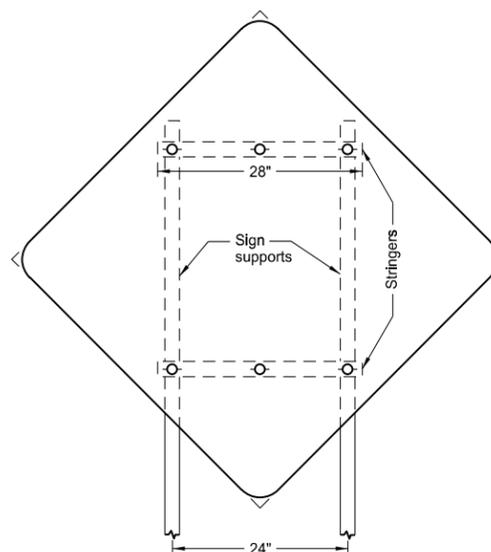
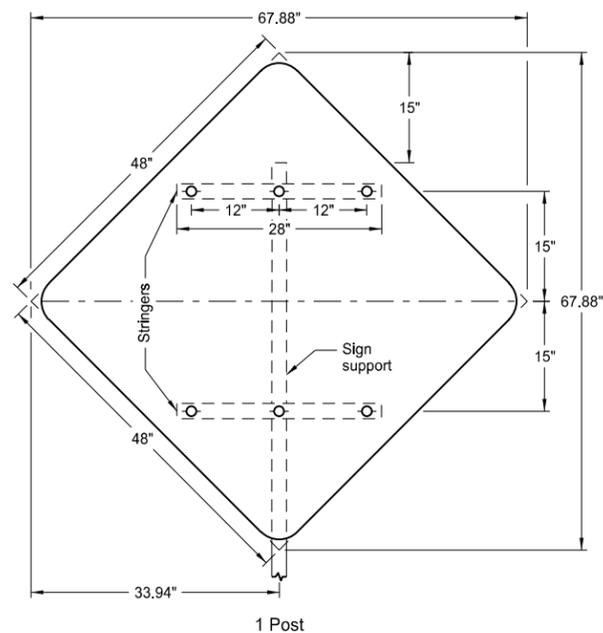
Assembly No. 18



Assembly No. 19



Assembly No. 20



Assembly No. 21

Notes:

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

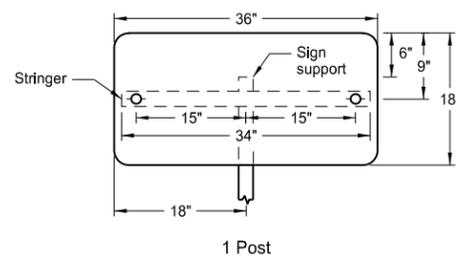
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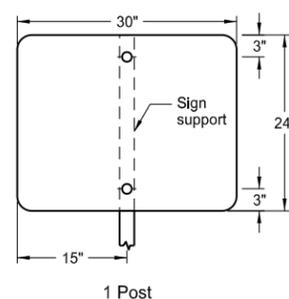
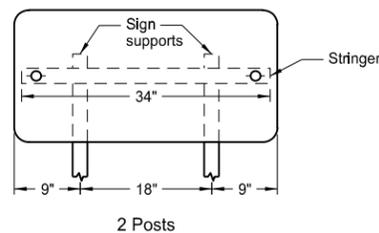
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION  
DETAILS REGULATORY, WARNING AND GUIDE SIGNS

Notes:

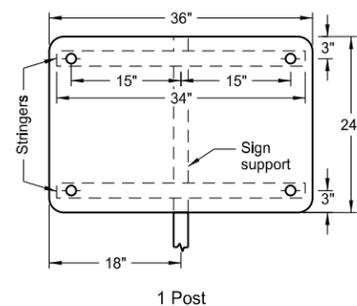
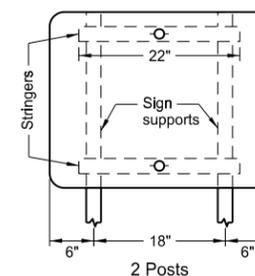
1. See Standard D-754-25 for mounting details.
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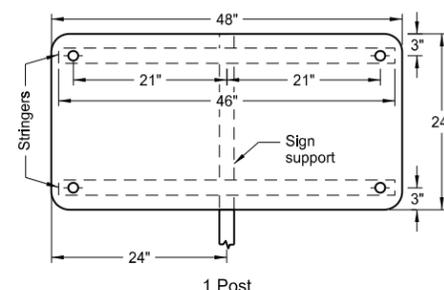
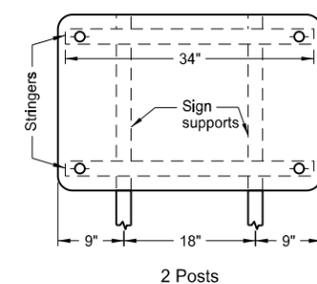
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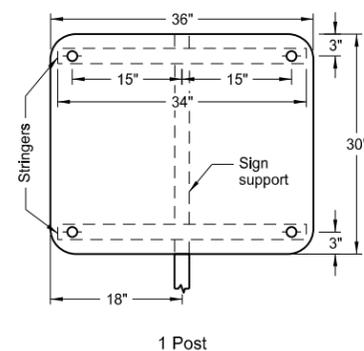
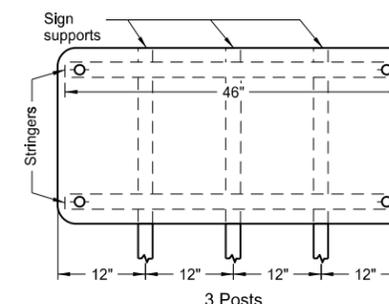
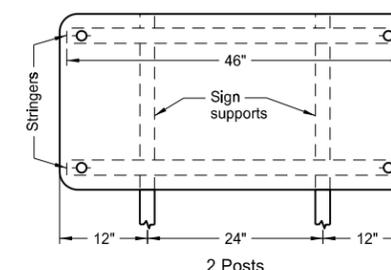
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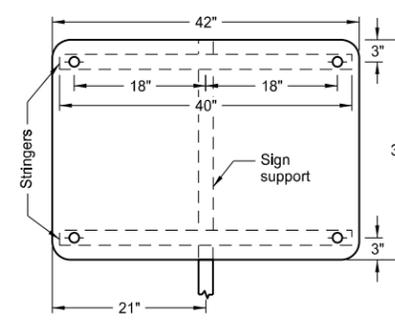
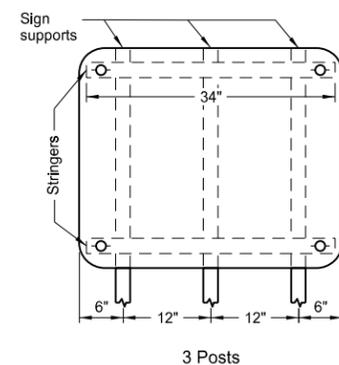
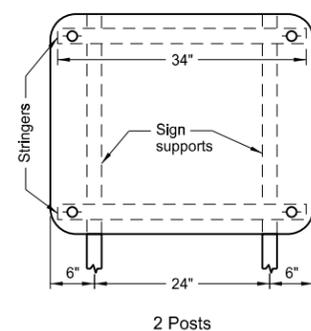
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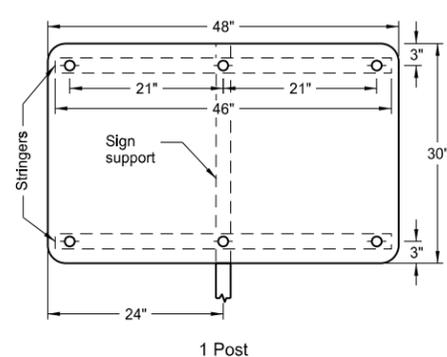
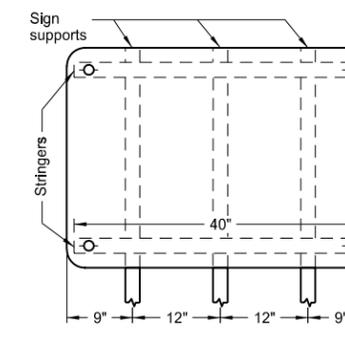
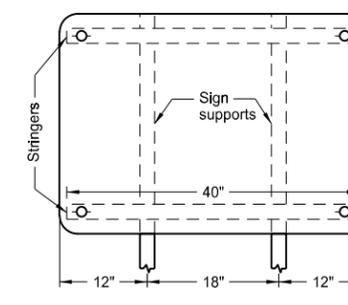
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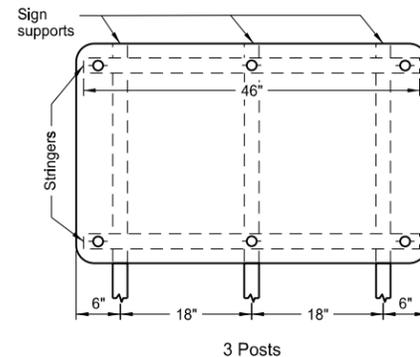
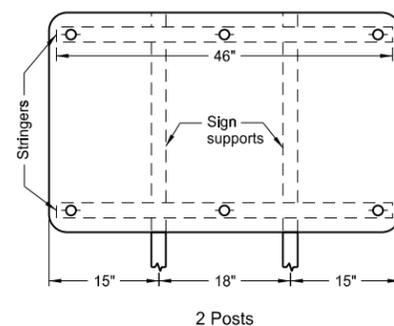
Assembly No. 35



Assembly No. 36



Assembly No. 37

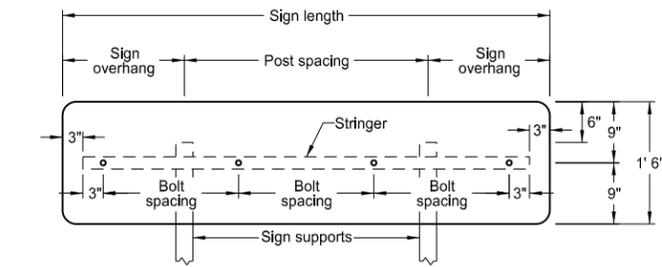


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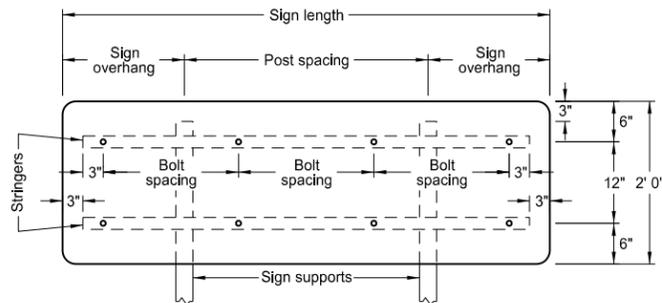
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# SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS FOR VARIABLE LENGTH SIGNS

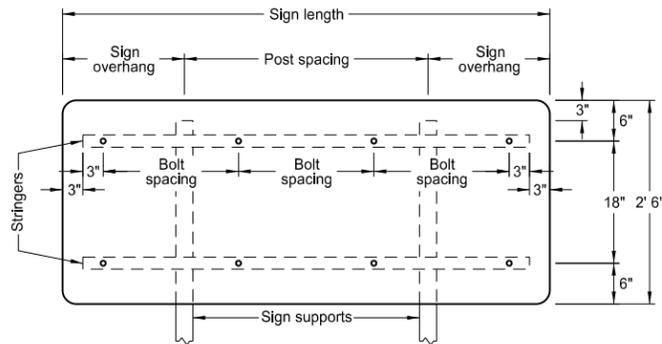
**D-754-48**



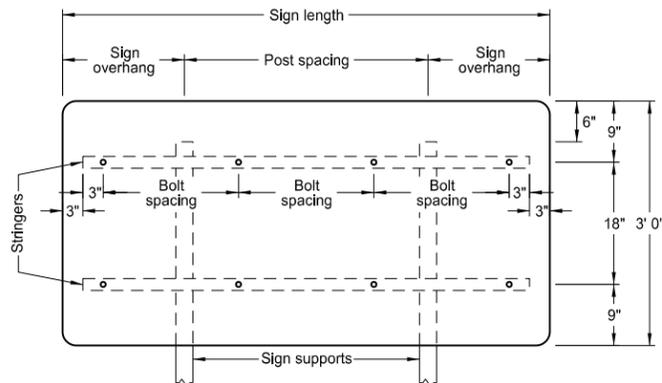
**VARIES X 1'-6"**



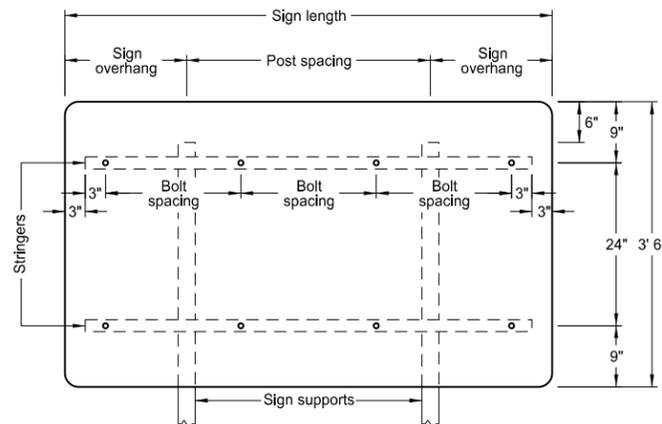
**VARIES X 2'-0"**



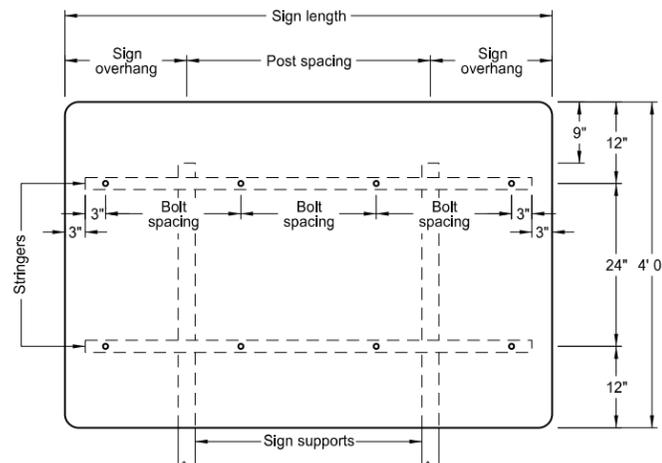
**VARIES X 2'-6"**



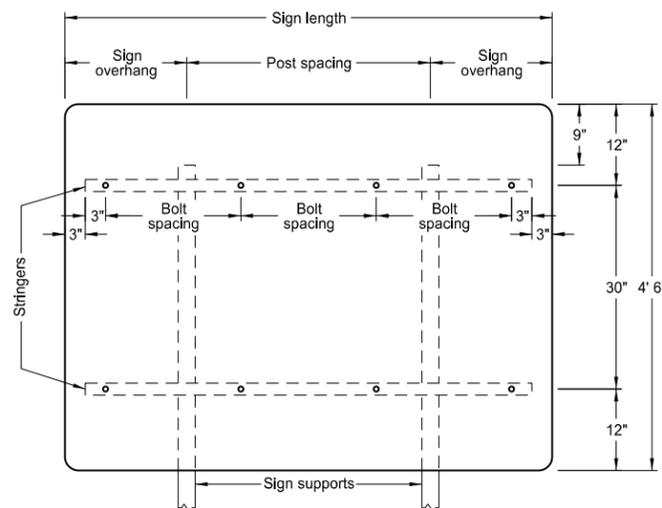
**VARIES X 3'-0"**



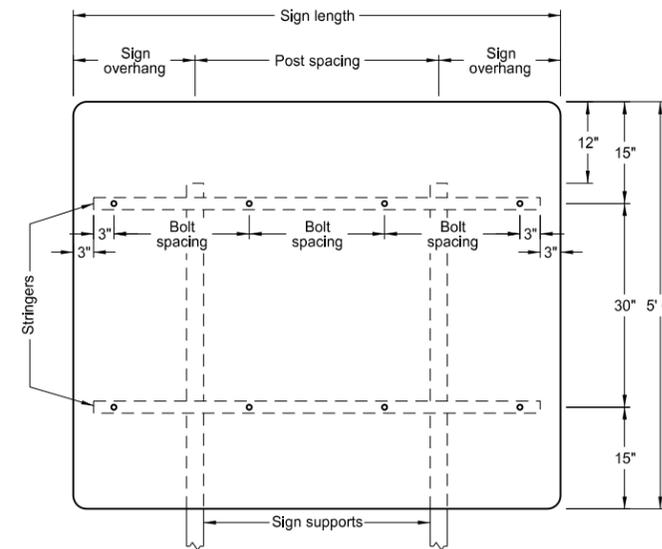
**VARIES X 3'-6"**



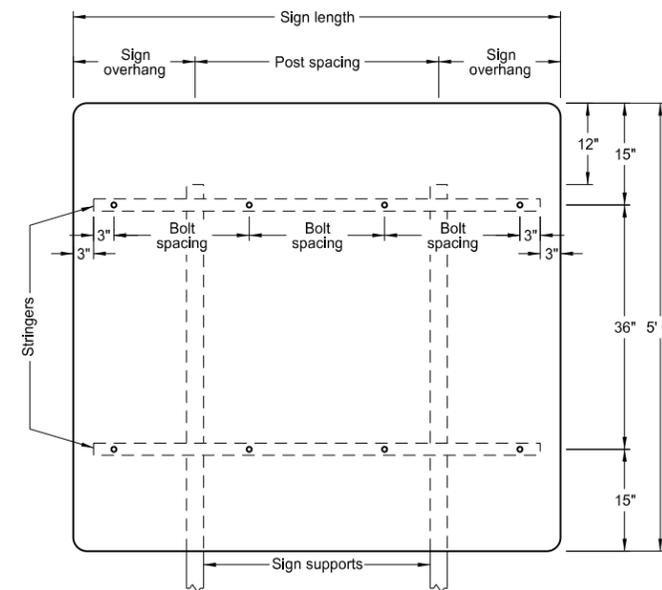
**VARIES X 4'-0"**



**VARIES X 4'-6"**



**VARIES X 5'-0"**



**VARIES X 5'-6"**

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

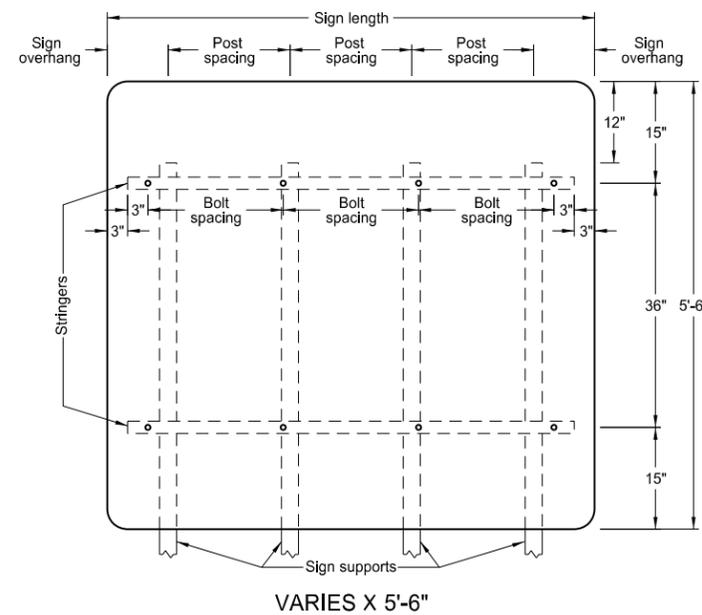
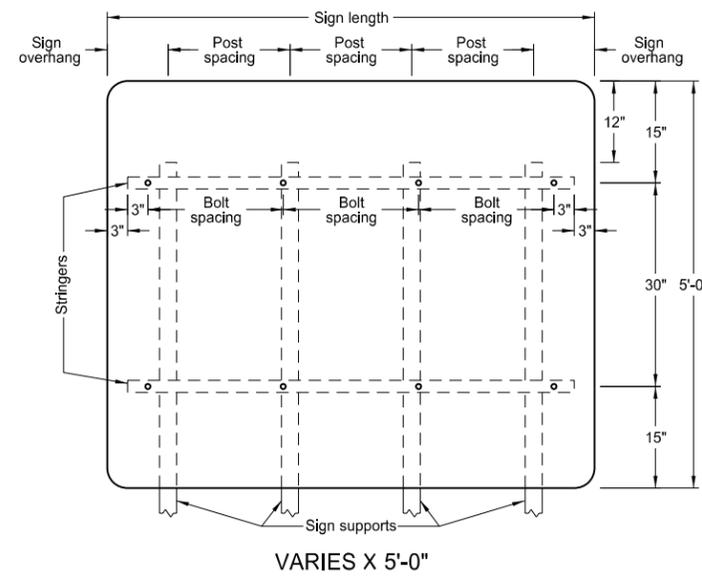
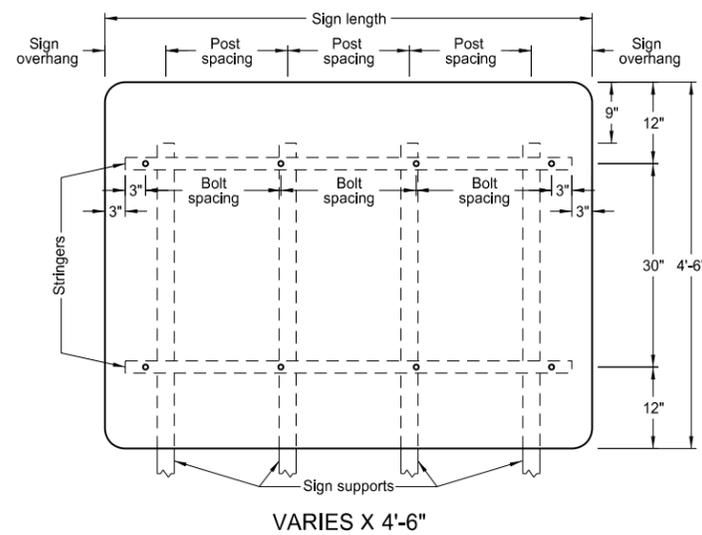
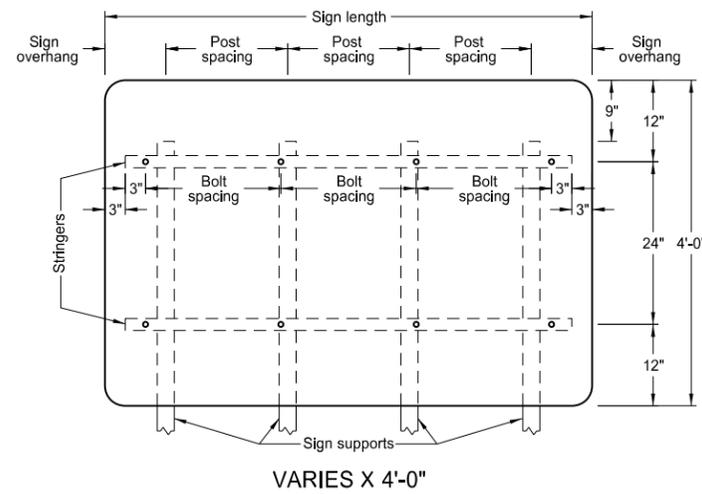
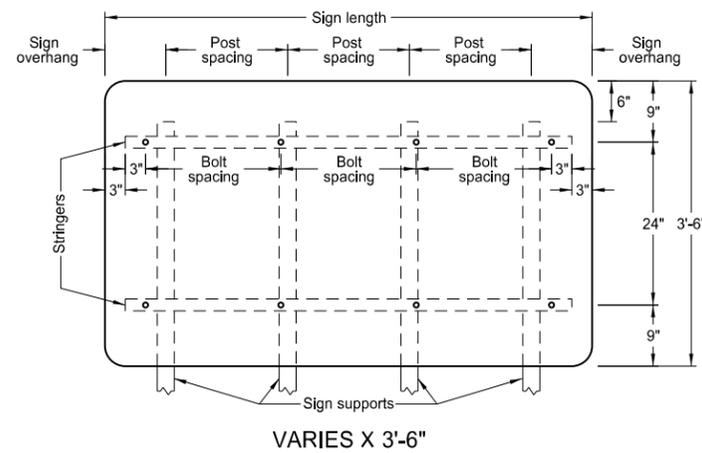
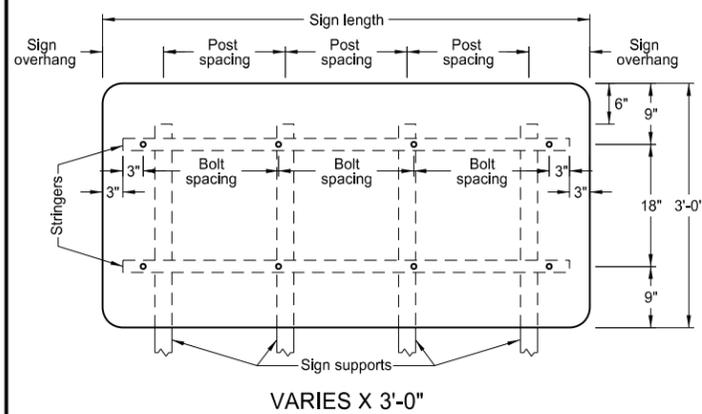
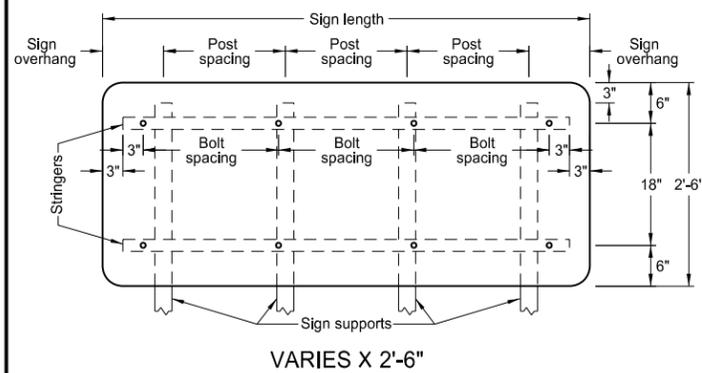
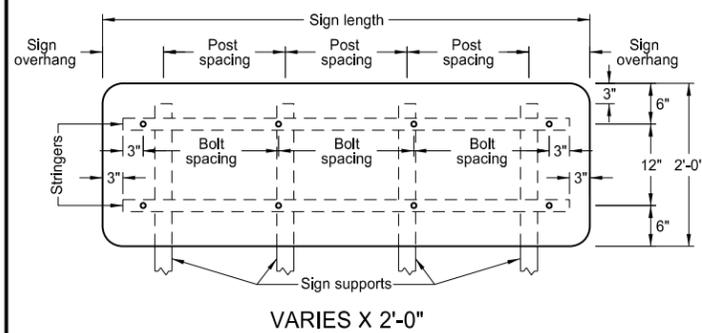
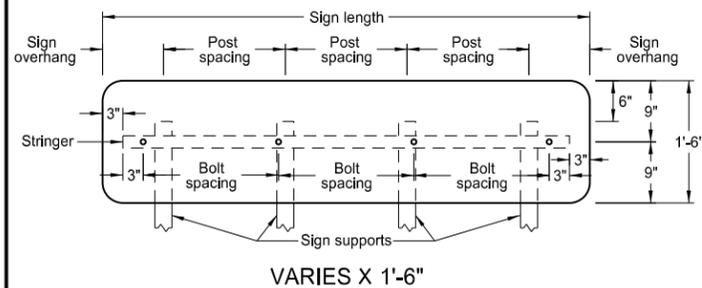
- Notes:
1. The minimum sign backing material thickness shall be 0.100 inch.
  2. Perforated square tube stringer shall be 1½" x 1½".
  3. All holes shall be punched round for ⅜" bolt.

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

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PE-2930,  
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# SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS FOR VARIABLE LENGTH SIGNS

**D-754-50**



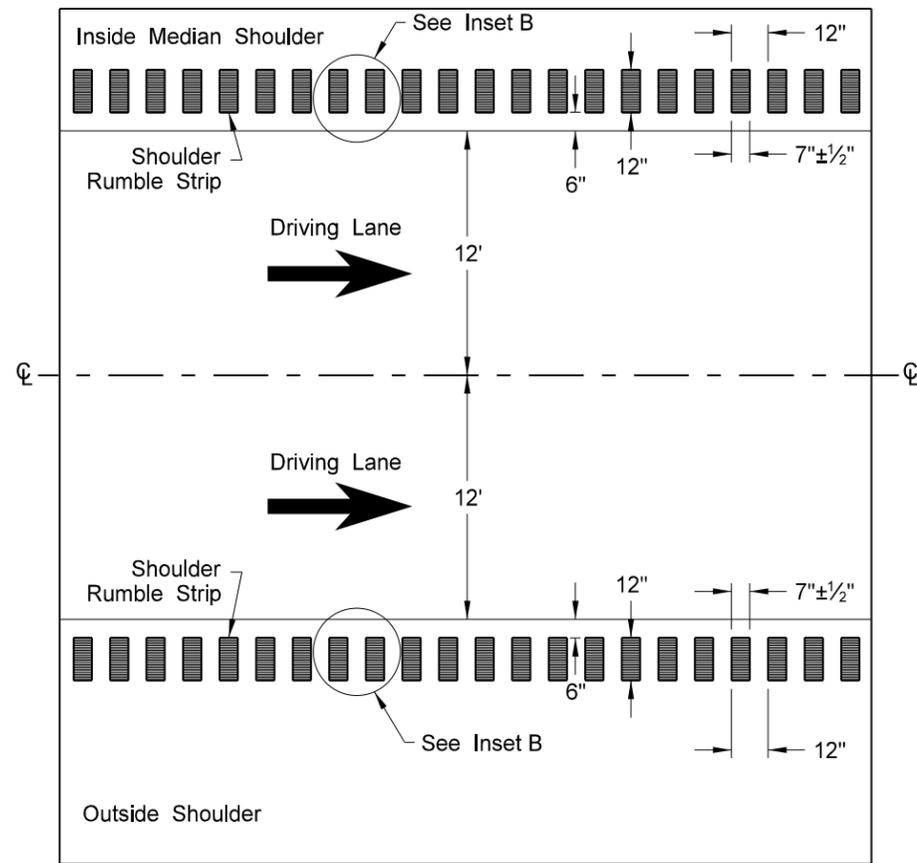
4 POSTS			
Sign Length	Sign Overhang	Post Spacing	Bolt Spacing
8'-6"	0'-3"	2'-8"	2-22" & 2-23"
9'-0"	0'-6"	2'-8"	24"
9'-6"	0'-9"	2'-8"	4-20" & 1-22"
10'-0"	1'-0"	2'-8"	2-21" & 3-22"
10'-6"	1'-3"	2'-8"	4-23" & 1-22"
11'-0"	1'-0"	3'-0"	24"
11'-6"	0'-6"	3'-6"	21"
12'-0"	0'-6"	3'-8"	22"
12'-6"	0'-6"	3'-10"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

- Notes:
1. The minimum sign backing material thickness shall be 0.100 inch.
  2. Perforated square tube stringer shall be 1½" x 1½".
  3. All holes shall be punched round for ⅝" bolt.

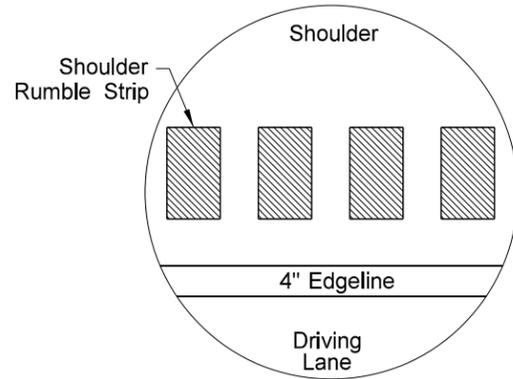
NORTH DAKOTA	
DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE

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**RUMBLE STRIPS  
DIVIDED HIGHWAYS (NON-INTERSTATE)**



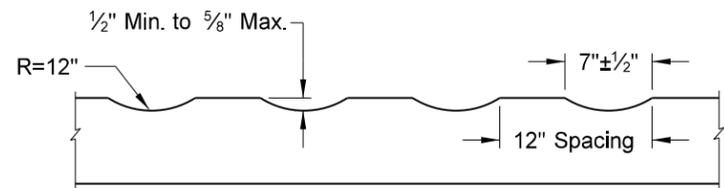
**Divided Highways (Non-Interstate)**



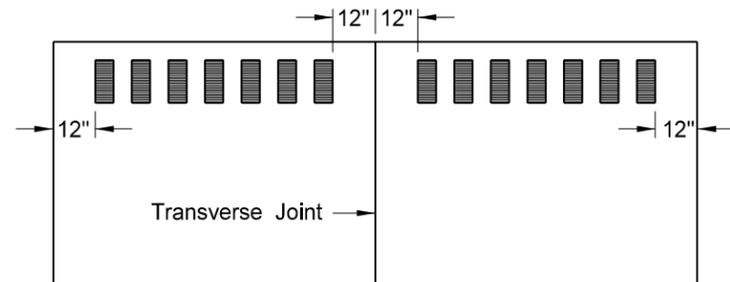
**Inset B - Shoulder Rumble Strip**

**NOTES:**

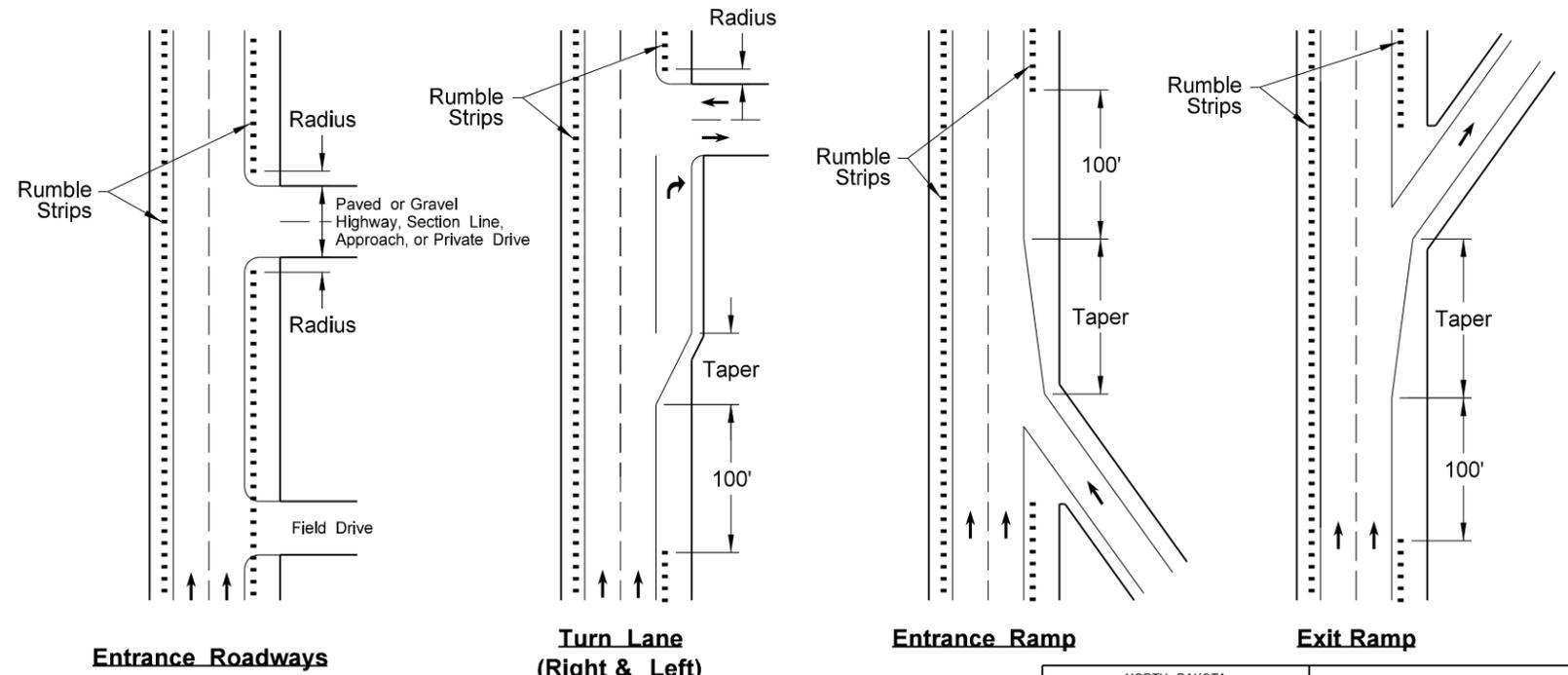
1) Discontinue rumble strips through the entire length of turn lanes & ramps, 100' before turn lane tapers, 100' before or after ramp tapers, and at the radius of a paved or gravel highway, section line, approach, or private drive as shown below.



**Profile of Rumble Strips - Bituminous and PCC Pavements**



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



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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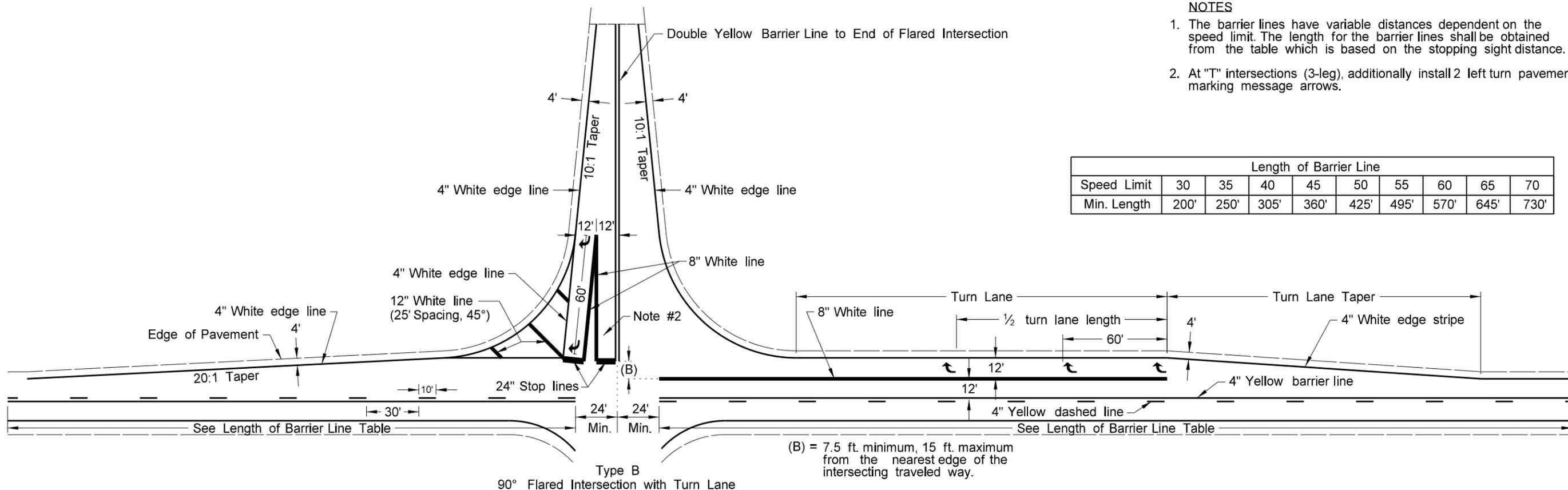
PAVEMENT MARKING FOR STANDARD 90° FLARED INTERSECTION

D-762-3

NOTES

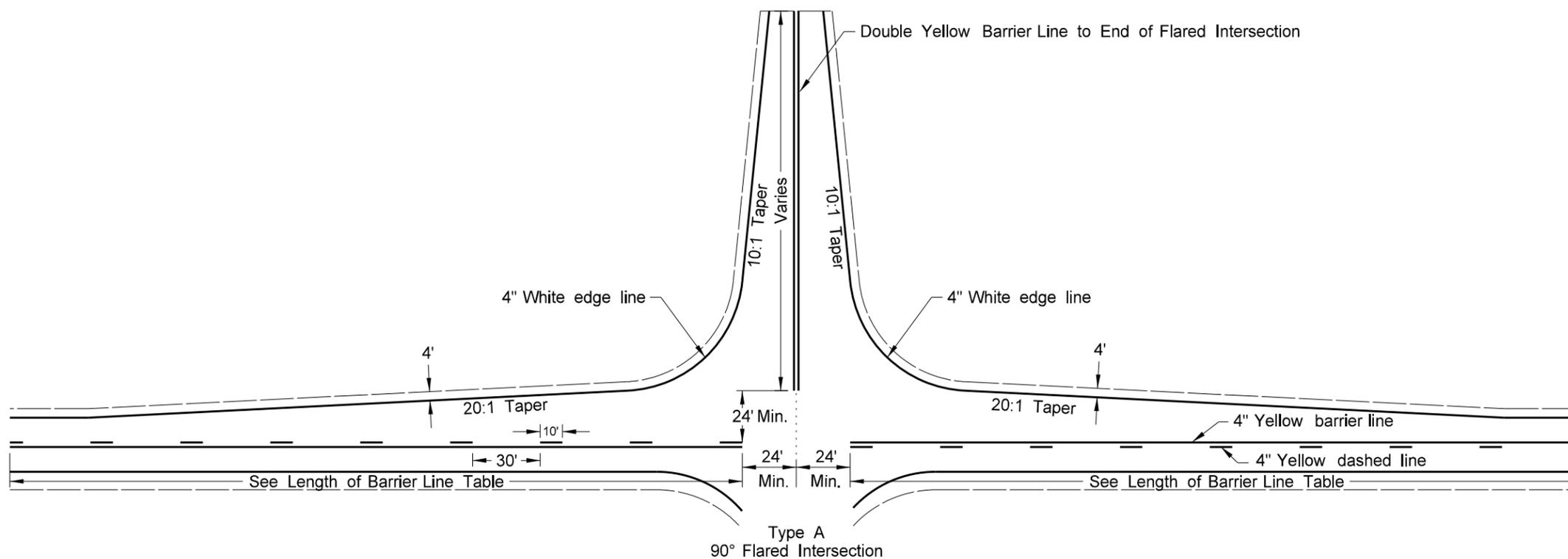
1. The barrier lines have variable distances dependent on the speed limit. The length for the barrier lines shall be obtained from the table which is based on the stopping sight distance.
2. At "T" intersections (3-leg), additionally install 2 left turn pavement marking message arrows.

Length of Barrier Line									
Speed Limit	30	35	40	45	50	55	60	65	70
Min. Length	200'	250'	305'	360'	425'	495'	570'	645'	730'



Legend

- 4" Line
- 8" Line
- 12" Line
- 24" Line

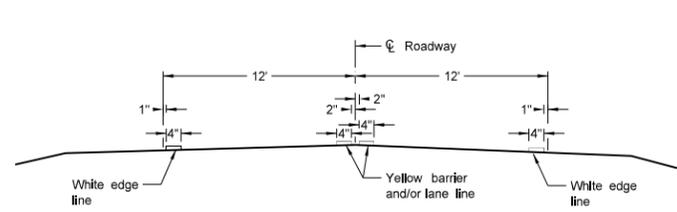


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
6-9-09	
REVISIONS	
DATE	CHANGE
9-24-09	Barrier Stripe Correction
9-21-11	Revised Turn Lane Markings
11-25-13	Revised Type B Layout

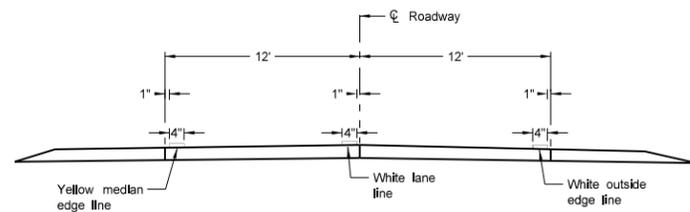
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 of Transportation

# PAVEMENT MARKING

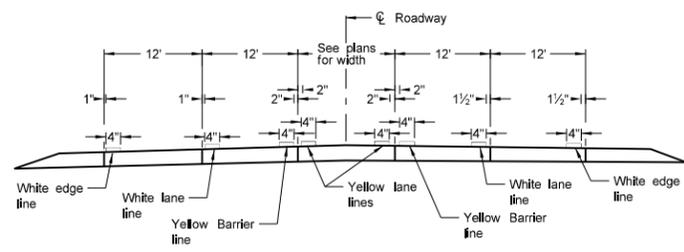
D-762-4



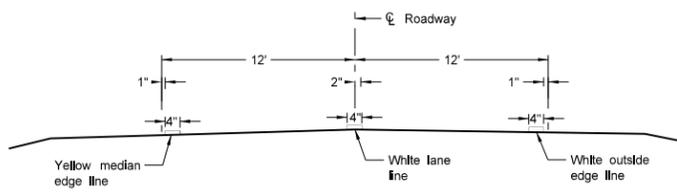
Two Lane Two Way  
RURAL ROADWAY



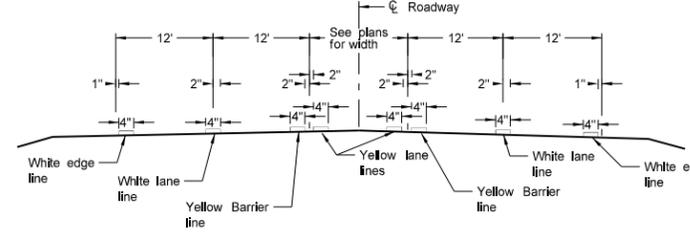
Two Lane Roadway  
INTERSTATE HIGHWAY  
Concrete Section



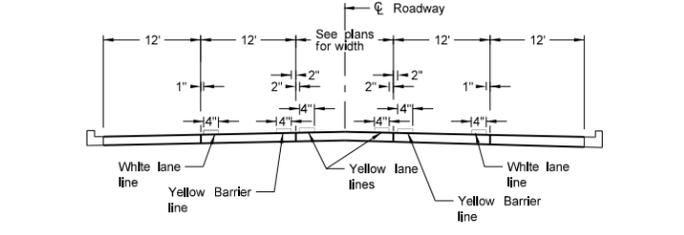
RURAL FIVE LANE ROADWAY  
Concrete Section



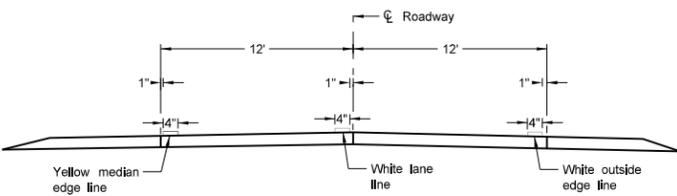
Two Lane Divided  
Rural Roadway  
PRIMARY HIGHWAY  
Asphalt Section



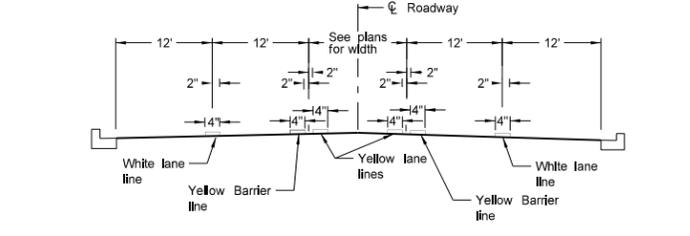
RURAL FIVE LANE ROADWAY  
Asphalt Section



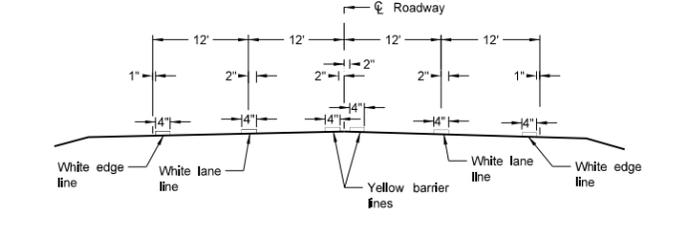
URBAN FIVE LANE SECTION  
Concrete Section



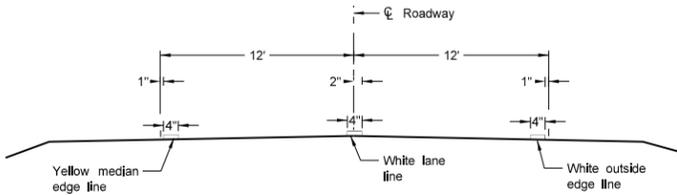
Two Lane Roadway  
PRIMARY HIGHWAY  
Concrete Section



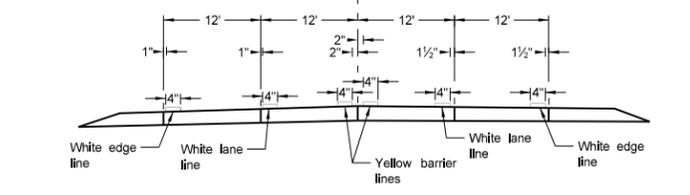
URBAN FIVE LANE SECTION  
Asphalt Section



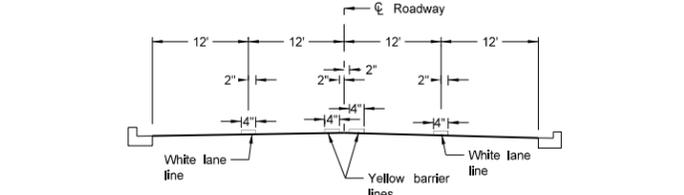
RURAL FOUR LANE ROADWAY  
Asphalt Section



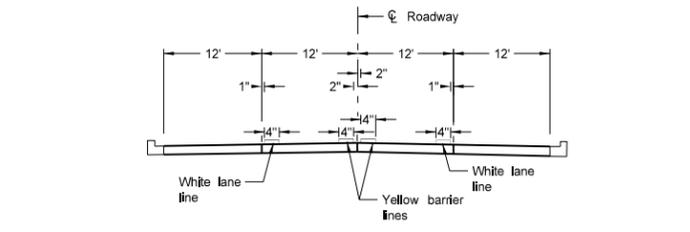
Two Lane Roadway  
INTERSTATE HIGHWAY  
Asphalt Section



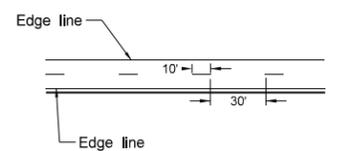
RURAL FOUR LANE ROADWAY  
Concrete Section



URBAN FOUR LANE SECTION  
Asphalt Section



URBAN FOUR LANE SECTION  
Concrete Section



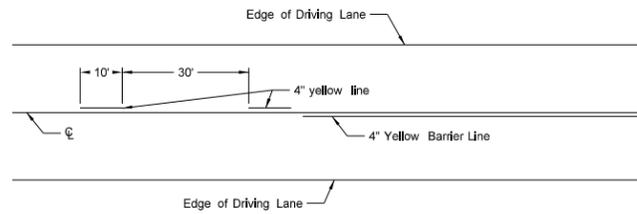
CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

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

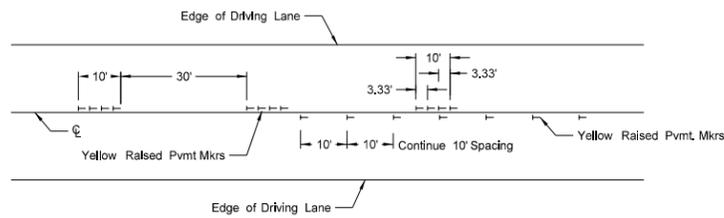
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE

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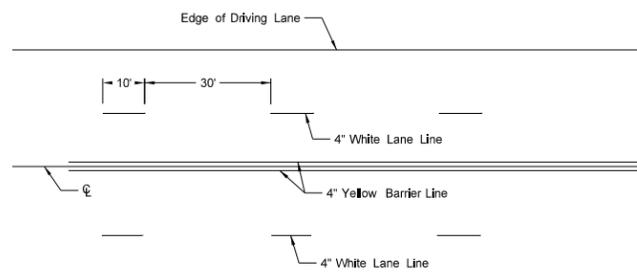
SHORT-TERM PAVEMENT MARKING



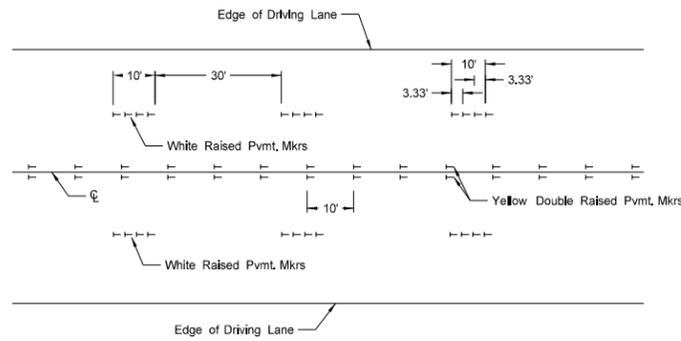
Painted or Tape Lines



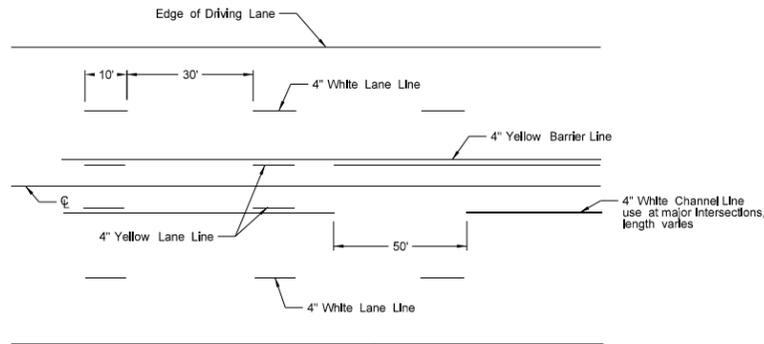
Raised Pavement Markers  
TWO-LANE TWO-WAY ROADWAY



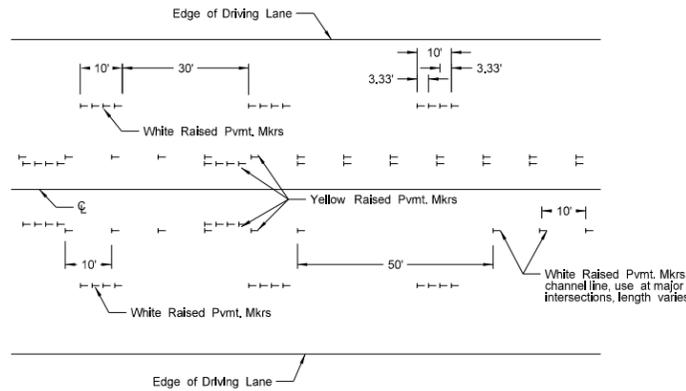
Painted or Tape Lines



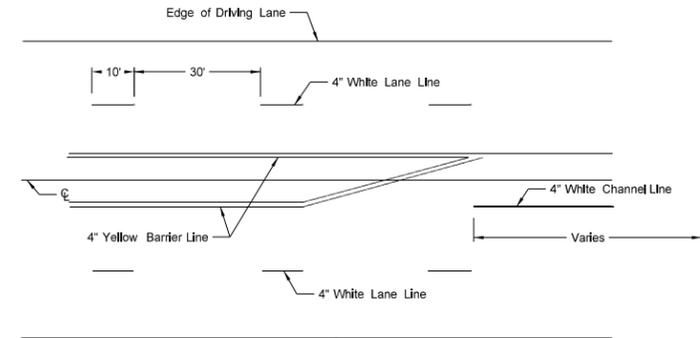
Raised Pavement Markers  
FOUR LANE ROADWAY



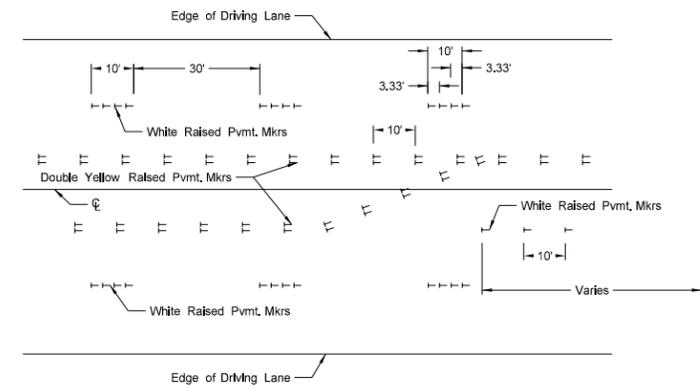
Painted or Tape Lines



Raised Pavement Markers  
FIVE LANE ROADWAY TWO WAY LEFT TURN



Painted or Tape Lines



Raised Pavement Markers  
FIVE LANE ROADWAY WITH MARKED ISLANDS

NOTES:

1. 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.

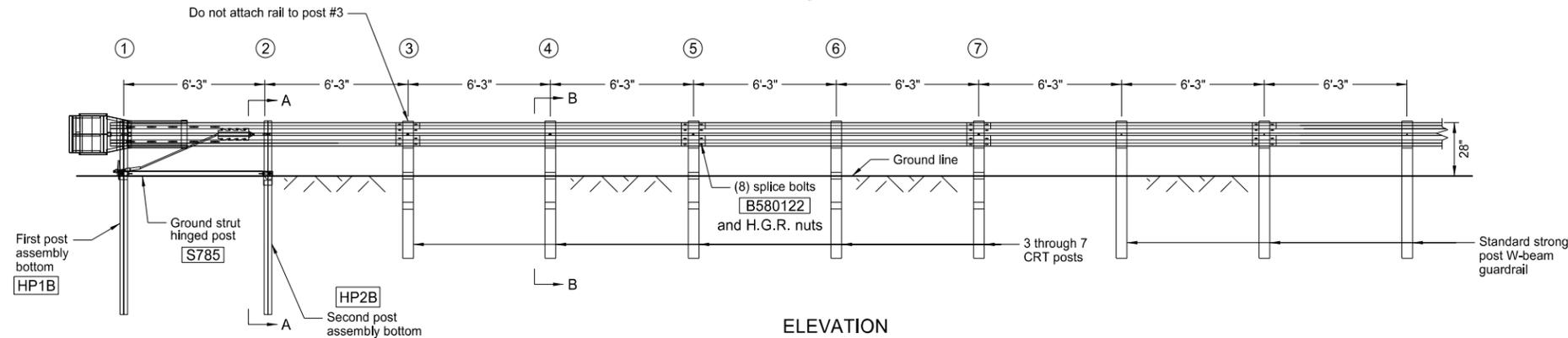
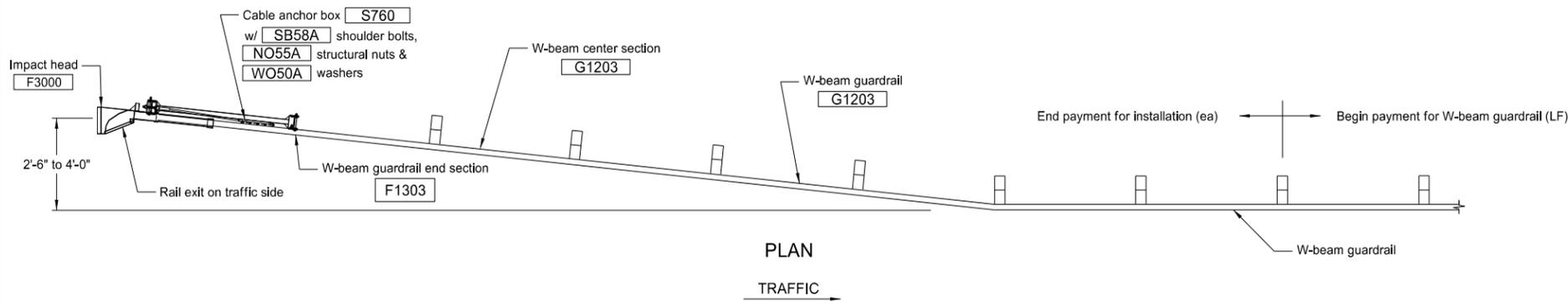
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE

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# FLARED ENERGY ABSORBING TERMINAL

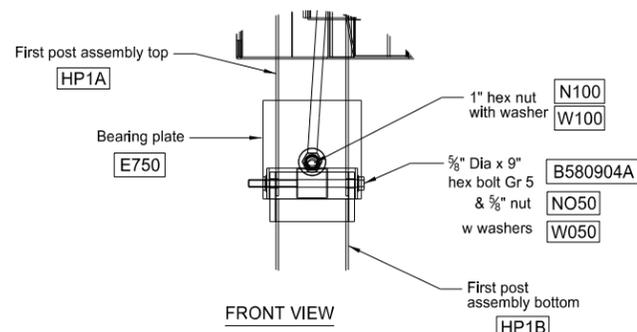
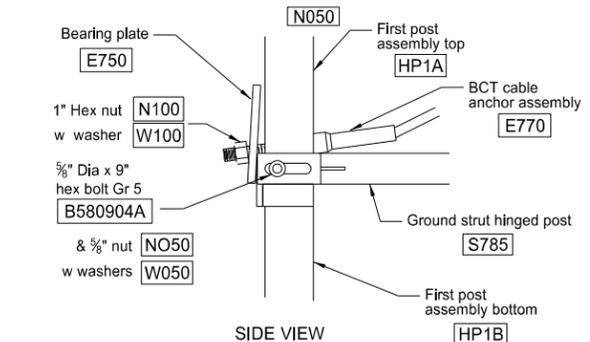
D-764-6



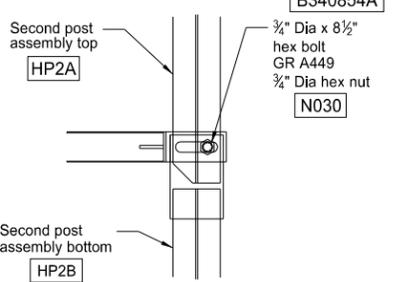
ITEM #	QTY	BILL OF MATERIALS
F3000	1	IMPACT HEAD
F1303	1	W-BEAM GUARDRAIL END SECTION, 12 GA
G1203	2	W-BEAM GUARDRAIL, 12 GA
HP1A	1	FIRST POST ASSEMBLY TOP
HP1B	1	FIRST POST ASSEMBLY BOTTOM
HP2A	1	SECOND POST ASSEMBLY TOP
HP2B	1	SECOND POST ASSEMBLY BOTTOM
P671	5	WOOD CRT POST
P675	5	TIMBER BLOCKOUT OR RECYCLED EQUIVALENT
E750	1	BEARING PLATE
S760	1	CABLE ANCHOR BOX
E770	1	BCT CABLE ANCHOR ASSEMBLY
S785	1	GROUND STRUT HINGED POST
HARDWARE (ALL DIMENSIONS IN INCHES)		
B140404	2	1/4 Dia x 4 HEX BOLT
WO14	4	1/4 WASHER
N014	2	1/4 HEX NUT
B580122	17	5/8 Dia x 1 1/4 SPLICE BOLT
B581802	4	5/8 Dia x 10 H.G.R. BOLT (POSTS 3 THRU 6)
B580904A	1	5/8 Dia x 9 HEX BOLT GR 5
W050	5	5/8 WASHER
N050	22	5/8 Dia H.G.R. NUT
B340854A	1	3/4 Dia x 8 1/2 HEX BOLT GR A449
N030	1	3/4 Dia HEX NUT
N100	2	1 ANCHOR CABLE HEX NUT
W100	2	1 ANCHOR CABLE WASHER
SB58A	8	CABLE ANCHOR BOX SHOULDER BOLT
N055A	8	1/2 A325 STRUCTURAL NUT
W050A	16	1 1/16 OD x 3/16 ID A325 STR. WASHER

**GENERAL NOTES**

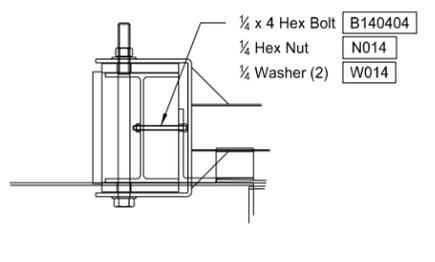
- Wood posts are required with the Flared Energy Absorbing Terminal except posts #1 and #2.
- All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
- The lower sections of the posts shall not protrude more than 4 inches above the ground (measured along a 60 inch cord). Site grading may be necessary to meet this requirement.
- Lower post sections shall not be driven with the upper post attached. If the post is placed in a drilled hole, the backfill material must be satisfactory compacted to prevent settlement.
- When rock is encountered during excavation, a 12" diameter post hole 20" deep may be used if approved by the Engineer. Granular material will be placed in the bottom of the hole approximately 2 1/2" deep to provide drainage. The soil tubes shall be field cut to length, placed in the hole and back filled with adequately compacted material excavated from the hole.
- The breakaway cable assembly shall be taut. A locking device (vice grips or channel lock pliers) should be used to prevent cable from twisting when tightening nuts.
- The wood blockouts shall be "toe nailed" to the rectangular wood posts to prevent them from turning when wood shrinks. The nail shall be 20 penny and galvanized.
- The Flared Energy Absorbing Terminal shall be flared only when the approach guardrail is parallel with the roadway. When the approach guardrail is flared at 16:1 to 10:1, the Flared Energy Absorbing Terminal shall have only the flare rate of the guardrail. When the guardrail flare is between 10:1 and 7:1, the Flared Energy Absorbing Terminal shall be turned parallel to the roadway.



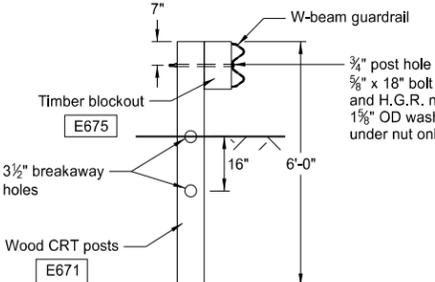
POST #1 CONNECTION DETAILS



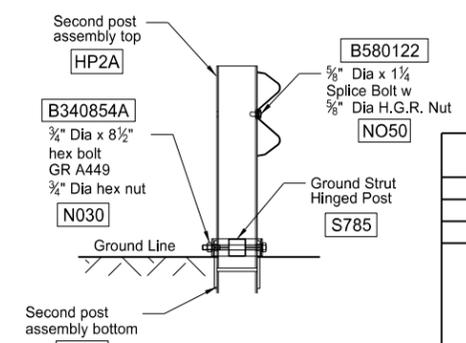
SIDE VIEW DETAIL OF POST #2



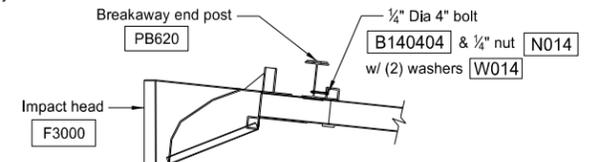
IMPACT HEAD CONNECTION DETAIL



SECTION B-B  
POST 3 THRU 7



SECTION A-A  
at Post #2



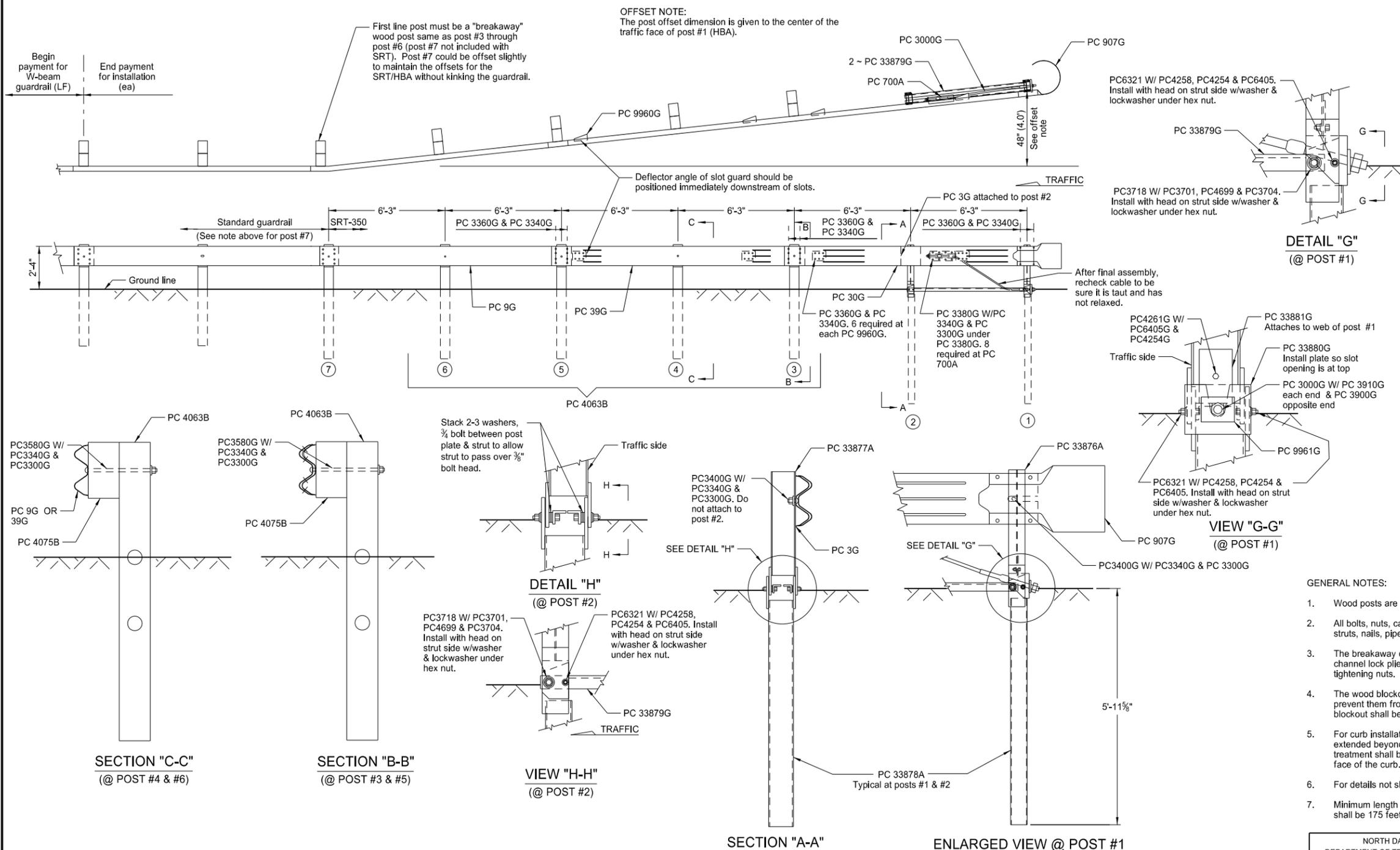
IMPACT HEAD CONNECTING DETAIL

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# SLOTTED RAIL TERMINAL

D-764-7



BILL OF MATERIAL		
PC	QTY	DESCRIPTION
3G	1	12/12"/BACKUP (GUARDRAIL)
9G	1	12/12"/6/3/S (GUARDRAIL)
30G	1	12/12"/S SRT-1 (GUARDRAIL)
39G	1	12/12"/S SRT-2 (GUARDRAIL)
700A	1	CABLE ANCHOR BRACKET
907G	1	12/BUFFER/ROLLED (TERMINAL)
3000G	1	3/4 x 6"6" CABLE
3300G	14	5/8" WASHER
3340G	58	5/8" HEX NUT
3360G	44	5/8" x 1 1/4" SPLICE BOLT
3380G	8	5/8" x 1 1/2" HEX HD BOLT
3400G	2	5/8" x 2" POST BOLT
3580G	4	5/8" x 18" POST BOLT
3701G	10	3/4" WASHER
3704G	4	3/4" HEX NUT
3718G	4	3/4" x 3" HEX HD BOLT (A325)
3900G	1	1" WASHER
3910G	2	1" HEX NUT
4063B	4	6" POST 6" x 8"
4075B	4	14" BLOCK 6" x 8"
4254G	5	3/8" WASHER
4258G	4	3/8" LOCKWASHER
4261G	1	3/8" x 3" 1/2" HEX HD BOLT (GR 5)
4699G	4	3/4" LOCKWASHER
6321G	4	3/8" x 2" HEX HD BOLT (GR 5)
6405G	5	3/8" HEX NUT
9960G	4	SLOT GUARD
9961G	1	3/8" x 3" x 4" PLATE WASHER
33876A	1	HBA POST 1 TOP (W6 x 8.5)
33877A	1	HBA POST 2 TOP (W6 x 8.5)
33878A	2	HBA POST 1 & 2 BOT (TS 6 x 4)
33879G	2	ANGLE STRUT 2" x 2" x 3/8"
33880G	1	1" x 6" x 8" BEARING PLATE
33881G	1	CABLE WEB PL 4" x 1/4" x 6 1/2"

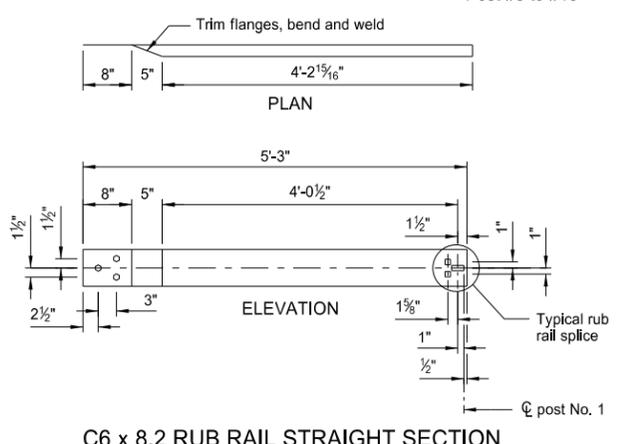
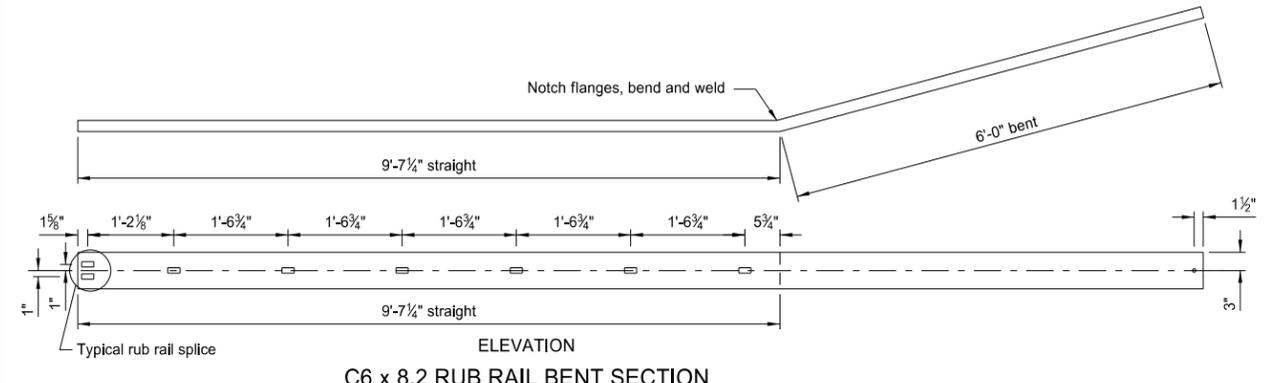
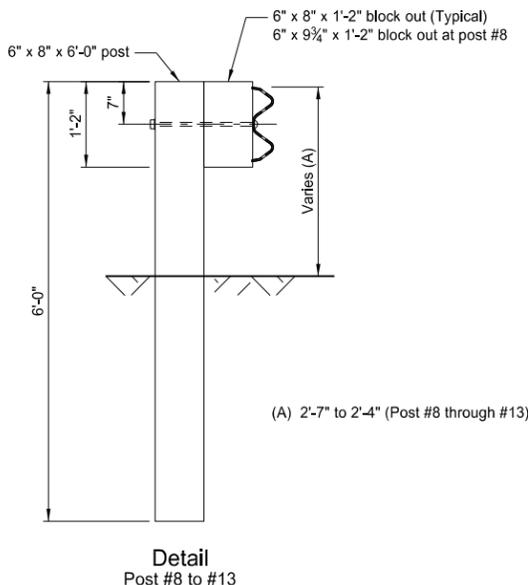
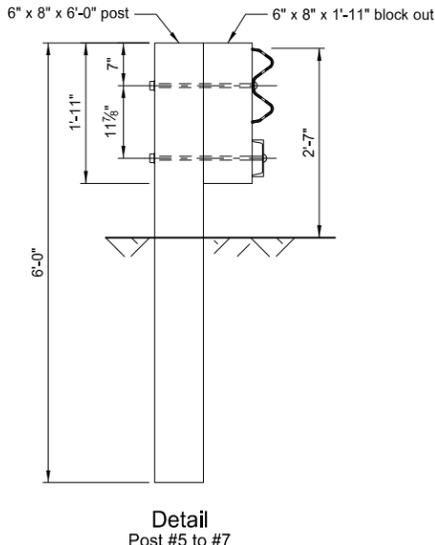
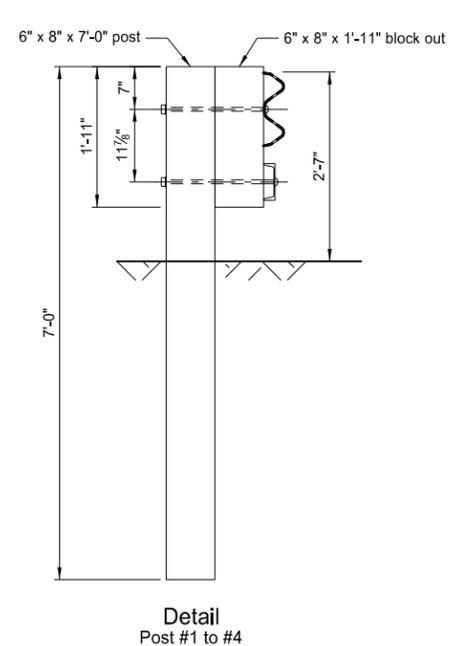
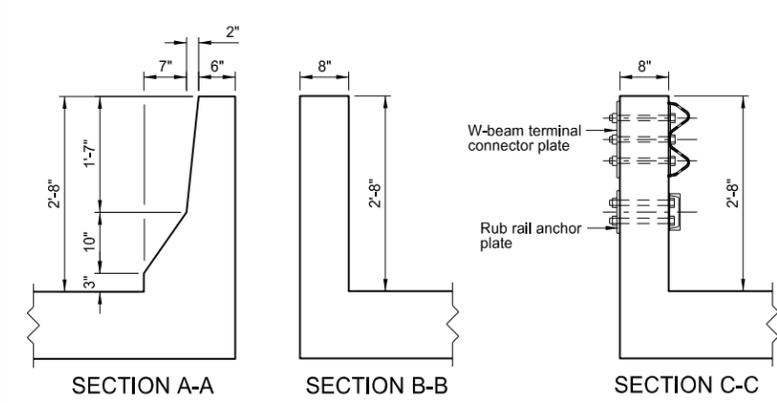
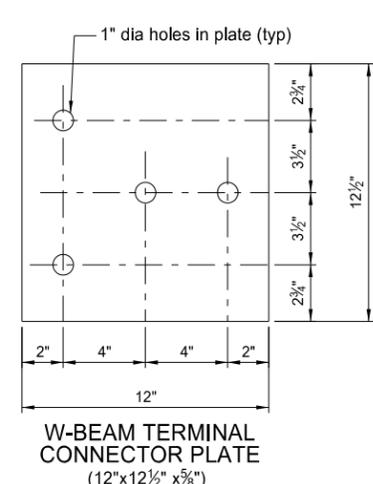
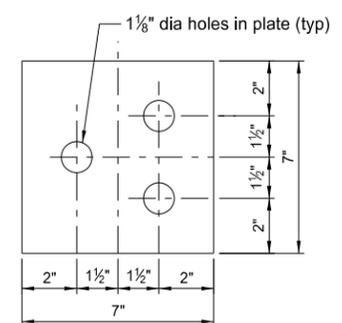
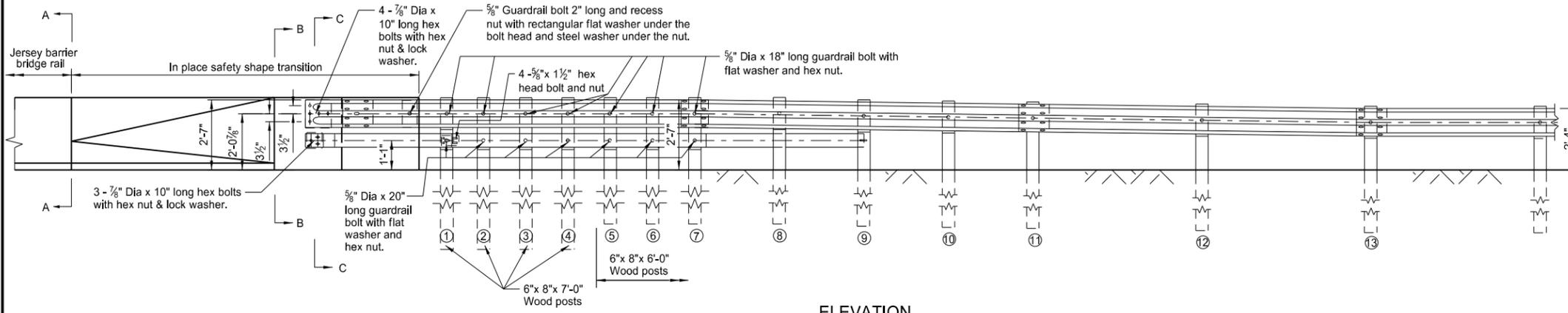
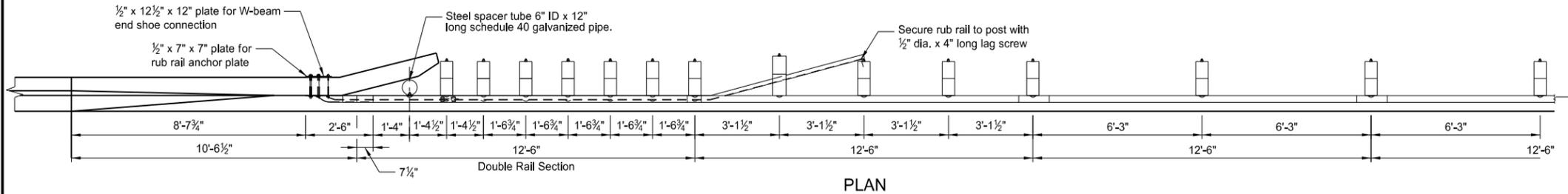
- GENERAL NOTES:**
- Wood posts are required with the slotted rail terminal except posts #1 and #2.
  - All bolts, nuts, cable assemblies, cable anchors, bearing plates, slot guards, struts, nails, pipes soil tubes and soil plates shall be galvanized.
  - The breakaway cable assembly must be taut. A locking device (vice grips or channel lock pliers) should be used to prevent cable from twisting when tightening nuts.
  - The wood blockouts shall be "toe nailed" to the rectangular wood posts to prevent them from turning when wood shrinks. The 2 nails required per blockout shall be 20 penny and galvanized.
  - For curb installation, the curb must end prior to post #7. Where the curb is extended beyond post #7, the flared SRT can not be used. A straight end treatment shall be used at the end of the straight guardrail that is placed at the face of the curb.
  - For details not shown, see the manufacturer's installation manual.
  - Minimum length of rail, including end terminal, in advance of fixed objects shall be 175 feet when the slotted rail terminal is used as the end terminal.

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# W-BEAM TRANSITION TO IN PLACE CONCRETE SAFETY SHAPE TRANSITION

D-764-11

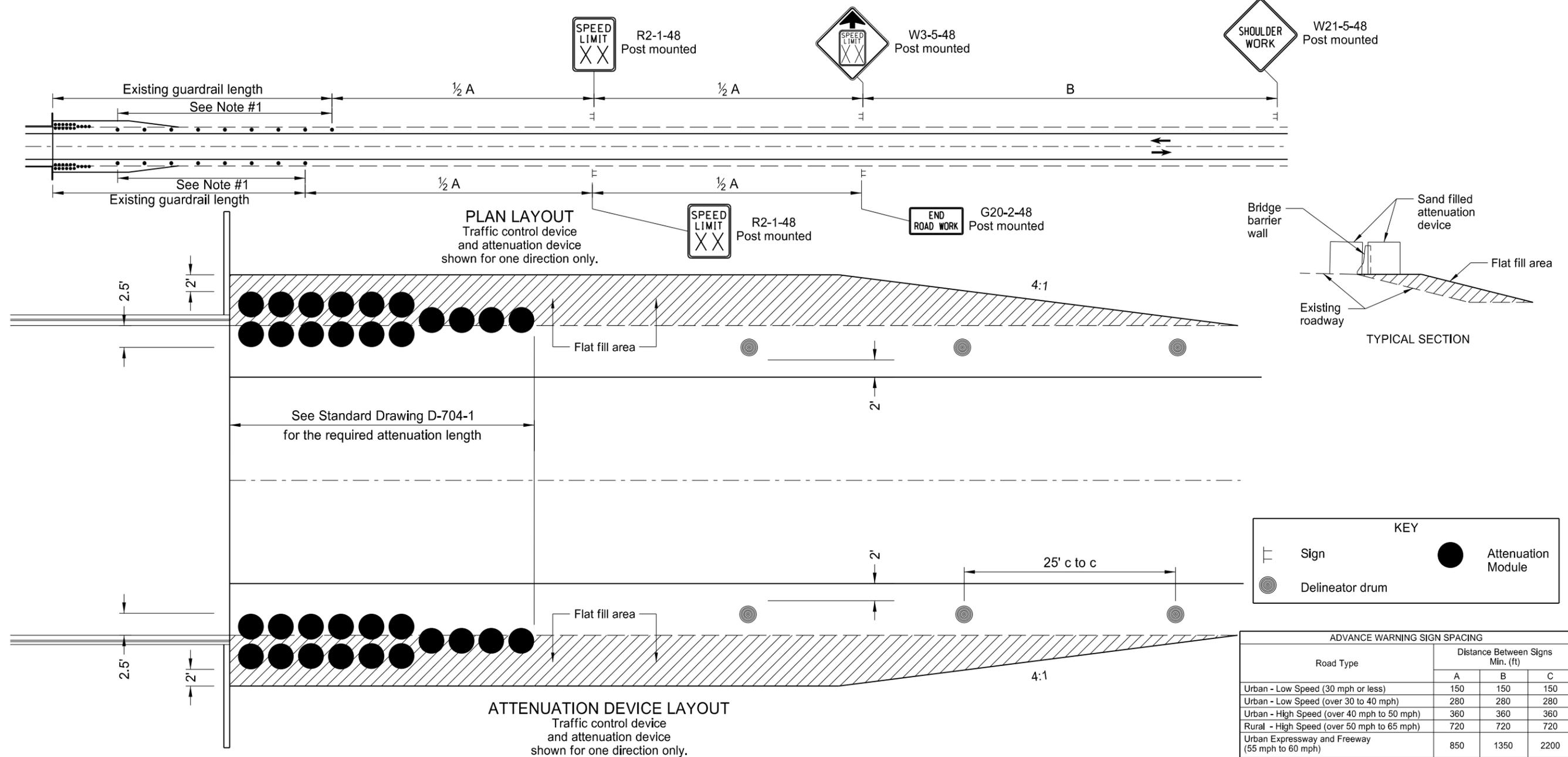


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Note:  
The bolt holes shall be drilled through the Safety Shape wall. If reinforcing steel is encountered it shall be drilled through.

SHORT TERM END TREATMENT FOR BRIDGES  
(ATTENUATION DEVICE METHOD)



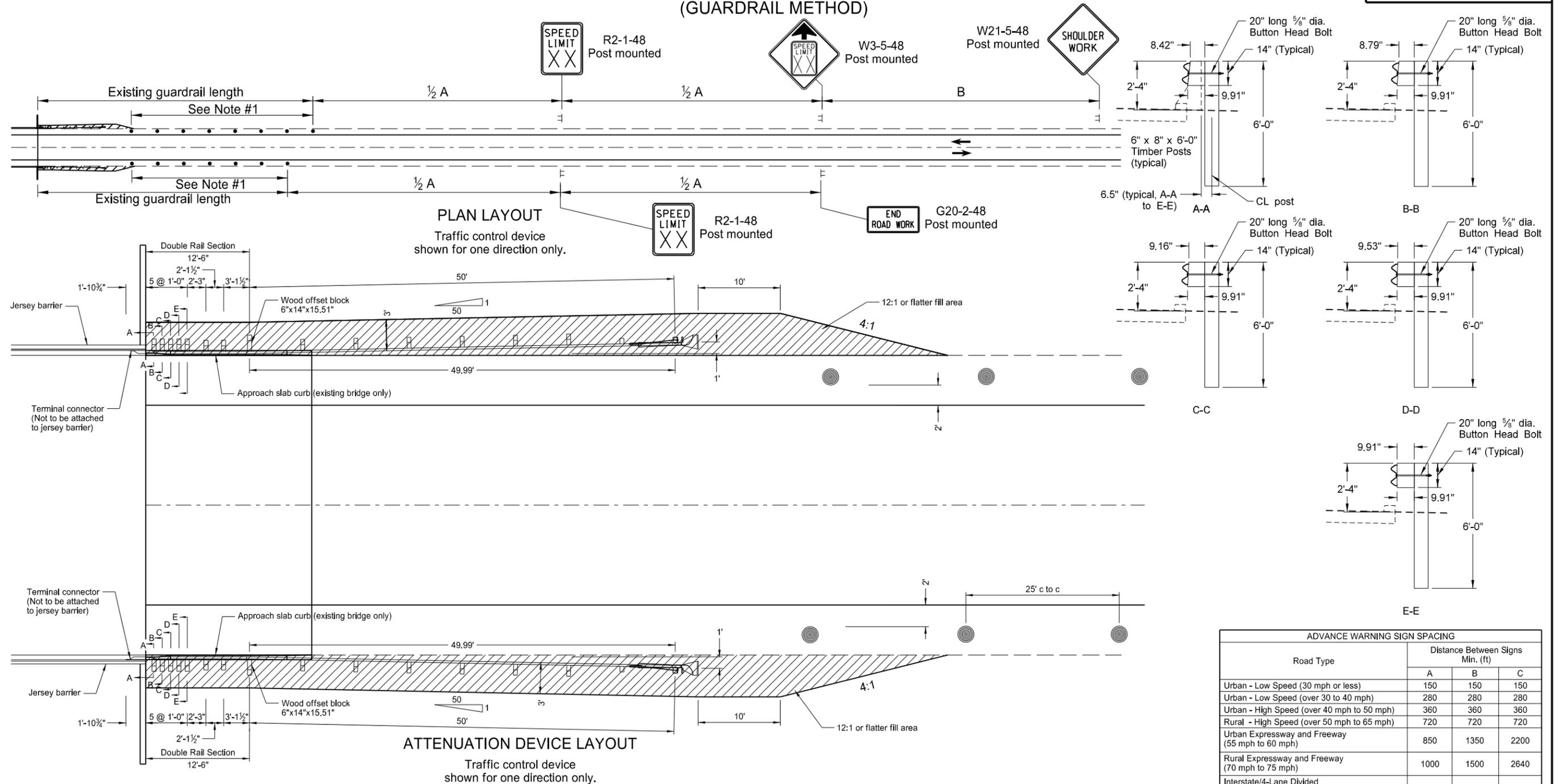
Notes

1. If the shoulder width is less than 3', the vertical panels shall be used and placed as far from the driving lane as possible and still be on the finished shoulder. When there is no shoulder, the vertical panels shall be placed as near as possible to the driving lane on the foreslope of the shoulder.
2. If the bridge is within construction zone signing, the reduced speed ahead sign can be eliminated.
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 shall be placed at 1/2 B.
4. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
5. Existing speed limit signs within a reduced speed zone shall be covered.

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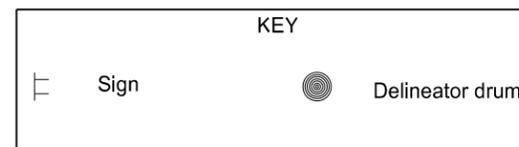
SHORT TERM END TREATMENT FOR BRIDGES  
(GUARDRAIL METHOD)



Notes

1. If the shoulder width is less than 3', vertical panels shall be used in place of delineator drums and placed as far from the driving lane as possible and still be on the finished shoulder. When there is no shoulder, the vertical panels shall be placed as near as possible to the driving lane on the foreslope of the shoulder.
2. If the bridge is within construction zone signing, the reduced speed ahead sign can be eliminated.
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 shall be placed at 1/2 B.

4. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
5. Existing speed limit signs within a reduced speed zone shall be covered.



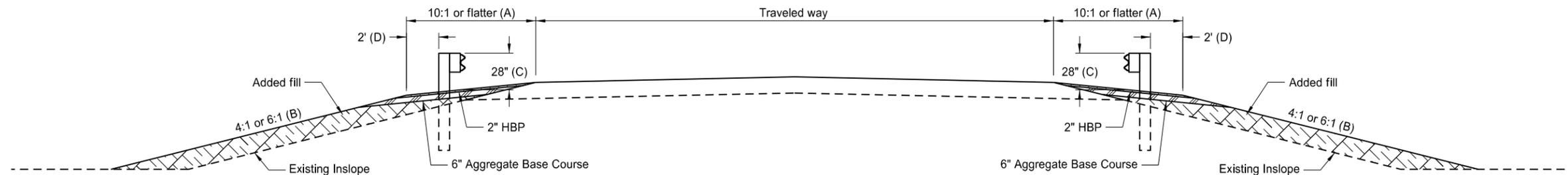
Road Type	ADVANCE WARNING SIGN SPACING		
	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway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

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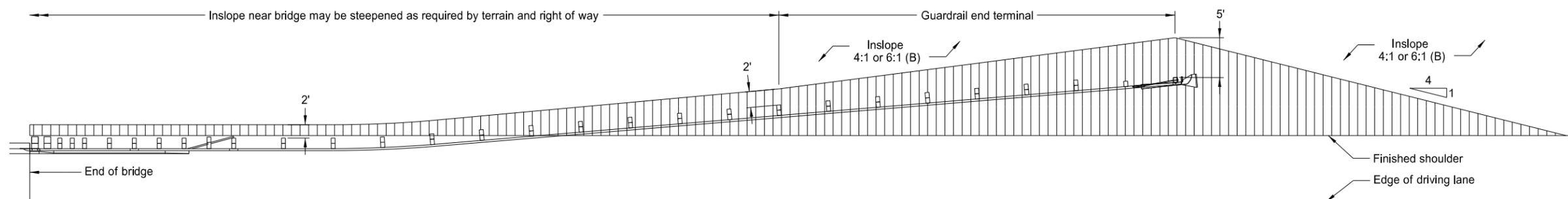
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TYPICAL GRADING AT BRIDGE ENDS  
WITH W-BEAM GUARDRAIL

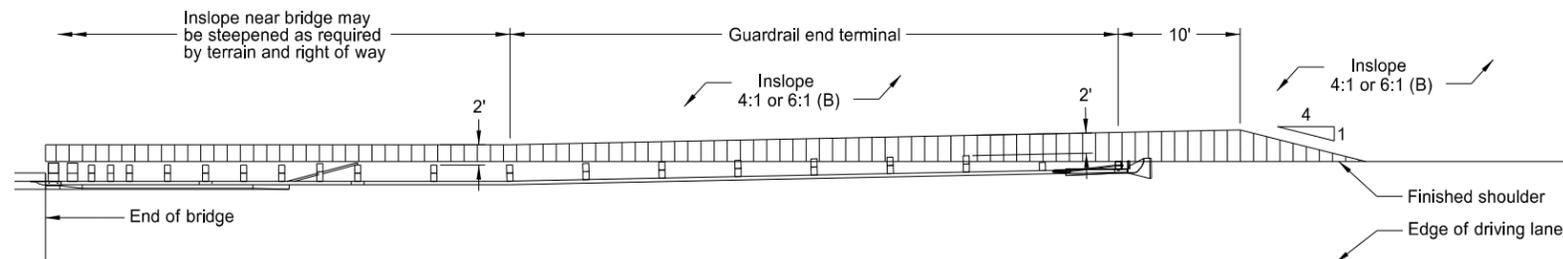
D-764-22



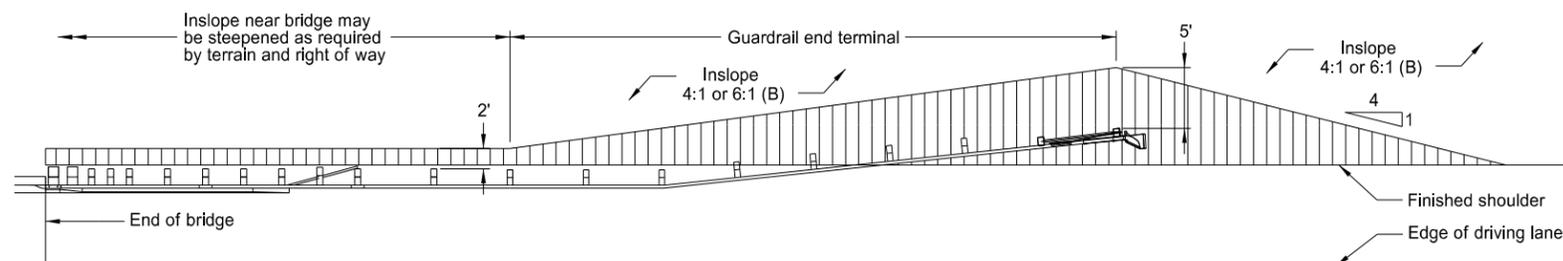
TYPICAL SECTION



PLAN LAYOUT  
FLARED GUARDRAIL WITH END TERMINAL



PLAN LAYOUT  
NON-FLARED GUARDRAIL WITH TANGENT END TERMINAL



PLAN LAYOUT  
NON-FLARED GUARDRAIL WITH FLARED END TERMINAL

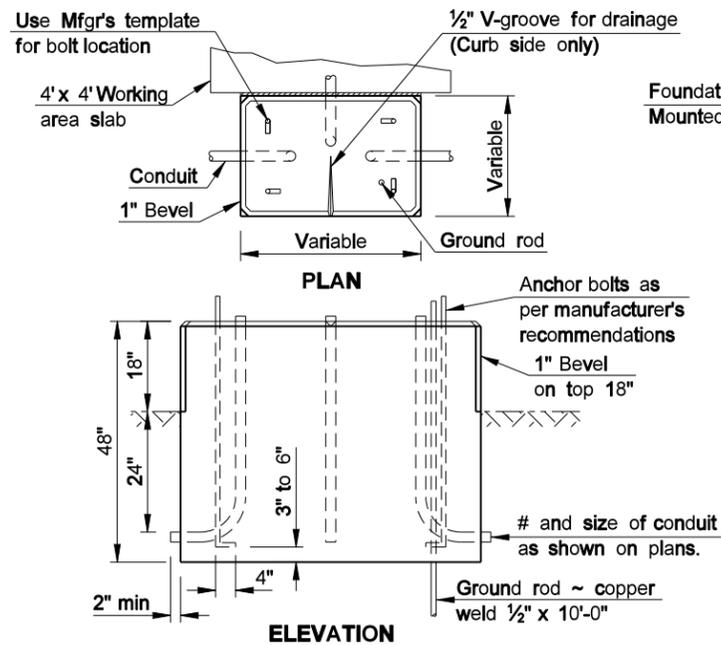
NOTES:

- (A) Slope flatter than 10:1 may be required to provide proper guardrail height.
- (B) Where normal inslope is 4:1 the added fill shall be 4:1. Where normal inslope is 6:1 the added fill shall be 6:1.
- (C) Measured from top of guardrail to top of surfacing at front face of guardrail.
- (D) Dimension at end terminals may vary per Plan Layouts shown on this sheet.

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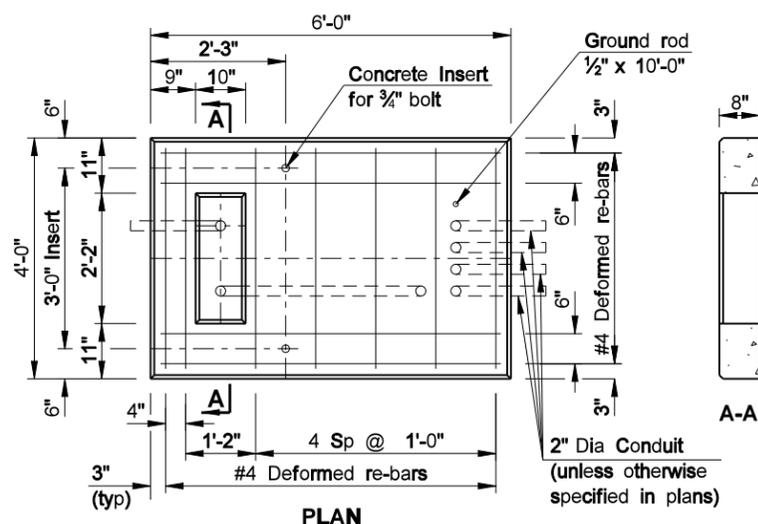
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**CONCRETE FOUNDATIONS  
(TRAFFIC SIGNALS & HIGHWAY LIGHTING)**

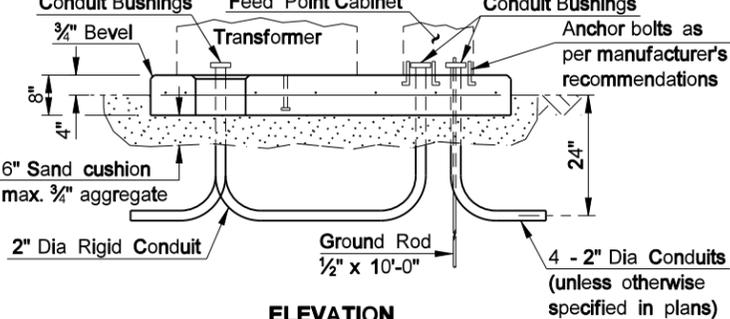


**CONTROLLER CABINET FOUNDATION PAD MOUNT**

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

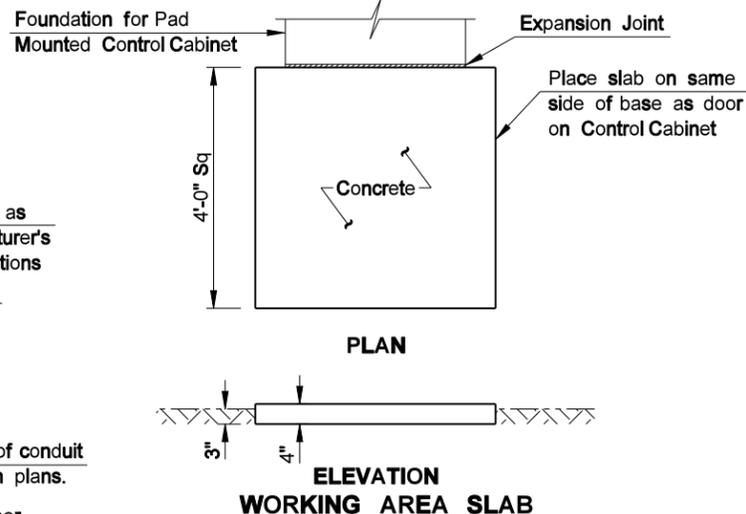


**TRANSFORMER & FEED POINT CABINET FOUNDATION PAD MOUNT**



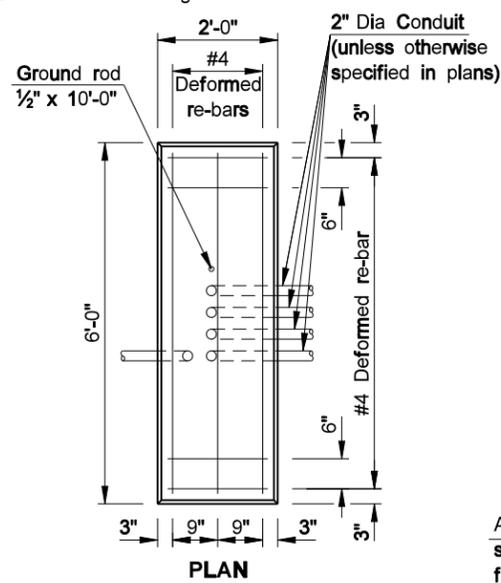
**TRANSFORMER & FEED POINT CABINET FOUNDATION PAD MOUNT**

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

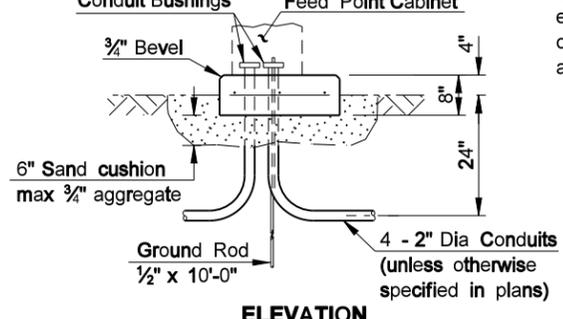


**WORKING AREA SLAB**

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

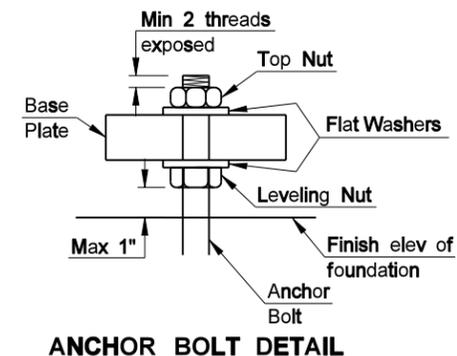


**FEED POINT CABINET FOUNDATION PAD MOUNT**

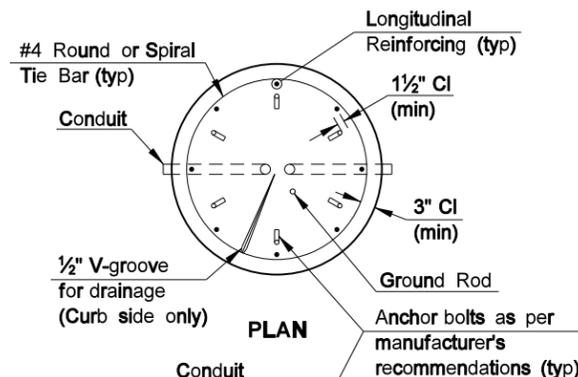


**FEED POINT CABINET FOUNDATION PAD MOUNT**

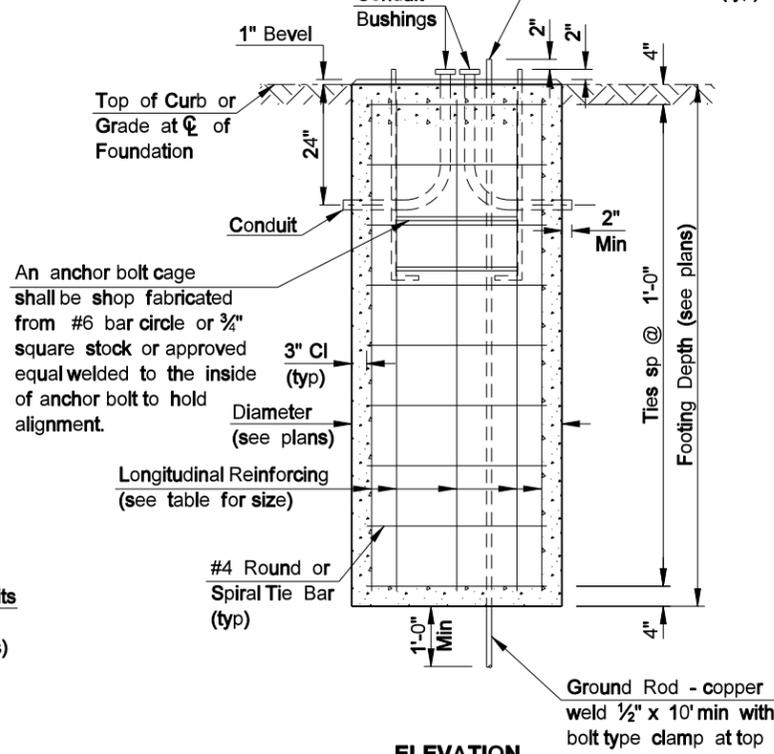
The Feed Point Cabinet Foundation Pad Mount shall be bid as Concrete Foundation ~ Feed Point ~ Type B.



**ANCHOR BOLT DETAIL**



**PLAN**



**ELEVATION**

**LIGHT & SIGNAL STANDARD FOUNDATION**

An anchor bolt cage shall be shop fabricated from #6 bar circle or 3/4" square stock or approved equal welded to the inside of anchor bolt to hold alignment.

**NOTES:**

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

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

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

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

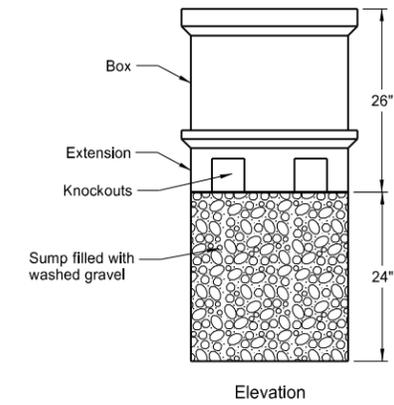
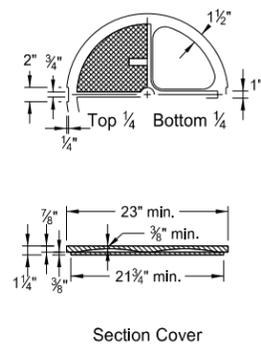
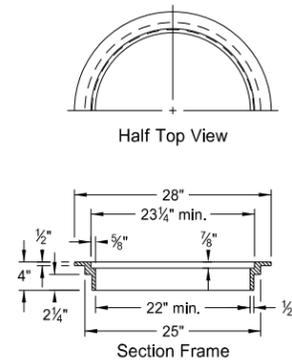
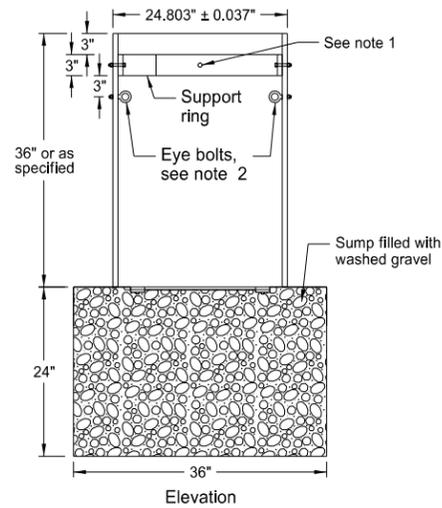
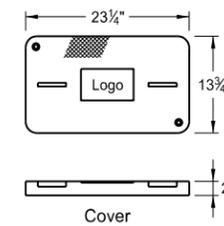
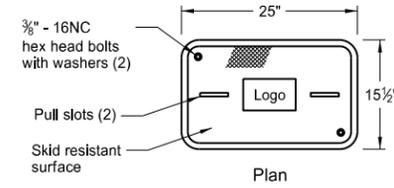
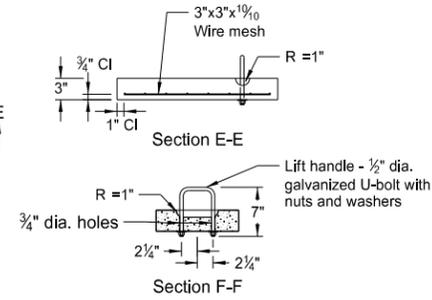
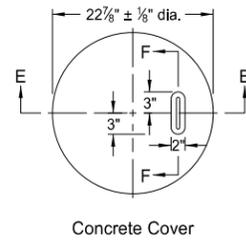
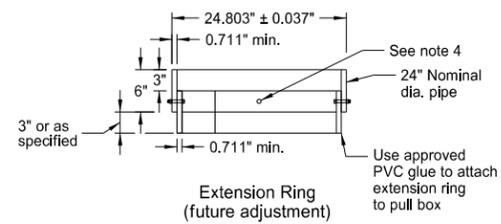
**FEED POINT CABINET FOUNDATION PAD MOUNTED:** The foundation shall have a wood float finish. All conduits shown shall be installed. Conduit that is not used at this time shall be plugged with an expandable plug.

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

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PULL BOX DETAILS



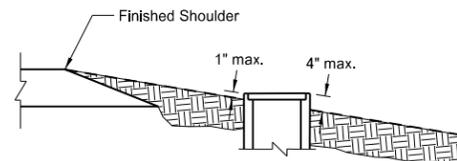
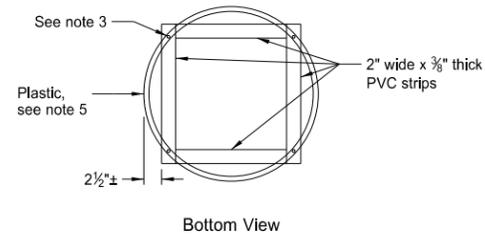
Polymer Concrete Pull Box

Note: Polymer concrete reinforced by a heavy weave fiberglass

Notes:

1. Place top of pull box flush with surfaced area and approximately one inch above earth or sodded areas on level surfaces.
2. Pull box shall have at least one knockout per side.

PVC Pull Box



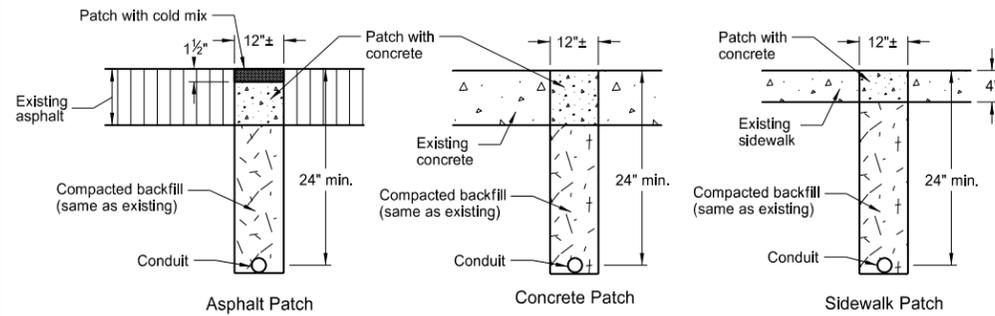
PVC Pull Box Notes:

1. Attach split 24" nominal diameter PVC cover support ring with four 3/8" dia. x 2" long stainless steel hex head bolts with nuts at 90 degrees apart.
2. Two type 2 shoulder eye bolts, 3/8" dia. x 1 1/4" shank length with hex nuts 180 degrees apart (for lifting pull box and supporting electric cable).
3. Four 1/4" x 1 1/4" long galvanized lag screws. Screw assembly together.
4. Attach split 24" nominal diameter PVC cover support extension ring with four 3/8" dia. x 2" long stainless steel hex head bolts with nuts at 90 degrees apart.
5. Bolt assembly together.
6. Conduit holes located in barrel section shall be sized no more than 1" larger than size of conduit being used.
7. After pull box and conduit installation all inside walls and cover shall be made water tight to the satisfaction of the Engineer.
8. PVC pipe to meet requirements of ASTM F679T-1 or equal.
9. Hex head bolts and nuts shall be austenitic stainless steel. Other fasteners to be galvanized as per AASHTO M-232.
10. Concrete cover shall be coated on top and sides with an approved epoxy coating. The epoxy protective coating shall be light gray, clear, or neutral in color and shall be applied as recommended by the manufacturer. The surfaces of the concrete to which the epoxy protective coating is applied, shall be cleaned by wire brush and shall be dry before application.
11. Cast Iron Cover castings shall be gray iron as per AASHTO M 105, Class 35B.

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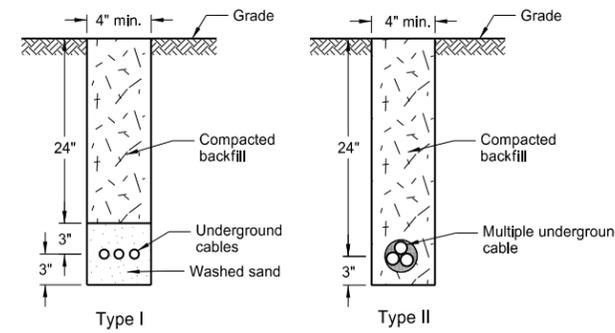
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LIGHTING AND SIGNAL DETAILS



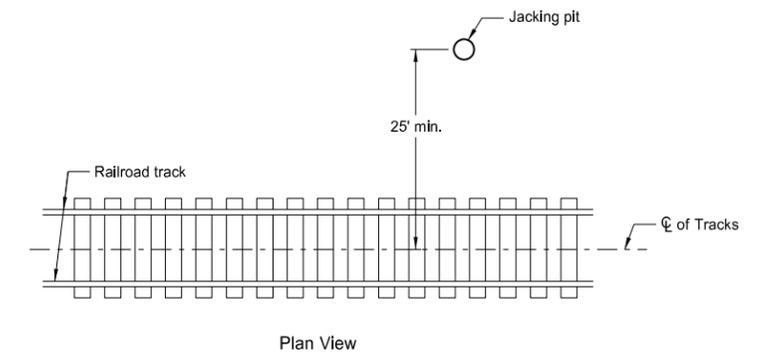
Surface Patch Details

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

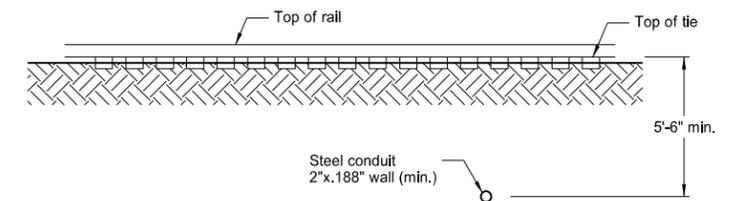


Cable Trench

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

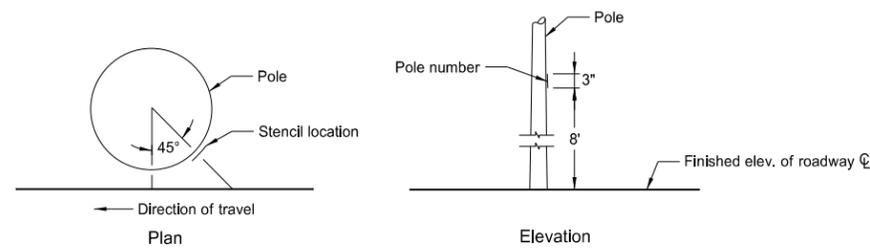


Plan View



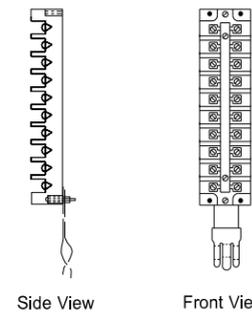
Elevation View

Conduit Placement under Railroad Tracks



Light Standard Numbering

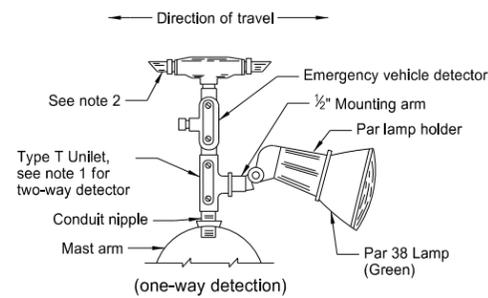
Note: On the roadway side of each light standard, the Contractor shall stencil on the pole number using black paint or an adhesive coated plastic such as Scotchcal by 3M or as approved by the Engineer. See layout sheets for pole numbers.



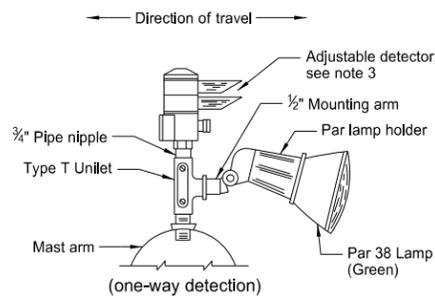
Side View

Front View

Terminal Block Detail

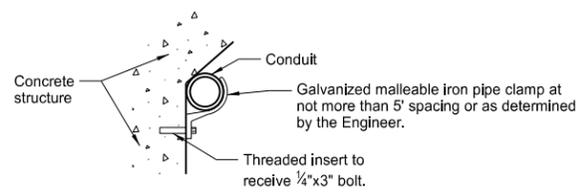


Emergency Vehicle Detector Detail

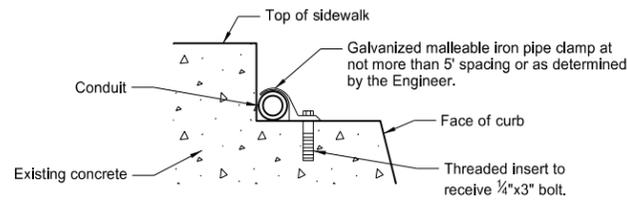


Alternate Emergency Vehicle Detector Detail (adjustable)

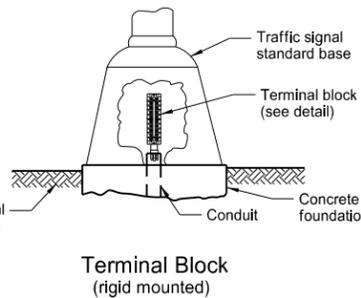
Notes:  
 1. Two-way Detector shall have Type X Unilet with two Par lamp holders and lamps. (one in each direction).  
 2. One-way Detector shall have the unused end plugged with metal pipe plug.  
 3. Two-way Detector shall have the detector lens rotated to face the direction of travel, and shall have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



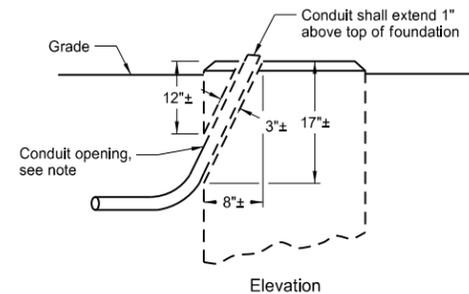
Bridge Mounted Conduit Hanger



Curb Mounted Conduit



Terminal Block (rigid mounted)



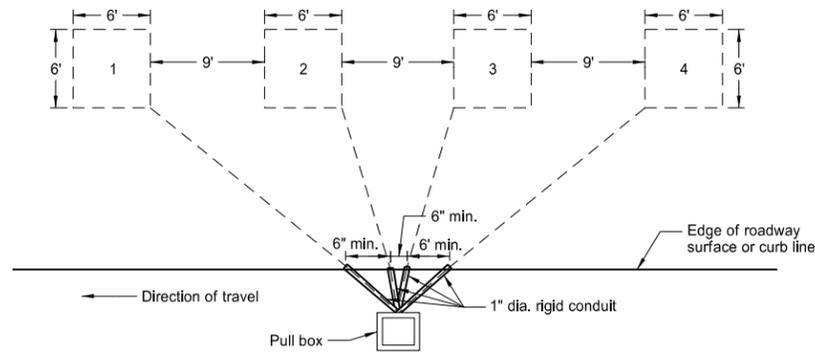
Revise Concrete Foundation

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

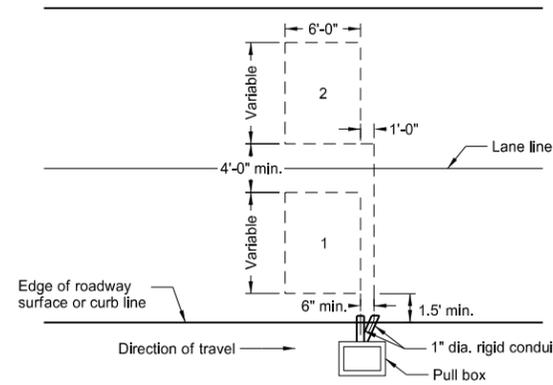
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LOOP DETECTOR DETAILS  
(SAW SLOT)



Multiple Loop Details  
(Presence Loops)

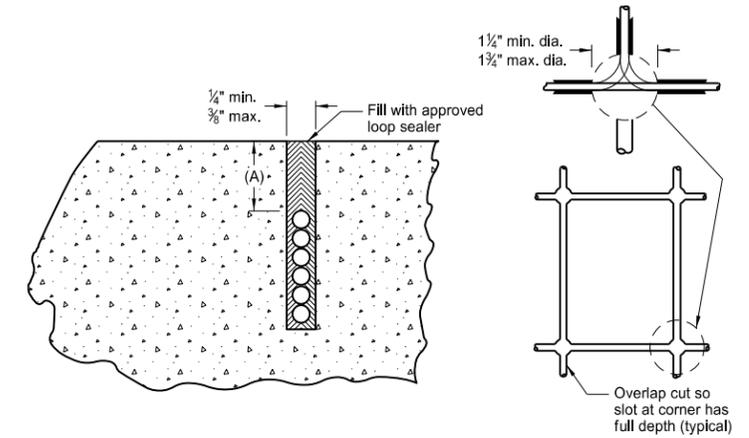


Loop Detector Detail  
(Passage or Calling Loops)  
Number of loops and number of turns as shown in the plans

Notes:

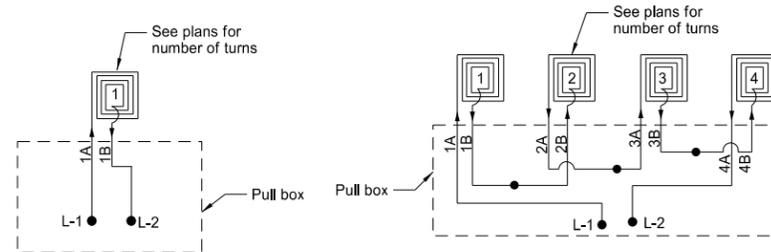
1. Each loop shall be saw cut in the roadway.
2. The number of turns, size of loop, and size of conductor shall be as shown on the plans.
3. The leads from the loop to the pull box shall be placed in saw slots and conduits to minimize interaction.

(A) 1" minimum on concrete surface  
2" minimum on asphalt surface



Saw Slot Details

Drill detector loop corners 2" deep then saw pavement slots to form loops. Dimensions and location shall be as shown in plans.

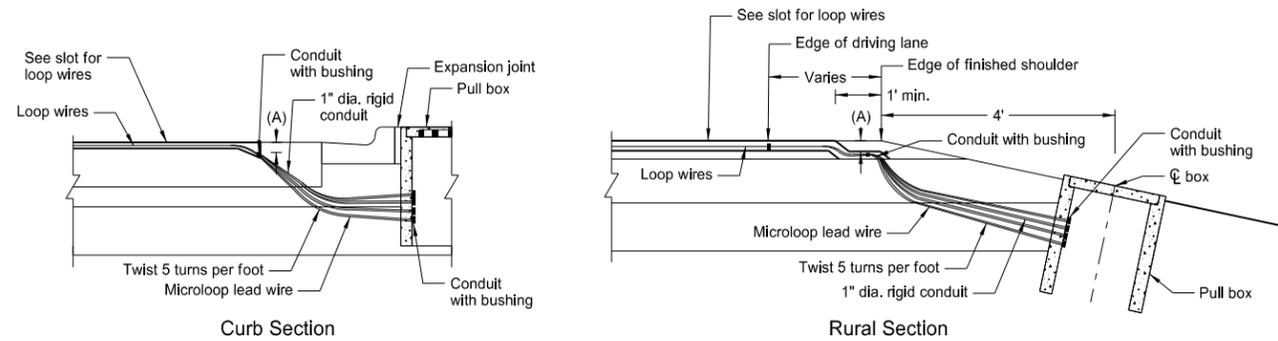


Single Loop Connection

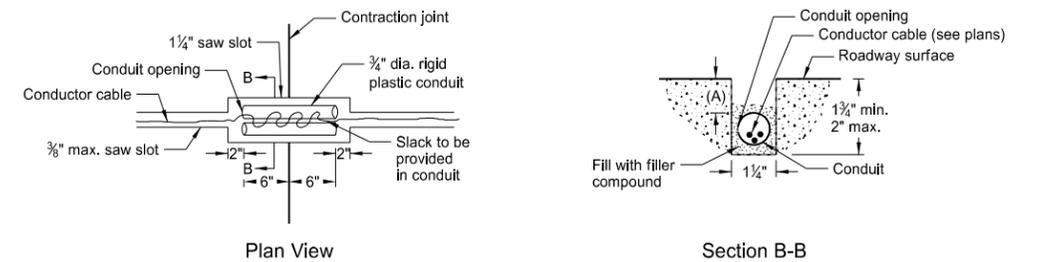
All conductors shall be labeled in the pull box as shown. The loop connections shall be spliced in the pull box.

Multiple Loop Connection

Where multiple loops are connected to create one detection zone. All conductors shall be labeled in the pull box as shown. The loop connections shall be spliced in the pull box as shown. Number of loops may vary with connections made following the same pattern.



Saw Slot to Pull Box Details



Construction Joint Detail

This detail shall be used whenever a crack in the roadway is encountered.

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