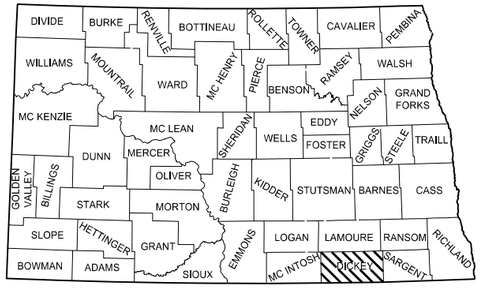
JOB # 4

	STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
	ND	CER-SC-1112(064)	19597	1	1



STATE COUNTY MAP

DICKEY COUNTY, NORTH DAKOTA
FEDERAL AID PROJECT
CER-SC-1112(064)

FHWA LIMITED INVOVEMENT
DICKEY COUNTY HIGHWAY 3 (CMC 1112)
GRADE RAISE, SALVAGED BASE, HOT BITUMINOUS PAVEMENT, RIPRAP & INCIDENTALS

Project is located on Dickey County Highway 3
approximately 8 miles west of Oakes, North Dakota.

GOVERNING SPECIFICATIONS

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

DESIGN DATA

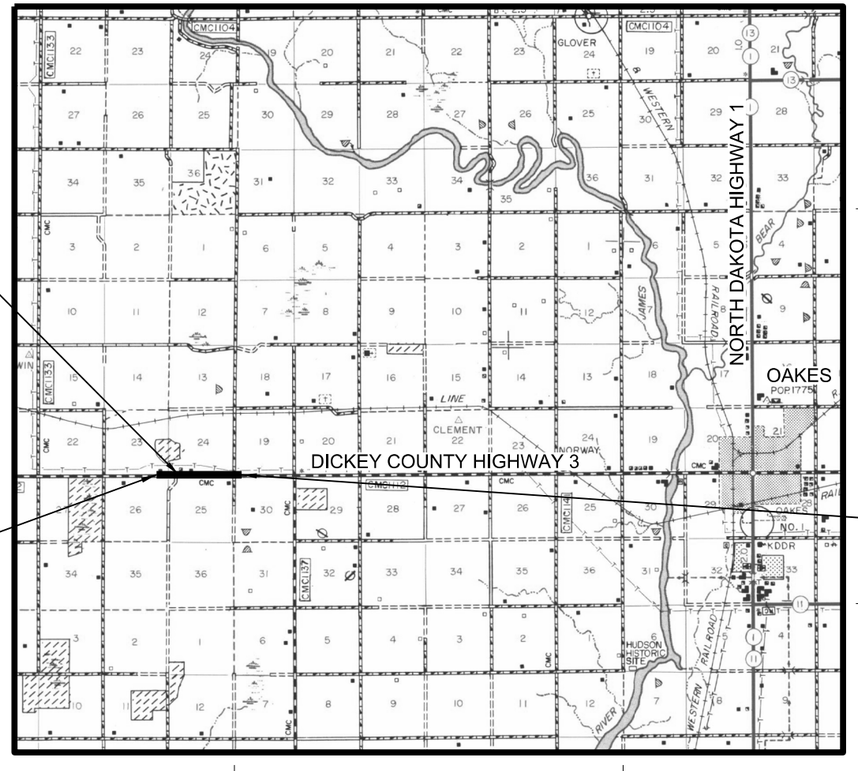
Traffic ~ CER-SC-1112(064)		Average Daily			Est. 30th Max. Hr.
		Passenger	Trucks	Total	
Current Traffic	2013	350	40	390	39
Forecast Traffic	2033	385	45	430	43

Design Speed: 55 MPH
Minimum Sight Dist. for Stopping: 495 Feet

PROJECT LENGTH

Project ~ CER-SC-1112(064)	Gross Miles	Net Miles
SC Segment	0.248	0.248
ER Segment	0.924	0.924
TOTAL	1.172	1.172

End SC Segment
Begin ER Segment
Sta. 26+80



BEGIN PROJECT CER-SC-1112(064)
Begin SC Segment
Sta. 13+70 = A Point Approximately
841 Feet West and 12 Feet South
of the Southwest Corner of
Sec. 24, Twp. 131 N., Rge. 61 W.

END PROJECT CER-SC-1112(064)
End ER Segment
Sta. 75+60 = A Point Approximately
71 Feet East and 2 Feet North
of the Southeast Corner of
Sec. 24, Twp. 131 N., Rge. 61 W.

RGE. 61 W. | RGE. 60 W. | RGE. 59 W.

PS&E Corrections Made: August 2013

Surveyed & Designed Date: February & June 2013

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CERTIFICATION

I HEREBY CERTIFY THAT THESE 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 NORTH DAKOTA.

Gordon Bean /s/
KADRMAS, LEE & JACKSON, INC.
DATE 08/30/2013 REGISTRATION NUMBER PE-8390

KLJ
1010 4th AVENUE SW
P.O. BOX 937
VALLEY CITY, ND 58072-0937
(701) 845-4980, FAX (701) 845-0252

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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TABLE OF CONTENTS

LIST OF SPECIAL PROVISIONS (SP)

SP #	DESCRIPTION
1276(08)	Permits and Environmental Considerations
1010(08)	Temporary Erosion and Sediment Best Management Practices
1101(08)	Split Sampling and Testing Requirements for Aggregate Base
1275(08)	Weather Limitations for Hot Bituminous Mix

LIST OF STANDARD DRAWINGS

STANDARD NO.	DESCRIPTION
D-20-1, 2 & 3	NDDOT Abbreviations
D-20-10	NDDOT Utility Company Abbreviations
D-20-20 & 21	Line Styles
D-20-30, 31 & 32	Symbols
D-203-08	Section Line & Private Drive Approaches (Rural)
D-704-2	Traffic Control for Coring of Hot Bituminous Pavement
D-704-7 & 8	Breakaway Systems for Construction Zone Signs
D-704-9	Construction Sign Details Terminal and Guide Signs
D-704-11	Construction Sigh Details Warning Signs
D-704-13	Barricade Details and Channelizing Devices
D-704-14	Construction Sign and Barricade Assembly Details
D-704-15	Construction Sign and Barricade Location Details
D-704-16	Typical Construction Signal Layout
D-704-19, 20, 22 & 26	Construction Sign and Barricade Location Details
D-704-27	Traffic Control Plan for Moving Operations on Conventional Highways (Pavement Marking)
D-704-50	Portable Sign Support Assembly
D-706-1	Type C Field Laboratory
D-708-2	Erosion and Siltation Controls
D-708-6	Erosion Control Median or Ditch Inlet Protection
D-708-7	Erosion Control Fiber Roll Staking Details
D-714-01	Reinforced Concrete Pipe Culvert and End Sections
D-714-04	Corrugated Steel Pipe Culverts and End Sections (Round Pipe)
D-714-06	Corrugated Aluminum Pipe Culvert and End Sections (Round Pipe)
D-714-22	Concrete Pipe Ties
D-714-25	Transverse Centerline Pipe Backfill for Pipes More than 4 Feet Below the Proposed Base
D-754-23	Assembly Details
D-754-24 & 25	Mounting Details Perforated Tube
D-762-4	Pavement Marking
D-762-6	Short-Term Pavement Marking
D-766-1	Mailbox Location Details

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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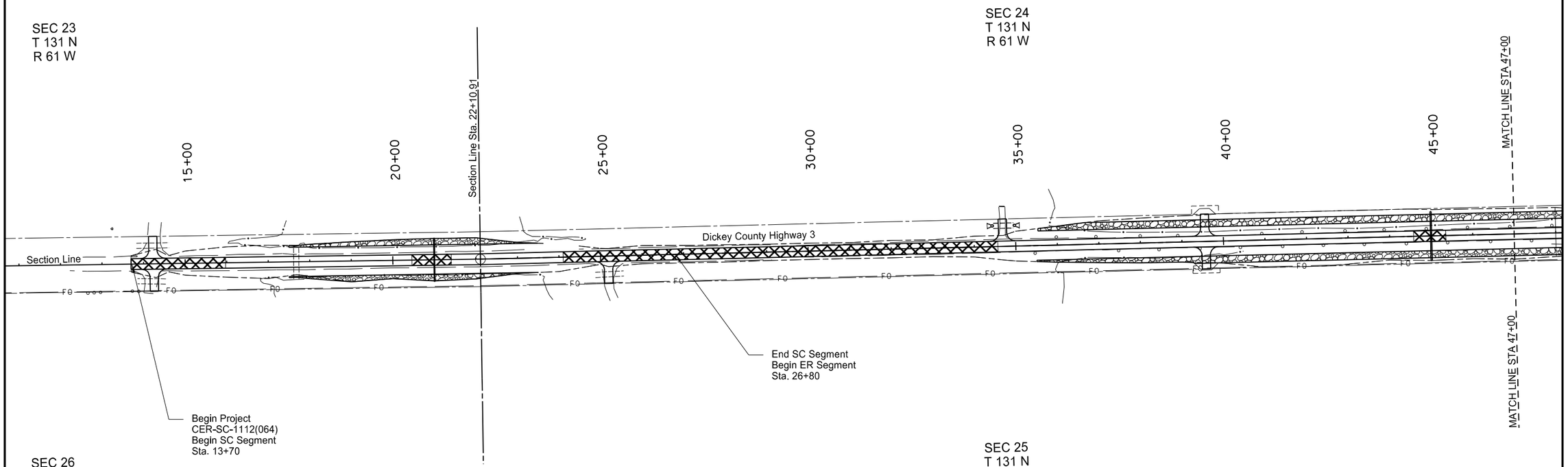

Pavement Removal Limits

Riprap-Loose Rock

Proposed Culvert

Existing Culvert

Construction Limits

N

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CER-SC-1112(064)
DICKEY COUNTY, NORTH DAKOTA

KLJ

SCOPE OF WORK
STA 13+70 TO STA 47+00

DRWN. BY	CHK'D. BY	PROJECT NO.
JN	JL	5313100

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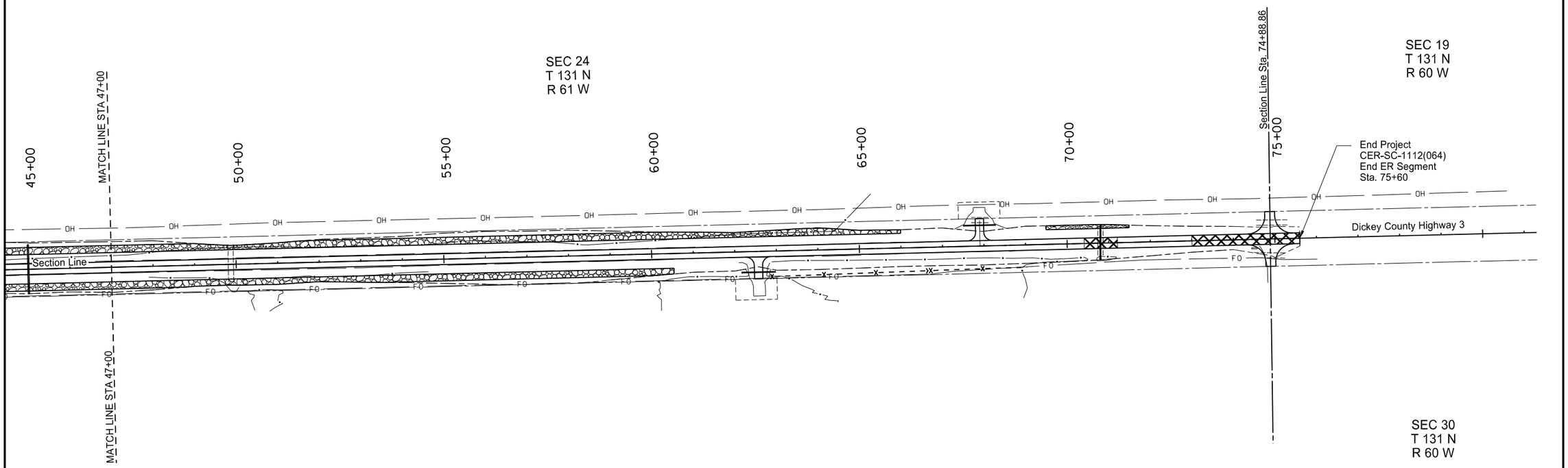
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	CER-SC-1112(064)	4	2



Pavement Removal Limits

Riprap-Loose Rock

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CER-SC-1112(064)
DICKEY COUNTY, NORTH DAKOTA

KLJ

SCOPE OF WORK
STA 47+00 TO STA 75+60

DRWN. BY	CHK'D. BY	PROJECT NO.
JN	JL	5313100

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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PLAN NOTES

100-P01 **CONSTRUCTION ACTIVITIES:** Work activities shall be conducted during daylight hours only and construction activities shall be scheduled to accommodate traffic before dark. Both lanes shall be opened during non-work hours and one lane open during working hours.

100-P02 **COORDINATION OF PROJECTS:** Another project, not yet under contract, is being planned for construction during the 2014 construction season in the vicinity of this project. The project is a mine and blend on Dickey County Highway 3, from the east end of this project east to the city of Oakes.

100-P03 **DIMENSIONS:** Thicknesses shown on the typical sections for surfacing are approximate. It is intended that the plan tonnage provided by the basis of estimate will be used uniformly throughout the project unless otherwise authorized by the Engineer.

100-P04 **UTILITIES:** Notice shall be given to the utility companies a minimum of 2 weeks prior to work on the project. Power lines, telephone cables, rural water lines, and other utilities may be encountered on this project. The Contractor shall be responsible to verify the locations and to notify all utility and pipeline companies to have the locations flagged and marked prior to beginning construction. Any charges by the utility companies for locates shall be paid by the Contractor. The Contractor will be liable for any costs resulting from damage to utilities or pipelines.

104-P01 **WATER LEVEL:** The Contractor should be aware that the water levels on these projects may fluctuate. The Contractor's bid price for all bid items will be considered full compensation for that item regardless of the water elevation at the time of construction.

107-P01 **HAUL ROADS:** The Contractor shall contact the appropriate Tribal, State, County, Township or City officials to determine if there are any No Haul Routes or Restricted Routes prior to preparing a bid for this project. All haul routes must be approved in writing by the local agency and approved by the Engineer. The gross vehicle weight on all county and township roads shall not exceed the legal load limits unless approved by the local agency.

201-P01 **SAW BITUMINOUS SURFACING:** Where existing bituminous pavement abuts new bituminous pavement a full depth saw cut shall be used to provide a clean joint. The cost for saw cutting the bituminous pavement will be included in the price bid for "REMOVAL OF PAVEMENT".

202-P01 **REMOVAL OF PAVEMENT:** The limits of pavement removal are shown in Section 40. The pavement removed shall become the property of the Contractor. All costs associated with removing, hauling and disposing of the pavement shall be included in the price bid for "REMOVAL OF PAVEMENT". Payment is based upon the top width. All sloughs shall be removed and are incidental to the price bid for "REMOVAL OF PAVEMENT".

202-P02 **REMOVAL OF PIPE:** All pipe designated for removal shall be become the property of the Contractor and be disposed of offsite. All costs associated with removing and disposing of the pipe shall be included in the price bid for "REMOVAL OF CULVERT-ALL TYPES & SIZES".

202-P03 **PLUGGING EXISTING CENTERLINE PIPES:** Existing culverts designated on the plans to be plugged shall be cut at the ends to allow 3 feet of cover by the existing inslope and filled with flowable fill. All water shall be pumped from the culvert to allow for placement of the flowable fill in dry conditions. All costs for removing the ends of the culverts, dewatering, filling with flowable fill, and backfilling shall be included in the "FLOWABLE FILL" bid item.

202-P04 **REMOVAL OF OBSTRUCTIONS:** All obstructions and debris within the construction limits shall be removed and hauled to an approved offsite disposal site. Known obstructions and debris include, but are not limited to, fence posts, wood, tree limbs, tires, and existing flotation silt curtain. All costs shall be included in the "REMOVAL OF OBSTRUCTIONS" bid item.

203-P01 **TOPSOIL:** In all disturbed areas above the current water level, the existing topsoil shall be removed to its full depth, but not to exceed 6 inches, and salvaged. The quantity of topsoil to be removed and salvaged is based upon a depth of 6 inches. The topsoil shall be removed and stockpiled within the right of way, as approved by the Engineer. Upon completion of the construction, the topsoil shall be spread evenly, to a depth not less than 4 inches, over the areas to be seeded. Additional quantities of topsoil required to achieve a uniform depth of 4 inches over the areas to be seeded shall be furnished and placed by the Contractor. The topsoil summary in Section 10 indicates the amounts of topsoil to be salvaged and imported.

All work as described above shall be paid for by the unit price bid for "TOPSOIL". Measurement shall be according to Section 203.03 G of the Standard Specifications.

203-P02 **COMMON EXCAVATION-TYPE A: "**COMMON EXCAVATION-TYPE A" shall include all excavation necessary to construct the grade raise excluding the pavement designated for removal and the material designated as "COMMON EXCAVATION-WASTE". "COMMON EXCAVATION-TYPE A" shall be paid for according to Section 203.03 B of the Standard Specifications (Contract Quantity Payment).

203-P03 **COMMON EXCAVATION-WASTE:** All "COMMON EXCAVATION-WASTE" is designated as waste material and shall be disposed of outside the road right of way, not adjacent to the construction site, at a site approved by the Engineer and in accordance with Section 107.04 of the Standard Specifications. All costs associated with excavating, hauling, and disposing of the waste material shall be included in the price bid for "COMMON EXCAVATION-WASTE".

A quantity of 65 CY of "COMMON EXCAVATION-WASTE" has been provided for use in the subgrade repair locations for the SC segment, and 135 CY has been included for the ER segment (see Subgrade Repair Detail on Sheet 1 Section 20).

203-P04 **BORROW-EXCAVATION:** The borrow required for the grade raise is not available within the highway right of way. It is the Contractor's responsibility to furnish the borrow. The Contractor shall take measures to minimize the loss of borrow placed on foreslopes.

203-P05 **KEYWAY AND BERM:** A keyway and berm shall be constructed in areas where the proposed riprap extends into the water at locations as shown on the plans. The keyway and berm shall be constructed as shown in the typical section (see Sheet 3 Section 30).

The berm shall be removed in its entirety at pipe locations after the new pipes or extensions have been installed, and in all locations where the temporary berm extends into USFWS easements. In addition, the berm shall be removed to one foot below the existing water elevation after the riprap is placed. The Contractor is required to remove this described embankment and will not be allowed to push the embankment into the water so it is below the water elevation. The Contractor may incorporate the removed embankment into other areas of the project.

If the Contractor elects to incorporate the removed berm embankment within other areas on the project, the Contractor will not be paid for this material a second time. The Contractor will only be paid for borrow material removed from the borrow site.

All removed embankment not incorporated into the project shall then become property of the Contractor and shall be disposed of outside the highway right of way in accordance with Section 107.04. If the Contractor elects to remove the berm embankment as waste material, this waste will not be paid for a second time.

If the Contractor elects to dispose of the removed berm embankment at the borrow site, the Contractor shall work with the Engineer allowing the Engineer to cross-section the borrow site prior to placing the waste embankment at the borrow site.

All costs of material, dewatering, construction, removal, and disposal of the berm shall be included in the price bid for "BORROW-EXCAVATION". The quantity of borrow needed to construct the keyway and berm is included in the quantities for "BORROW-EXCAVATION."

203-P06 **COMPACTION CONTROL:** Density control for all fill placed within the 36-foot wide graded roadbed shall be in accordance with Section 203.02 G of the Standard Specifications. This includes subgrade preparation-type A.

Density control for all fill placed outside the graded roadbed shall be in accordance with Section 203.02 H of the Standard Specifications.

203-P07 **SUBGRADE REPAIR:** Quantities for "COMMON EXCAVATION-WASTE", "SALVAGED BASE COURSE", and "GEOTEXTILE FABRIC-TYPE R1" have been included for subgrade repair in locations where subgrade preparation to a depth of 12 inches is not enough to stabilize the subgrade. The Engineer in the field shall determine the actual locations and extents of the subgrade repair (see Subgrade Repair Detail on Sheet 1 Section 20). The unit prices bid for "COMMON EXCAVATION-WASTE", "SALVAGED BASE COURSE", and "GEOTEXTILE FABRIC-TYPE R1" shall govern regardless of the quantity used. An increase or decrease from plan quantity will not be accepted as a reason to negotiate any pay adjustment under these bid items.

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CER-SC-1112(064)
DICKEY COUNTY, NORTH DAKOTA

KLJ

PLAN NOTES

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TO	JL	5313100

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210-P01 **FLOWABLE FILL:** The mix design for the flowable fill shall be submitted to the Engineer for approval at least three days prior to installation.

230-P01 **SUBGRADE PREPARATION-TYPE A:** "SUBGRADE PREPARATION-TYPE A" has been provided for all areas where the existing asphalt surfacing will be removed as well as along the entire length of the emergency grade raise completed in 2011. Subgrade preparation will be measured by the Station (STA).

The depth of subgrade preparation will be 12 inches and will be completed in accordance with Section 230.02 B 1 of the Standard Specifications. This item may be eliminated in areas if the Engineer determines that the subgrade is stable.

302-P01 **SALVAGED BASE COURSE:** An additional 122 Tons of "SALVAGED BASE COURSE" has been provided in the quantities to be used in the subgrade repair locations for the SC segment, and 253 Tons has been included for the ER segment (see Subgrade Repair Detail on Sheet 1 Section 20).

302-P02 **TEMPORARY TRAFFIC SURFACE AGGREGATE:** A quantity of 2,000 Tons of "TEMPORARY TRAFFIC SURFACE AGGREGATE" has been provided for use in maintaining traffic. The price bid shall include all material, equipment and labor costs to furnish, haul, place and maintain the aggregate placed. This is in addition to the surface aggregate that may be obtained from salvaging the existing aggregate (refer to plan note 302-P03). The temporary surface aggregate must meet NDDOT Class 5, 8, 13, or salvaged base. An increase or decrease in quantity is not a basis for an adjustment in the price bid.

302-P03 **REMOVE & SALVAGE AGGREGATE BASE COURSE:** Approximately 1,554 CY of aggregate surface course was placed as part of the 2011 emergency grade raise. The existing aggregate surface shall be removed if possible and stockpiled outside of the traveled way for use in maintaining traffic during the grading operations as directed by the Engineer. All costs for removing, stockpiling, placing, hauling, and maintaining the salvaged aggregate for maintenance of traffic shall be included in the price bid for "REMOVE & SALVAGE AGGREGATE BASE COURSE" and shall be paid for by the Station (STA).

Existing aggregate not salvaged for traffic maintenance shall be blended into the grade as part of the subgrade preparation. Costs to blend the existing aggregate into the grade shall be included in the price bid for "SUBGRADE PREPARATION-TYPE A".

401-P01 **FOG COAT:** Pavement placed after September 15 will receive a fog seal with a SS1H or CSS1H emulsified asphalt at a rate of 0.10 gal/sy. The fog seal shall be applied immediately after the final rolling while the pavement is still warm. The bitumen will be paid for at the unit price bid for "SS1H OR CSS1H OR MS1 EMULSIFIED ASPHALT". If the Contractor fails to have bitumen available to provide the fog seal, the Engineer may require the Contractor to cease paving operations and place the wearing course in the next construction season with liquidated damages applied until project completion.

401-P02 **PRIME COAT:** The prime coat may be eliminated at the discretion of the Engineer in the field based on site conditions and the Contractor's operation.

408-P01 **MIX DESIGN:** The Contractor shall develop and submit a mix design for the material for the Hot Bituminous Pavement CL 29. A higher class of hot bituminous pavement may be used with approval from the Engineer. The second and third paragraphs of Standard Specification 408.04 A shall be deleted in their entirety. The aggregate source and bitumen target percentage shall be shown on the mix design.

The mix design shall meet the provisions of Section 408.04 B with the following revisions:

1) The laboratory mix shall meet all three of the properties – percent VMA, Fines/Asphalt Ratio, and Film Thickness – in addition to all of the other specified properties for Class 29 mix.

The cost for the mix design work shall be included in the price bid for "HOT BITUMINOUS PAVEMENT CL 29". Additional mix designs shall be provided if there are any changes in aggregate sources, asphalt sources, or operations.

408-P02 **HOT BITUMINOUS PAVEMENT CL 29 – MAINLINE:** The 1st and 2nd lifts shall not be placed on the same day. If the Contractor chooses to pave both lanes in the same day, the Contractor shall exercise extreme care not to mark or tear the new driving surface and shall keep all loaded trucks off the newly placed hot bituminous pavement. Any damage to the newly paved surface shall be repaired at the Contractor's expense.

408-P03 **COMPACTION:** The compaction requirements for the Hot Bituminous Pavement CL 29 1st and 2nd lifts shall be as per NDDOT Standard Specification 408.04 I.3 (Specified Density).

408-P04 **ACCEPTANCE:** Acceptance of the Hot Bituminous Pavement CL 29 1st and 2nd lifts shall be in accordance with Section 408.05 of the Specifications with the following revisions:

- The first paragraph of Section 408.05 shall be removed.
- The beginning of the third paragraph of Section 408.05 A.1 shall be revised to say the following: "If any test in a lot results in the variance of any one or more sieves from the JMF gradation target value by more than the tolerances listed below, a deduction on the entire lot will be applied."

704-P01 **TRAFFIC CONTROL SIGNS AND DEVICES:** The traffic control devices list has been developed using the following layouts on the Standard Drawing for traffic control:

Standard D-704-15, Layout A for temporary road closures.
Standard D-704-16 for temporary traffic signal layout.
Standard D-704-19, Layout F for one-lane closures.
Standard D-704-20, Layout G.

Standard Drawings D-704-2, 7, 8, 9, 11, 13, 14, 22, 26, and 27 are applicable.

The required traffic control signs and devices are included in the "Traffic Control Devices List" and will be measured and paid for at the contract unit price for each device. Additional devices required to accommodate the Contractor's operation shall be the Contractor's responsibility.

704-P02 **TRAFFIC CONTROL DURING WORKING AND NON-WORKING HOURS:** The Contractor shall maintain one lane of traffic at the posted speed limit at all times during working hours (except as noted in plan note 704-P03). During non-working hours, the Contractor shall leave the work area free of all hazards. The Contractor shall open the roadway to two-way traffic during non-working hours. A minimum 24-foot roadway width will be required to maintain two lanes of traffic.

During the grading operation, temporary traffic signals shall be used to maintain traffic during working hours. When the temporary traffic signals are not in use, they may remain along the roadway as long as they are located completely outside the clear zone.

During the paving operations (graveling and asphalt paving), flagging and pilot car shall be used to maintain traffic during working hours. The traffic control devices for flagging shall be removed at the end of each day and reinstalled when work commences.

If a hazard exists after working hours, the Contractor shall leave the required traffic control devices in place and provide flag persons at his own expense until the hazard has been eliminated. Hazards include but are not limited to steep embankment areas, inslopes steeper than 4:1 adjacent to the roadway, or drop-offs.

Traffic watchmen shall report on the condition of the travel lanes in their daily reports and shall notify the Superintendent and the Engineer if the project is not traversable at the posted speed limit. Traffic watchmen will include a description of the repairs made in the watchmen's daily report.

704-P03 **TRAFFIC CONTROL FOR CENTERLINE PIPE INSTALLATIONS:** The Contractor shall keep the road open to traffic by staging the construction and creating temporary bypasses, if necessary, around the excavation area. The Contractor shall submit a staging and traffic control plan to the Engineer for review and approval at least three days prior to the pre-construction conference. All costs for the staging and traffic control for the centerline pipe installation shall be included in the pipe bid items.

704-P04 **STACKABLE VERTICAL PANEL:** The stackable vertical panel made of hollow low density polyethylene orange plastic panel which is held in an upright position by a molded rubber base shall be provided.

The panel shall be a minimum 43 inches high with a minimum bottom dimension 15 inches x 9 inches. The panel shall be held down with a molded rubber base. The minimum weight of the panel shall be 4 pounds. The minimum weight of the molded rubber base shall be 30 pounds.

The reflective sheeting shall have a minimum width of 8 inches and 36 inches long. The reflective sheeting shall be as specified for vertical panel and shall have 6" wide

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CER-SC-1112(064)
DICKEY COUNTY, NORTH DAKOTA

KLJ

PLAN NOTES

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PLAN NOTES

strips sloping downward at an angle of 45 degrees in the direction vehicular traffic is to pass. The reflective sheeting shall be on both sides of the stackable vertical panels. The stackable vertical panels shall meet the requirements of NCHRP Report 350 as a Category II Traffic Control Device. Stackable vertical panels shall be spaced at two times the posted speed limit on the shoulder where a drop off occurs.

The item “STACKABLE VERTICAL PANEL” shall be measured by the number of each installed. The quantities measured will be paid for at the contract price and shall be full compensation for all labor, equipment, materials, relocation and removal, necessary to complete the installation.

704-P05 **SIGNS AND DELINEATORS:** Currently there are two Pavement Ends signs (W8-3-36), two 25 MPH Speed Limit Ahead signs (W3-5-48), two 25 MPH Speed Limit signs (R2-1-24), two 55 MPH Speed Limit signs (R2-1-24), one Soft Shoulder sign (W8-4-48), and seventy-one hazard markers installed in and around the project limits. All signs shall be removed and salvaged by the Contractor and stockpiled onsite for Dickey County. All costs associated with salvaging the signs shall be included in the price bid for ”TRAFFIC CONTROL SIGNS”.

704-252 **TRAFFIC CONTROL FOR UNEVEN PAVEMENT:** 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 and providing the following devices: Install “Uneven Lanes” signs (Sign No. W8-11-48) and a supplemental plate (Sign No. W20-52-54), identifying the distance, on the right shoulder (both directions) 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. Install “Do Not Pass” signs (Sign No. R4-1-48) on the right shoulder (both directions) between the uneven lanes sign and the beginning of the uneven pavement and at major intersections. Install tubular markers spaced at two times the posted speed limit on the centerline where uneven pavement exists.

These traffic control devices shall be left in place until the lanes are even. These signs and tubular markers 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.

706-P01 **FIELD LABORATORY:** Bathroom facilities shall be provided and maintained regularly with the Field Laboratory-Type B. Payment for this item will be included in the price bid for “FIELD LABORATORY-TYPE B”.

708-P01 **RIPRAP:** Riprap shall be clean and free of any contaminants before it is placed. All costs for labor, materials, and equipment to locate, load, haul and place the riprap shall be included in the price bid for “RIPRAP-LOOSE ROCK”. The Contractor shall place riprap around the proposed pipe conduit in such a manner that the pipe is not damaged and the flow is not obstructed. All costs to place riprap around the pipe shall be included in the price bid for “RIPRAP-LOOSE ROCK”.

An emergency grade raise project was completed within the ER segment in the summer of 2011 and approximately 2,355 CY of riprap was installed. In 2010 approximately 1,045 CY of riprap was installed through the SC segment as part of a widening project. The Contractor shall remove and salvage all existing riprap in locations where embankment is to be placed adjacent to the road. The salvaged riprap shall be clean and free of debris and shall meet gradation requirements in Section 708.04 B 3a of the Standard Specifications. Any riprap removed and not deemed salvageable shall become property of the Contractor and disposed of off the right of way. All costs associated with removing and salvaging the riprap shall be included in the price bid for “RIPRAP-LOOSE ROCK”.

If the Contractor does not elect to use the salvaged riprap, the riprap shall become the property of the County. The Contractor shall stockpile the riprap at the Dickey County Highway Department located at 213 15th St. N, Ellendale, ND 58436. All costs associated with loading, hauling, and stockpiling the salvaged riprap shall be included in the price bid for “RIPRAP-LOOSE ROCK”.

The riprap shall not be dumped on the foreslope but shall be placed with an excavator to reduce segregation. The finished riprap shall be without irregularities and must be traversable. Chinking may be required to produce a traversable surface. “RIPRAP-LOOSE ROCK” will be measured in place by the cubic yard as shown on the plans. The volume will be computed on the basis of actual surface dimensions as staked and the specified thickness. An increase or decrease in quantity is not a basis for an adjustment in price bid.

708-P02 **FLOTATION SILT CURTAIN:** The “FLOTATION SILT CURTAIN” shall be installed on the water prior to removal of the existing riprap and prior to stripping any topsoil (see Sheet 2 Section 20).

The Contractor shall place the floating silt curtain at a distance from the edge of the wetland that allows for sufficient area to construct the project without placing material against the floating silt curtain. No material shall be placed against the floating silt curtain. Floating silt curtain is a temporary device and must be removed following construction.

Sufficient quantity of “FLOTATION SILT CURTAIN” has been provided to allow for installation of curtain along both sides of the roadway within the closed water basin as shown in the plans without requiring curtain to be moved from one location to the next. If the Contractor chooses to install more “FLOTATION SILT CURTAIN” than plan quantity, the amount greater than plan quantity will not be paid for. Such variation in quantity will not be considered as a change in character of work. The silt curtain is to be used in the surrounding water bodies and shall be in place prior to construction activities taking place in and/or around the wetland areas.

709-P01 **GEOTEXTILE FABRIC-TYPE R1:** An additional 200 SY of “GEOTEXTILE FABRIC-TYPE R1” has been provided in the quantities to be used in the subgrade repair locations for the SC segment, and 410 SY has been included for the ER segment (see Subgrade Repair Detail on Sheet 1 Section 20).

714-P01 **SUBMERSED CENTERLINE PIPE:** The embankment used to construct a cofferdam for all approach and centerline pipe shall be paid for as “BORROW-EXCAVATION”.

It will be the responsibility of the Contractor to keep the pipe trench and work area dewatered. After the installation of the culvert, the Contractor is to remove the cofferdam as shown in Section 30 of the plans. If the Contractor elects to incorporate the removed cofferdam into the embankment within other areas on the project, the Contractor will not be paid for this material a second time. The Contractor will only be paid for borrow material removed from the borrow site.

714-P02 **REINFORCED CONCRETE PIPE:** Tie bolts shall be required on all sections of reinforced concrete pipe and end sections.

714-P03 **CORRUGATED STEEL PIPE:** Bands for steel pipe shall be 24” wide and shall be incidental to the pipe conduit bid item.

762-P01 **SHORT TERM PAVEMENT MARKING:** The quantity for short term striping is based on three applications (Prime, 1st lift and 2nd lift). Payment for additional application, if required, shall be at the unit price bid for the respective bid items.

Pavement marking paint for short term striping shall be certified to be a commercially available traffic marking paint. Glass beads for short term pavement marking shall meet the requirements of Standard Specification 880.02 and be tested and approved prior to use on the project.

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DICKEY COUNTY, NORTH DAKOTA

KLJ

PLAN NOTES

DRWN. BY	CHKD. BY	PROJECT NO.
TO	JL	5313100

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	CER-SC-1112(064)	6	4

ENVIRONMENTAL COMMITMENTS

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

Commitment No. 1: Disturbed areas will be returned to pre-construction conditions following construction.

Action Taken/Required: All disturbed areas will be re-seeded upon completion of construction to match the surrounding vegetation. Best Management Practices (BMPs) will be implemented to minimize the likelihood of invasive plant species while vegetation is being established.

Commitment No. 2: Erosion control devices will be used as needed during construction.

Action Taken/Required: The Contractor shall install and maintain erosion control devices. The Contractor is required to obtain a North Dakota Pollutant Discharge Elimination System (NDPDES) Permit from the North Dakota Department of Health prior to construction. As part of the NDPDES Permit, the Contractor must have a plan for erosion and sediment control during and post construction.

Commitment No. 3: Floating turbidity barriers will be placed in open water basins during construction and fiber rolls will be placed adjacent to shallow water wetlands to isolate the construction site from the main body of the wetland and minimize the adverse effects of sedimentation.

Action Taken/Required: Quantities for flotation silt curtain and fiber rolls have been provided in the plans. The Contractor will include these measures in the erosion and sediment control plan as part of the NDPDES Permit.

Commitment No. 4: Fugitive dust emissions created during construction would be minimized.

Action Taken/Required: The Contractor will implement BMPs, such as water as a palliative, to control dust during construction as appropriate.

Commitment No. 5: Impacts to wetlands under USFWS easement will be mitigated.

Action Taken/Required: The 0.03 acres of unavoidable permanent impacts to wetlands under USFWS easement will be mitigated via the Easement Exchange agreement between NDDOT and USFWS using the Vollrath 15/21 mitigation bank.

Wetland Number	Location	Cowardin Class.	Wetland Type	Wetland Size (Acres)	Wetland Feature	USACE Jurisdictional Wetlands*	USFWS Easement Impacts		Wetland Impacts (Acres)	
							Temp.	Perm.	Temp.	Perm.
1	Sec.19, T131N, R60W	PEMA	Drainage	0.11	Natural	N	0.00	0.00	0.00	0.00
2	Sec.19, T131N, R60W	PEMF	Basin	11.11	Natural	N	0.00	0.03	1.09	0.35
3	Sec.24, T131N, R60W	PEMA	Ditch	0.05	Artificial	Preamble	0.00	0.00	0.00	0.00
4	Sec.24, T131N, R60W	PEMF	Basin	2.55	Natural	N	0.00	0.00	0.29	<0.01
			Totals	13.82			0.00	0.03	1.38	0.35

*A wetland JD was issued by the USACE on December 3, 2009 (NWO-2009-2603-BIS) for Wetlands 1, 2 and 4, and on June 18, 2013 (NWO-2013-1068-BIS) for Wetland 3.

POTENTIAL OTHER WATERS									
Wetland Number	Location	Wetland Type	Size		Wetland Feature	USACE Jurisdictional Wetland	Impacts to Potential Other		
			Acres	Linear Feet			Acres		Linear Feet
							Temp	Perm	
OW 1	Sec.19, T131N, R60W	Open Water	22.62	N/A	Natural	N	2.23	0.60	N/A
OW 2	Sec.19, T131N, R60W	Open Water	3.87	N/A	Natural	N	0.10	<0.01	N/A
		Totals	26.49	N/A			2.33	0.60	N/A

* A wetland JD was issued by the USACE on December 3, 2009 (NWO-2009-2603-BIS) for OW 1 and OW 2.

Permits Required:

NDPDES (North Dakota Pollutants Discharge Elimination System)
Status: To be obtained by the Contractor prior to construction. Owner of the permit shall be listed as Dickey County.

National Wildlife Refuge System General Special Use Permit
Status: Has been obtained by Dickey County.

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ENVIRONMENTAL COMMITMENTS

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ESTIMATE OF QUANTITIES

SPEC	CODE	ITEM DESCRIPTION	UNIT	SC Segment	ER Segment	TOTAL
103	0100	CONTRACT BOND	L SUM	0.2	0.8	1
202	0137	REMOVAL OF PAVEMENT	SY	1,421	1,513	2,934
202	0170	REMOVAL OF CULVERT-ALL TYPES & SIZES	LF	0	116	116
202	0295	REMOVAL OF OBSTRUCTIONS	L SUM	0.2	0.8	1
203	0101	COMMON EXCAVATION-TYPE A	CY	85	250	335
203	0109	TOPSOIL	CY	540	2,610	3,150
203	0113	COMMON EXCAVATION-WASTE	CY	65	135	200
203	0140	BORROW-EXCAVATION	CY	10,325	110,100	120,425
210	0212	FLOWABLE FILL	CY	10	26	36
216	0100	WATER	M GAL	148	1,264	1,412
230	0300	SUBGRADE PREPARATION-TYPE A	STA	5.0	44.8	49.8
302	0100	SALVAGED BASE COURSE	TON	2,188	8,017	10,205
302	0314	TEMPORARY TRAFFIC SURFACE AGGREGATE	TON	500	1,500	2,000
302	0417	REMOVE & SALVAGE AGGREGATE BASE COURSE	STA	-	39.9	39.9
401	0100	MC70 OR 250 LIQUID ASPHALT	GAL	1,091	4,066	5,157
401	0150	SS1H OR CSS1H OR MS1 EMULSIFIED ASPHALT	GAL	439	1,615	2,054
401	0160	BLOTTER MATERIAL CL 44	TON	33	122	155
408	0185	HOT BITUMINOUS PAVEMENT CL 29	TON	928	3,431	4,359
408	0445	PG 58-28 ASPHALT CEMENT	TON	60	223	283
408	9605	CORED SAMPLE-BITUMINOUS PAVEMENT	EA	8	17	25
702	0100	MOBILIZATION	L SUM	0.2	0.8	1
704	0100	FLAGGING	MHR	110	320	430
704	1000	TRAFFIC CONTROL SIGNS	UNIT	711	729	1,440
704	1052	TYPE III BARRICADE	EA	7	7	14
704	1067	TUBULAR MARKERS	EA	26	99	125
704	1080	STACKABLE VERTICAL PANELS	EA	52	198	250
704	1185	PILOT CAR	HR	55	160	215
706	0200	FIELD LABORATORY-TYPE B	EA	0.2	0.8	1
706	0300	FIELD LABORATORY-TYPE C	EA	0.2	0.8	1
708	1020	RIPRAP-LOOSE ROCK	CY	1,085	6,580	7,665
708	1325	SILT FENCE SUPPORTED	LF	-	620	620
708	1335	REMOVAL SILT FENCE SUPPORTED	LF	-	620	620
708	1375	FLOTATION SILT CURTAIN	LF	1,330	5,815	7,145
708	1376	REMOVAL FLOTATION SILT CURTAIN	LF	1,330	5,815	7,145
708	1430	FIBER ROLLS 12IN	LF	1,910	4,885	6,795
708	1431	REMOVAL FIBER ROLLS 12IN	LF	450	1,430	1,880
708	2240	SEEDING-TYPE B-CL II	ACRE	0.78	3.79	4.57
708	5500	MULCHING	ACRE	0.78	3.79	4.57
709	0600	GEOTEXTILE FABRIC-TYPE RR	SY	2,167	12,825	14,992
709	0701	GEOTEXTILE FABRIC-TYPE R1	SY	525	1,029	1,554
714	4099	PIPE CONDUIT 18IN-APPROACH	LF	-	148	148
714	4105	PIPE CONDUIT 24IN	LF	104	74	178
714	4115	PIPE CONDUIT 36IN	LF	-	118	118
714	5015	PIPE CORR STEEL .064IN 18IN	LF	-	12	12
714	9660	REMOVE & RELAY END SECTION-ALL TYPE & SIZES	EA	-	2	2
754	0206	STEEL GALV POSTS-TELESCOPING PERFORATED TUBE	LF	-	16.5	16.5
754	0592	RESET SIGN PANEL	EA	-	4	4
754	0593	RESET SIGN SUPPORT	EA	-	1	1
762	0430	SHORT TERM 4IN LINE-TYPE NR	LF	2,085	6,540	8,625
762	1104	PVMT MK PAINTED 4IN LINE	LF	695	2,180	2,875
766	0120	RESET MAILBOX	EA	1	1	2
772	2810	TEMPORARY TRAFFIC SIGNALS	EA	1	1	2

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ESTIMATE OF QUANTITIES

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BASIS OF ESTIMATE

MAINLINE		DRIVES			
QUANTITY PER MILE	TOP WIDTH	PRIVATE & SECTION DRIVES (3/2)	FIELD DRIVES (5)	UNIT	DESCRIPTION
-	-	-	-	M GAL	Water (10 Gal/CY of Embankment & 20 Gal/Ton Salvaged Base Course & 10 M GAL for Dust Palliative)
8,067	30’	21	3	TON	Salvaged Base Course (1.875 Ton/CY)
4,400	30’	-	-	GAL	MC70 or 250 Liquid Asphalt (0.25 Gal/SY)
880	30’	-	-	GAL	SS1H OR CSS1H or MS1 Emulsified Asphalt for 1st Lift Tack Coat (0.05 Gal/SY) - May be eliminated if prime coat is eliminated.
821	28’	7	5	GAL	SS1H OR CSS1H or MS1 Emulsified Asphalt for 2nd Lift Tack Coat (0.05 Gal/SY)
132	30’	-	-	TON	Blotter Material Class 44 (15 Lbs/SY)
2,200	26’	5	3	TON	Hot Bituminous Pavement Class 29 for 1st Lift (2.0 Ton/CY)
1,450	26’	5	3	TON	Hot Bituminous Pavement Class 29 for 2nd Lift (2.0 Ton/CY)
143	26’	0.3	0.2	TON	PG 58-28 Asphalt Cement for 1st Lift (6.5% Hot Bit. Pavement)
94	26’	0.3	0.2	TON	PG 58-28 Asphalt Cement for 2nd Lift (6.5% Hot Bit. Pavement)
2 Cores/2,000’/Lane/Lift Plus 1 Full Depth/Mile	-	-	-	EA	Cored Sample-Bituminous Pavement

EARTHWORK SUMMARY

SEGMENT	EMBANKMENT			COMMON EXCAVATION (CY)	TOTAL BORROW REQUIRED (CY)
	MAINLINE[1] (CY)	BERM[2] (CY)	APPROACHES[3] (CY)		
SC Segment	8,185	2,225	-	85	10,325
ER Segment	83,885	23,520	2,945	250	110,100

1) Volumes includes 50% for shrinkage and losses for mainline.
2) Volumes includes 100% for shrinkage and losses for the berm.
3) Volumes includes 35% for shrinkage for the approaches.

TOPSOIL

SEGMENT	TOPSOIL EXCAVATION (CY)	TOPSOIL EMBANKMENT (CY)	ADDITIONAL TOPSOIL REQUIRED (CY)
SC Segment	400	540	140
ER Segment	1,365	2,610	1,245

Topsoil shall be placed at a 4-inch depth from the top of the riprap to the shoulder and over all disturbed areas.
Volumes include 25% for shrinkage.
Quantities are based on 6-inch removal and 4-inch replacement depth.

PAVEMENT MARKING

DESCRIPTION	UNIT	QUANTITY PER LOCATION
4” Yellow Center Lines (10’ Line, 30’ Skip)		
SC Segment		
Sta. 13+70 to Sta. 26+80	LF	330
ER Segment		
Sta. 26+80 to Sta. 75+60	LF	1,220
4” Yellow Center Lines (No Passing)		
SC Segment		
Sta. 23+15 RT to Sta. 26+80 RT	LF	365
ER Segment		
Sta. 26+80 RT to Sta. 29+20 RT	LF	240
Sta. 32+10 LT to Sta. 39+30 LT	LF	720

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BASIS OF ESTIMATE

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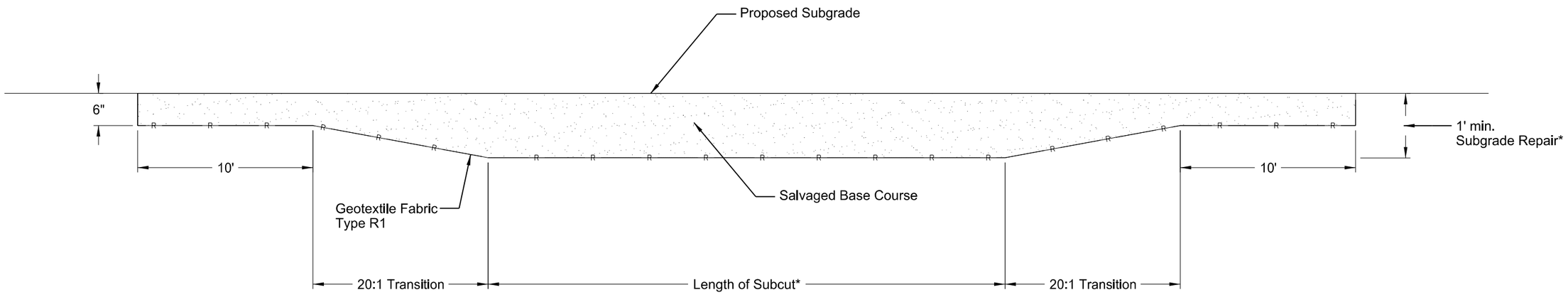

SUBGRADE REPAIR DETAIL*

*Location, Extents and Depth to be Determined in the Field by the Engineer.
Excavated Material Shall be Paid for as "Common Excavation-Waste".

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SUBGRADE REPAIR DETAIL

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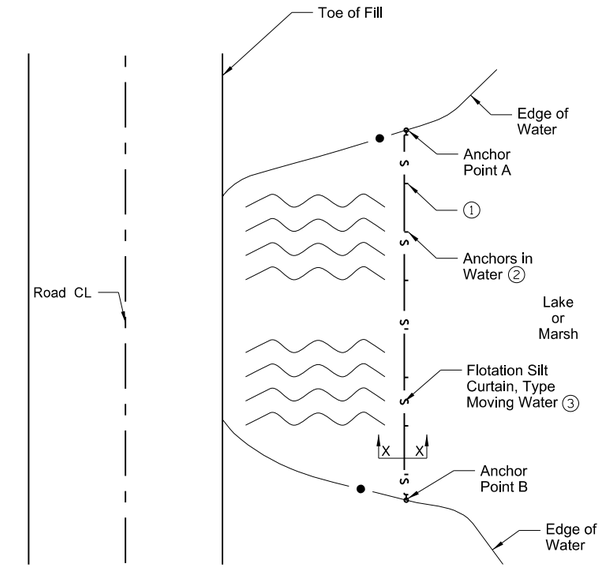
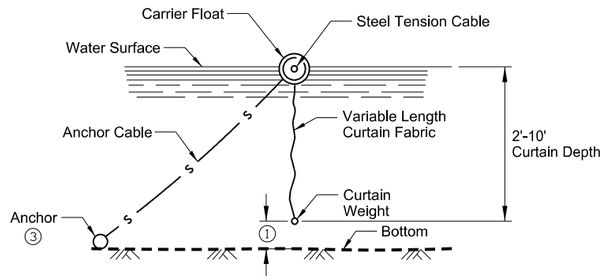


PLAN VIEW
FLOTATION SILT CURTAIN-TYPE MOVING WATER③



SECTION X-X

NOTES:

① Curtain 1 foot from bottom.

② Contractor to supply and install sufficient quantity of anchors to hold the silt curtain in place.

③ Flotation silt curtain will be used in still water, but due to size of the water body, materials meeting Type Moving Water will be required.

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FLOTATION SILT CURTAIN DETAIL

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JN	JL	5313100

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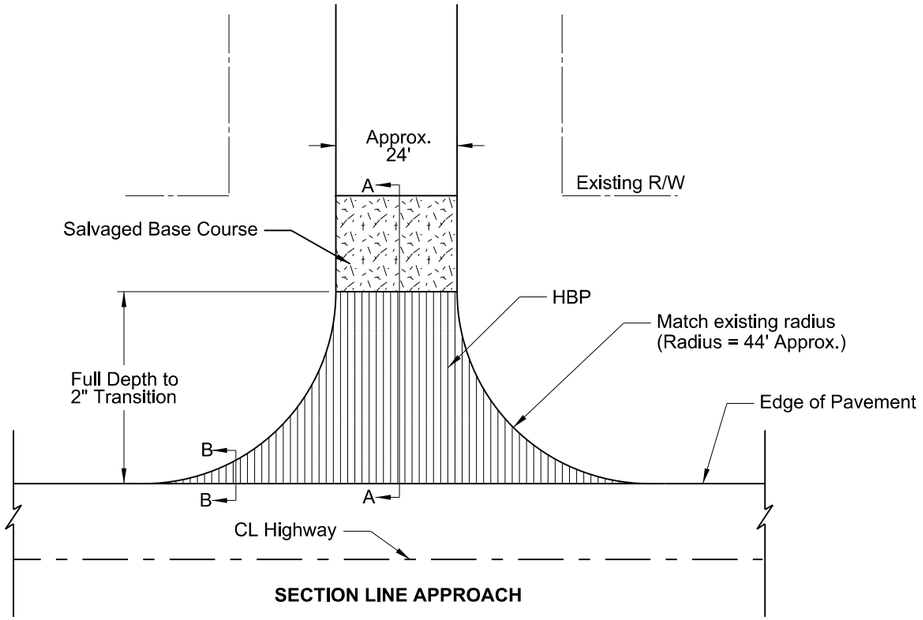
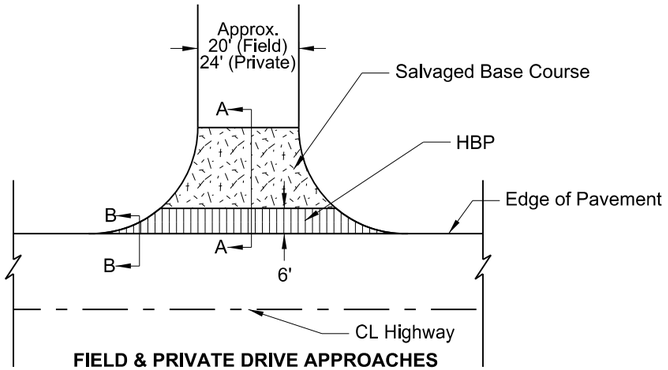
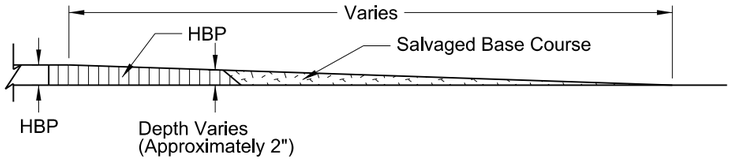
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	CER-SC-1112(064)	20	3



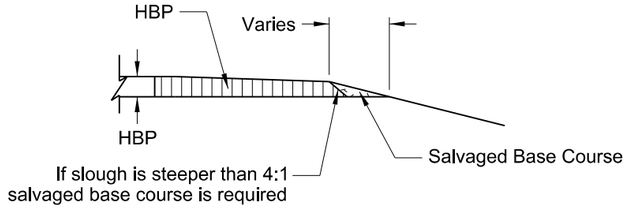
SECTION LINE APPROACH



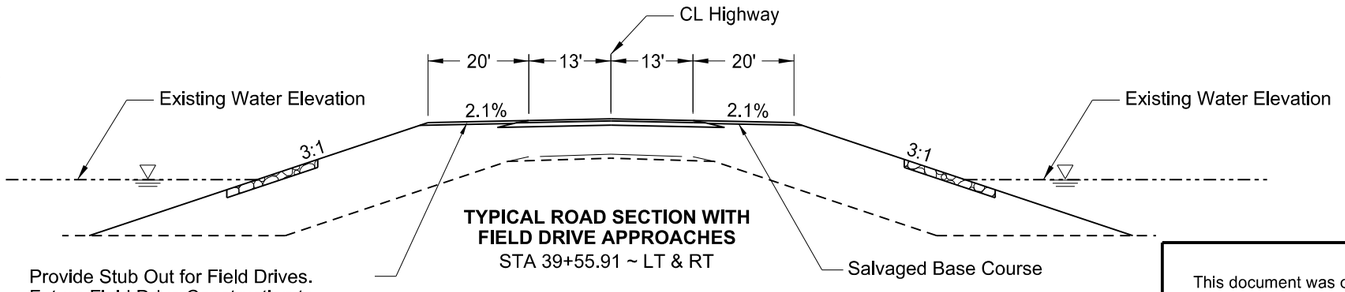
FIELD & PRIVATE DRIVE APPROACHES



SECTION A-A



SECTION B-B



TYPICAL ROAD SECTION WITH FIELD DRIVE APPROACHES
STA 39+55.91 ~ LT & RT

Provide Stub Out for Field Drives.
Future Field Drive Construction to
be Completed if Water Recedes to
Allow Access to the Adjacent Properties.

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APPROACH DETAILS

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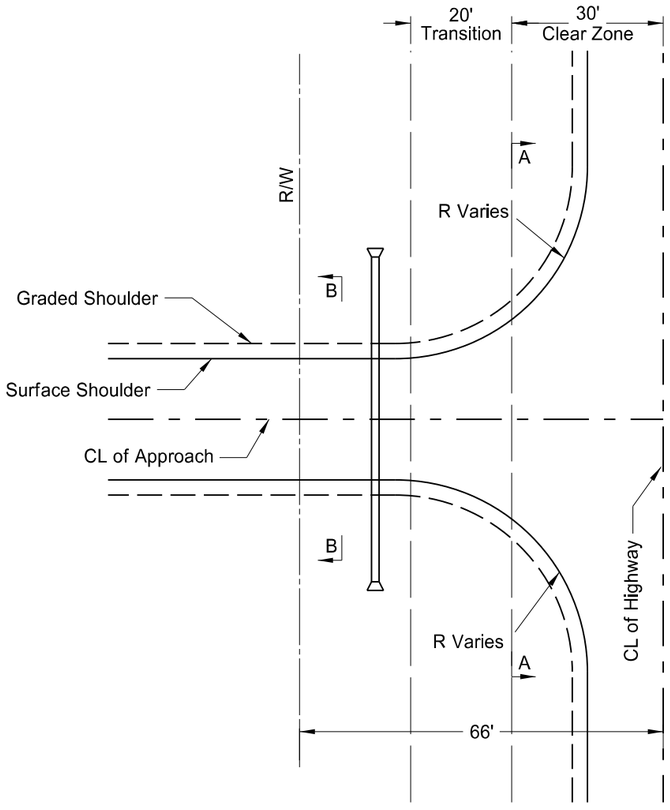
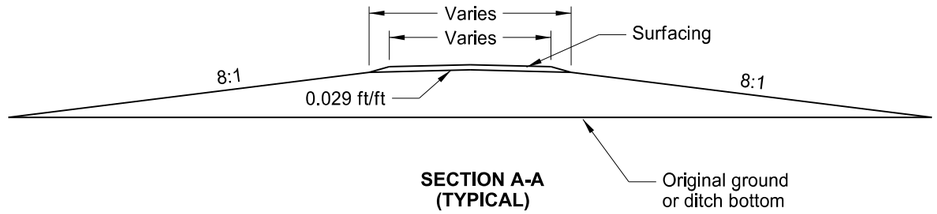
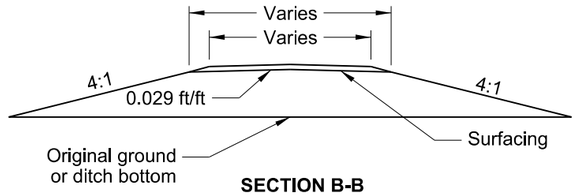


PLAN VIEW APPROACH



SECTION A-A
(TYPICAL)



SECTION B-B
(TYPICAL)

See Section 20 Sheet 3 for Approach Widths and Surfacing Details.

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APPROACH INSLOPE DETAILS

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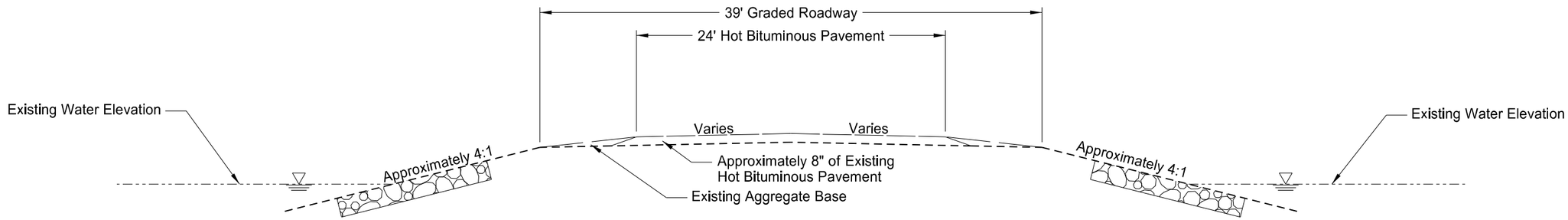
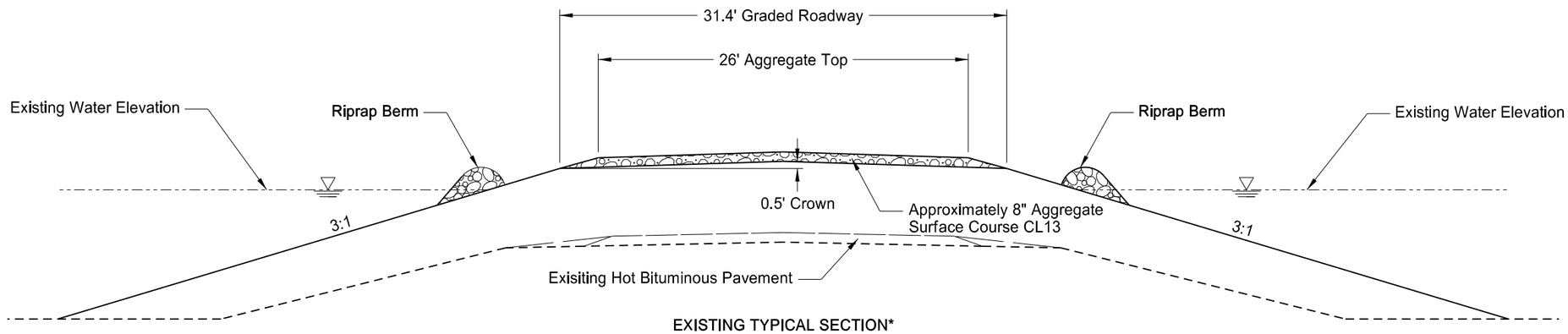
	ND	CER-SC-1112(064)	30	1



EXISTING TYPICAL SECTION
STA. 13+70 to STA. 29+13
STA. 68+98 to STA. 75+60

EXISTING RIPRAP LOCATIONS
STA. 17+22 RT to STA. 23+32 RT
STA. 17+35 LT to STA. 23+32 LT



EXISTING TYPICAL SECTION*
STA. 29+13 to STA. 68+98

EXISTING RIPRAP LOCATIONS
STA. 35+98 to STA. 66+78 ~ LT
STA. 36+36 to STA. 59+94 ~ RT

* Emergency grade raise section constructed in 2011.

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EXISTING TYPICAL SECTIONS

DRWN. BY	CHK'D. BY	PROJECT NO.
JN	JL	5313100

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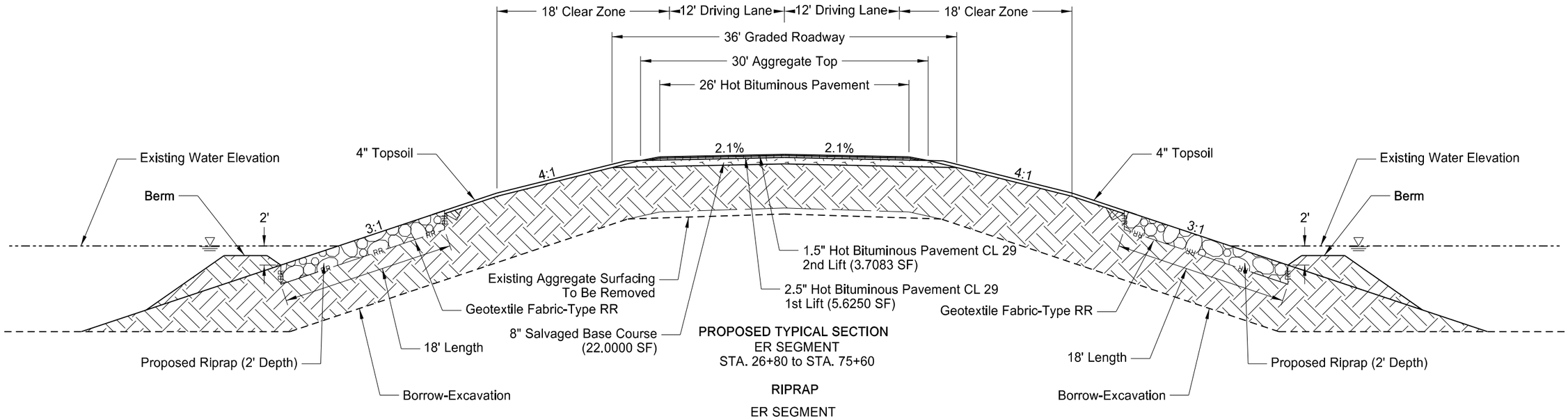
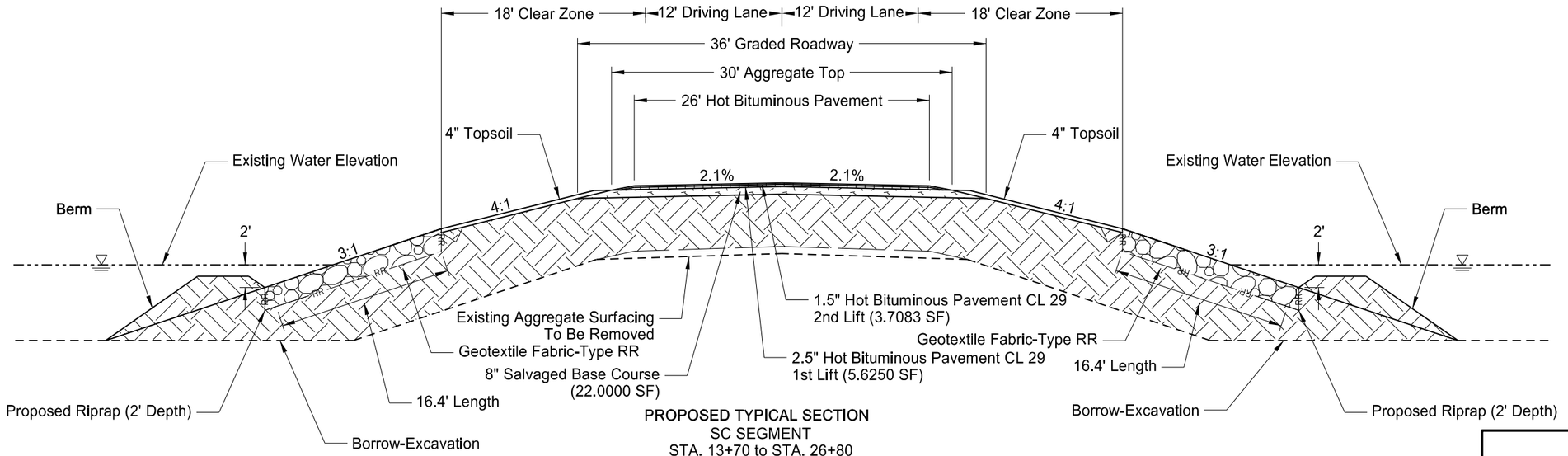
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	CER-SC-1112(064)	30	2



PROPOSED TYPICAL SECTION
ER SEGMENT
STA. 26+80 to STA. 75+60

RIPRAP
ER SEGMENT
STA. 35+50 to STA. 66+00 LT
STA. 35+50 to STA. 60+50 RT
STA. 69+50 to STA. 71+50 LT



PROPOSED TYPICAL SECTION
SC SEGMENT
STA. 13+70 to STA. 26+80

RIPRAP
SC SEGMENT
STA. 17+50 to STA. 23+50 LT
STA. 17+50 to STA. 23+50 RT

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CER-SC-1112(064)
DICKEY COUNTY, NORTH DAKOTA

KLJ

PROPOSED TYPICAL SECTIONS

DRWN. BY	CHK'D. BY	PROJECT NO.
JN	JL	5313100

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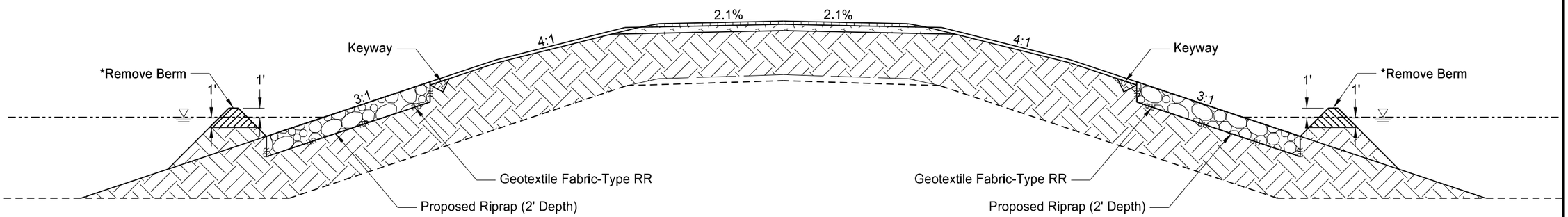
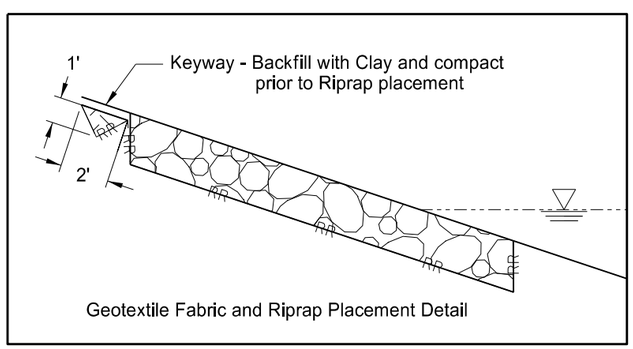
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	CER-SC-1112(064)	30	3



KEYWAY AND BERM TYPICAL SECTION

SC SEGMENT
STA. 17+50 to STA. 23+50 LT
STA. 17+50 to STA. 23+50 RT
ER SEGMENT
STA. 35+50 to STA. 66+00 LT
STA. 35+50 to STA. 60+50 RT
STA. 69+50 to STA. 71+50 LT

*Note: Berm locations are dependent upon water elevation at time of construction.



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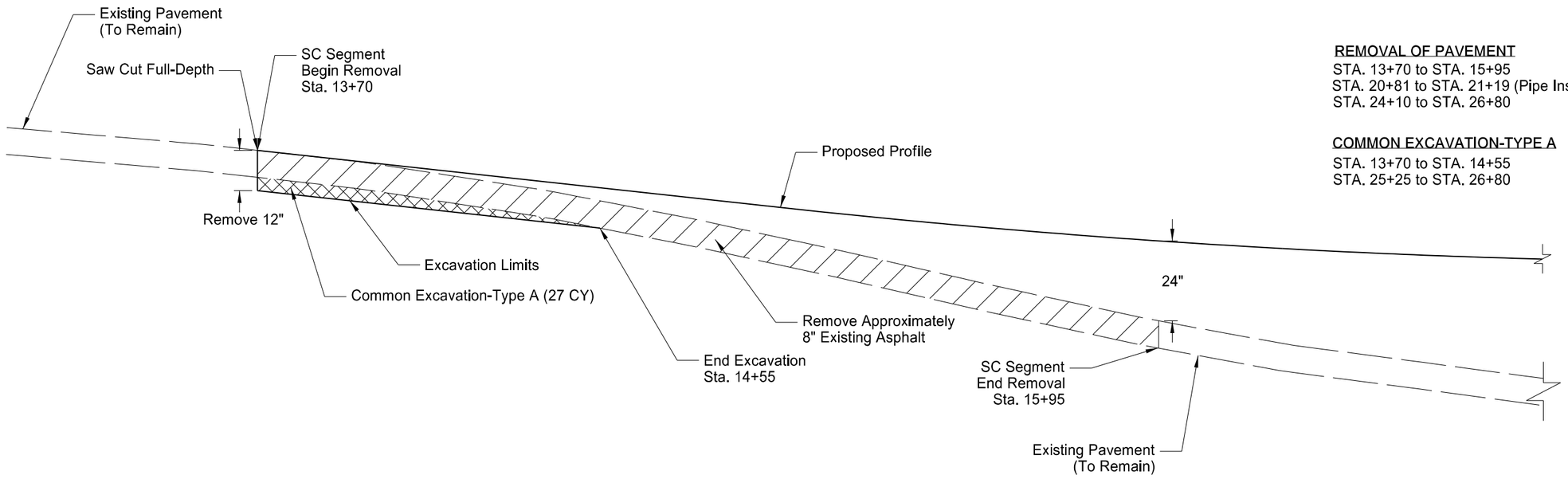
CER-SC-1112(064)
DICKEY COUNTY, NORTH DAKOTA

KLJ

KEYWAY AND BERM TYPICAL SECTION

DRWN. BY	CHK'D. BY	PROJECT NO.
JN	JL	5313100

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	CER-SC-1112(064)	40	1

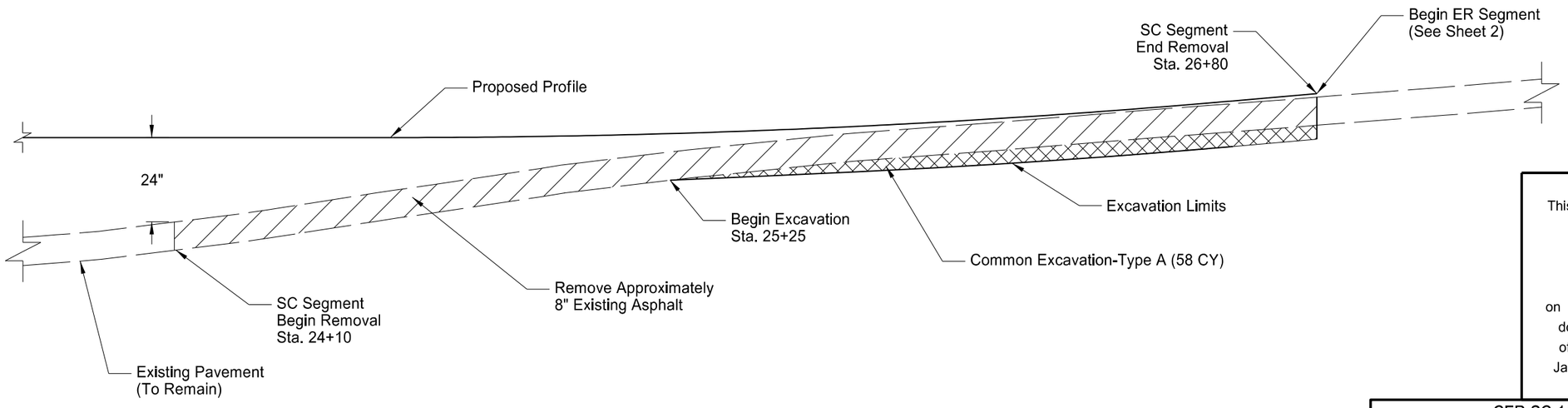


REMOVAL OF PAVEMENT

STA. 13+70 to STA. 15+95	600 SY
STA. 20+81 to STA. 21+19 (Pipe Installation)	101 SY
STA. 24+10 to STA. 26+80	720 SY
	1,421 SY

COMMON EXCAVATION-TYPE A

STA. 13+70 to STA. 14+55	27 CY
STA. 25+25 to STA. 26+80	58 CY
	85 CY



Common Excavation-Type A

Removal of Pavement

NOTE: Drawing Not To Scale

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CER-SC-1112(064)
DICKEY COUNTY, NORTH DAKOTA

KLJ

PAVEMENT REMOVAL DETAIL

DRWN. BY	CHK'D. BY	PROJECT NO.
AB	JK	5313100

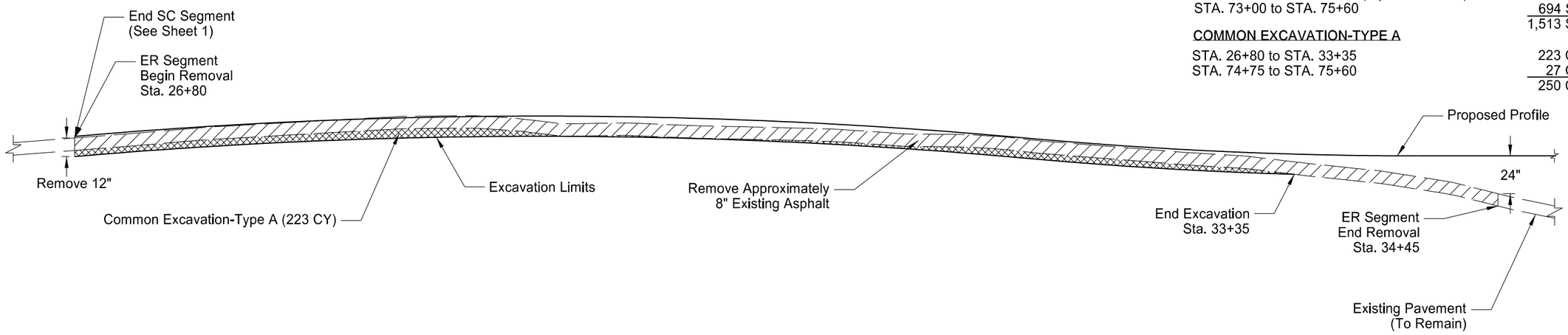
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	CER-SC-1112(064)	40	2

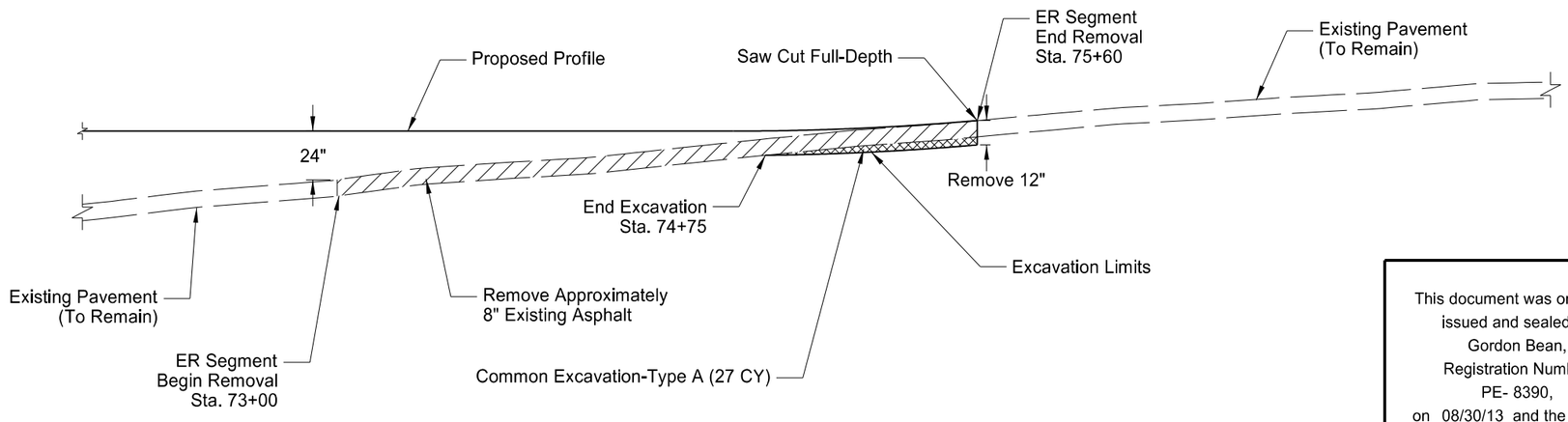
REMOVAL OF PAVEMENT

STA. 26+80 to STA. 29+13	621 SY
STA. 44+80 to STA. 45+20 (Pipe Installation)	107 SY
STA. 70+63 to STA. 70+97 (Pipe Installation)	91 SY
STA. 73+00 to STA. 75+60	694 SY
	1,513 SY

COMMON EXCAVATION-TYPE A

STA. 26+80 to STA. 33+35	223 CY
STA. 74+75 to STA. 75+60	27 CY
	250 CY





Common Excavation-Type A

Removal of Pavement

NOTE: Drawing Not To Scale

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CER-SC-1112(064)
DICKEY COUNTY, NORTH DAKOTA

KLJ

PAVEMENT REMOVAL DETAIL

DRWN. BY	CHK'D. BY	PROJECT NO.
AB	JK	5313100

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	CER-SC-1112(064)	51	1

Begin Station / Location	Begin Offset	End Station / Location	End Offset	Length	Pipe Conduit Pay Size	Pipe Conduit Approach Pay Size	Allowable Material (A)	Required Diameter	Minimum Thickness		R1 Fabric (Pay Item)	(A) End Sections		Applicable Backfill Detail
												Begin	End	
				LF	IN	IN		IN	IN	Gauge	SY	EA	EA	
21+00	52.0' LT	21+00	52.0' RT	104	24		Reinforced Concrete Pipe - Class III (barrel length = 104 LF)	24	-	-	325	_	_	D-714-25
							Aluminum Coated Steel (Type 2)		0.168	8				
							Polymeric Coated Steel (over zinc or aluminum coated steel) (A)		0.064	16				
34+42	52.0' LT	35+00	52.0' LT	6' Back & 6' Ahead		18	Aluminum Coated Steel (Type 2)	18	0.168	8	_	Relay	Relay	D-203-08
							Polymeric Coated Steel (over zinc or aluminum coated steel) (A)		0.064	16				
45+00	59.0' LT	45+00	59.0' RT	118	36		Reinforced Concrete Pipe - Class III (barrel length = 118 LF)	36	-	-	426	_	_	D-714-25
							Aluminum Coated Steel (Type 2)		0.168	8				
							Polymeric Coated Steel (over zinc or aluminum coated steel) (A)		0.064	16				
62+18	50.0' RT	62+94	50.0' RT	76		18	Reinforced Concrete Pipe - Class III (barrel length = 68 LF)	18	-	-	_	Y	Y	D-203-08
							Zinc Coated Steel (2-2/3"x1/2" Ribs)		0.064	16				
							Zinc Coated Steel (3/4"x3/4" @ 7-1/2" Ribs)		0.064	16				
							Aluminum Coated Steel (Type 2)		0.064	16				
							Polymeric Coated Steel (over zinc or aluminum coated steel) (A)		0.064	16				
							Corrugated Aluminum Alloy		0.060	16				
							High-Density Polyethylene (HDPE) (A)		-	-				
67+54	50.0' LT	68+26	50.0' LT	72		18	Reinforced Concrete Pipe - Class III (barrel length = 64 LF)	18	-	-	_	Y	Y	D-203-08
							Zinc Coated Steel (2-2/3"x1/2" Ribs)		0.064	16				
							Zinc Coated Steel (3/4"x3/4" @ 7-1/2" Ribs)		0.064	16				
							Aluminum Coated Steel (Type 2)		0.064	16				
							Polymeric Coated Steel (over zinc or aluminum coated steel) (A)		0.064	16				
							Corrugated Aluminum Alloy		0.060	16				
							High-Density Polyethylene (HDPE) (A)		-	-				
70+81	38.8' LT	70+79	35.2' RT	74	24		Reinforced Concrete Pipe - Class III (barrel length = 70 LF)	24	-	-	193	Y	Y	D-714-25
							Aluminum Coated Steel (Type 2)		0.168	8				
							Polymeric Coated Steel (over zinc or aluminum coated steel) (A)		0.064	16				

(A) Dickey County is reserving the right to allow burning in their ditches. Plastic coated metal or plastic pipe must have approved segments and end treatments that are non-flammable.

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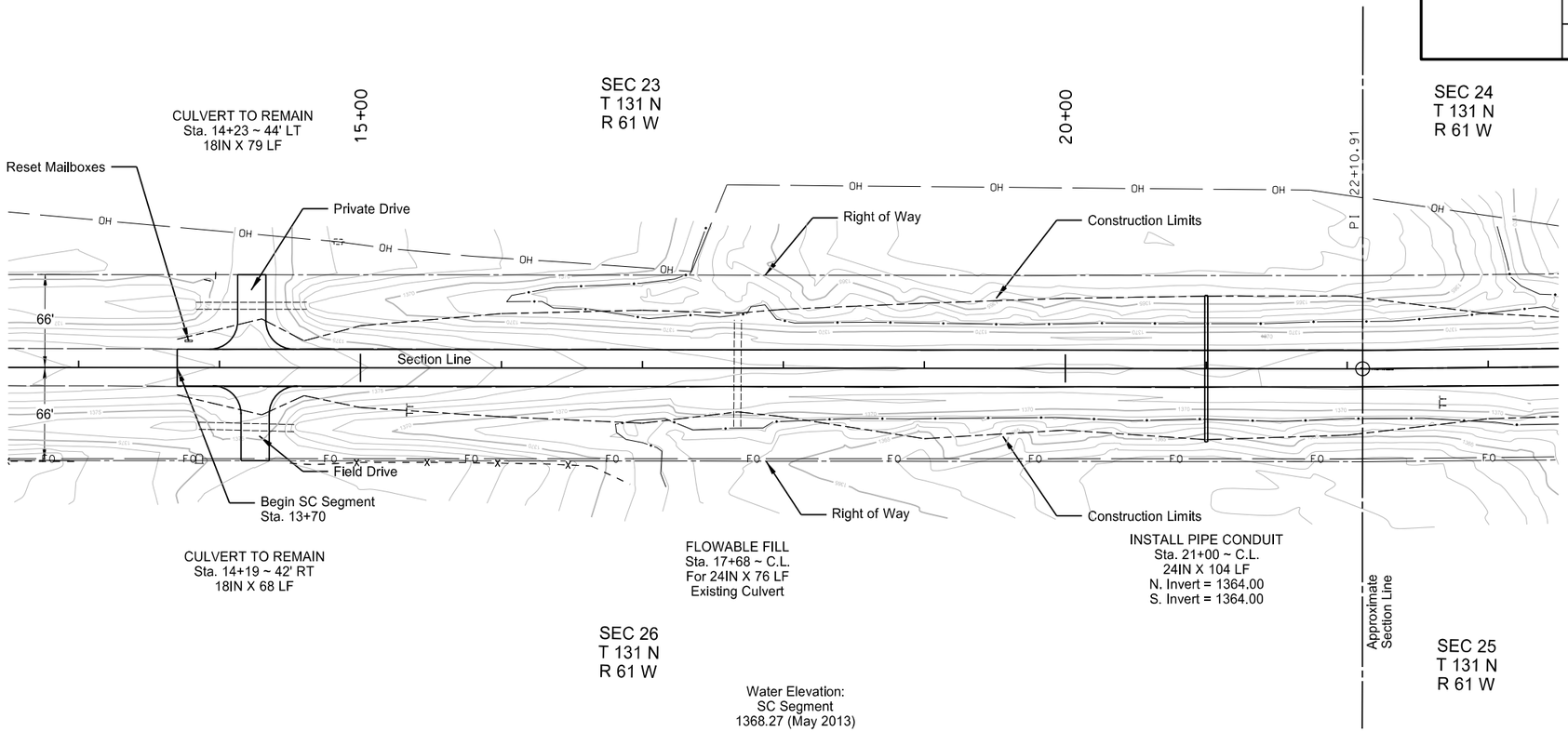
CER-SC-1112(064)
DICKEY COUNTY, NORTH DAKOTA

KLJ

ALLOWABLE PIPE LIST

DRWN. BY	CHK'D. BY	PROJECT NO.
JN	JL	5313100

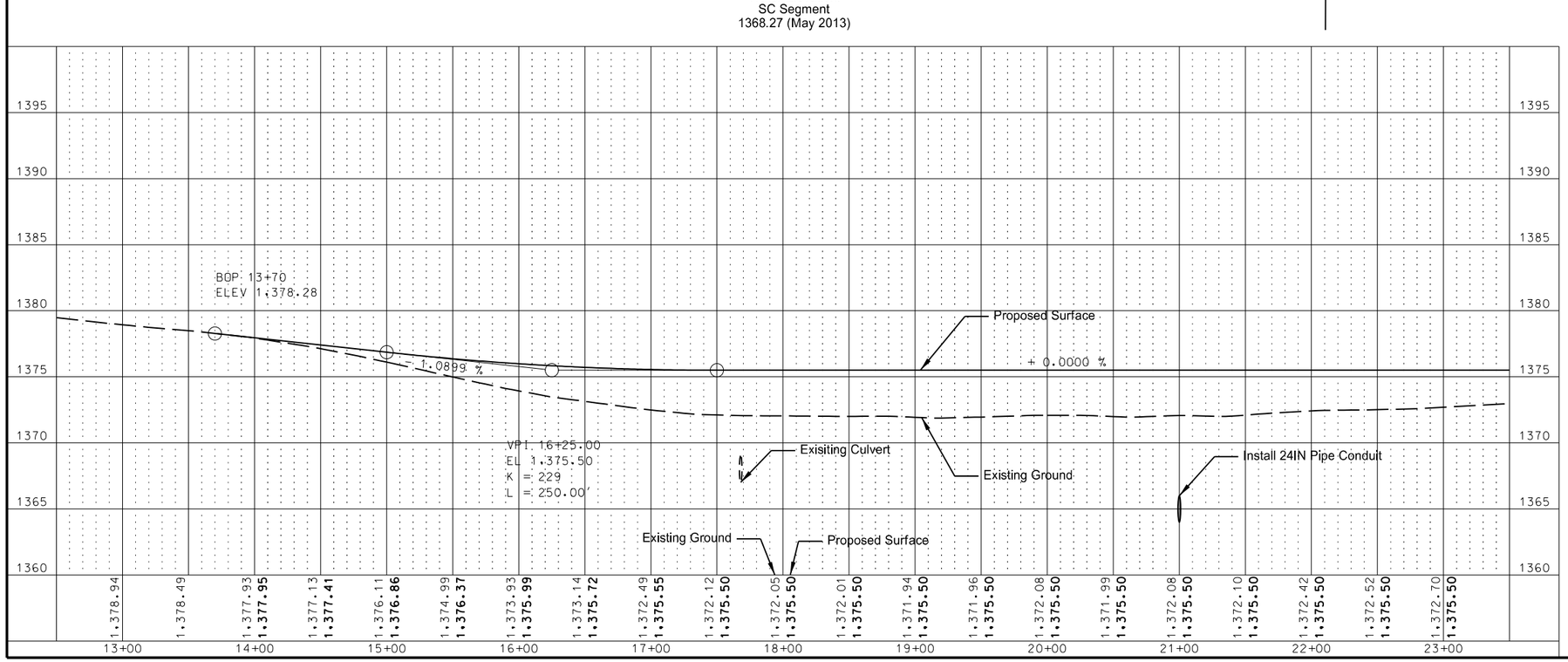
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	CER-SC-1112(064)	60	1



FLOWABLE FILL
STA 17+68 ~ C.L. 10 CY

RESET MAILBOX
STA 13+78 ~ LT 1 EA

PIPE CONDUIT 24IN
STA 21+00 ~ C.L. 104 LF



GRAPHIC SCALE (in feet)
50 0 50 100
1" = 100'

N

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CER-SC-1112(064)
DICKEY COUNTY, NORTH DAKOTA

KLJ

PLAN AND PROFILE
STA 13+70 TO STA 23+00

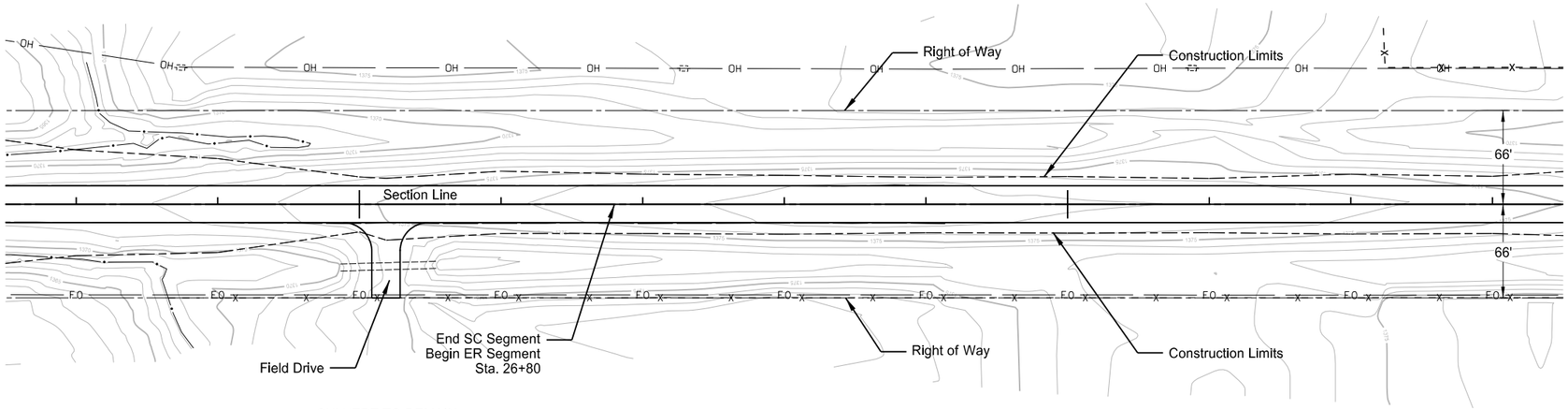
DRWN. BY	CHK'D. BY	PROJECT NO.
AB	JK	5313100

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	CER-SC-1112(064)	60	2

SEC 24
T 131 N
R 61 W

25+00

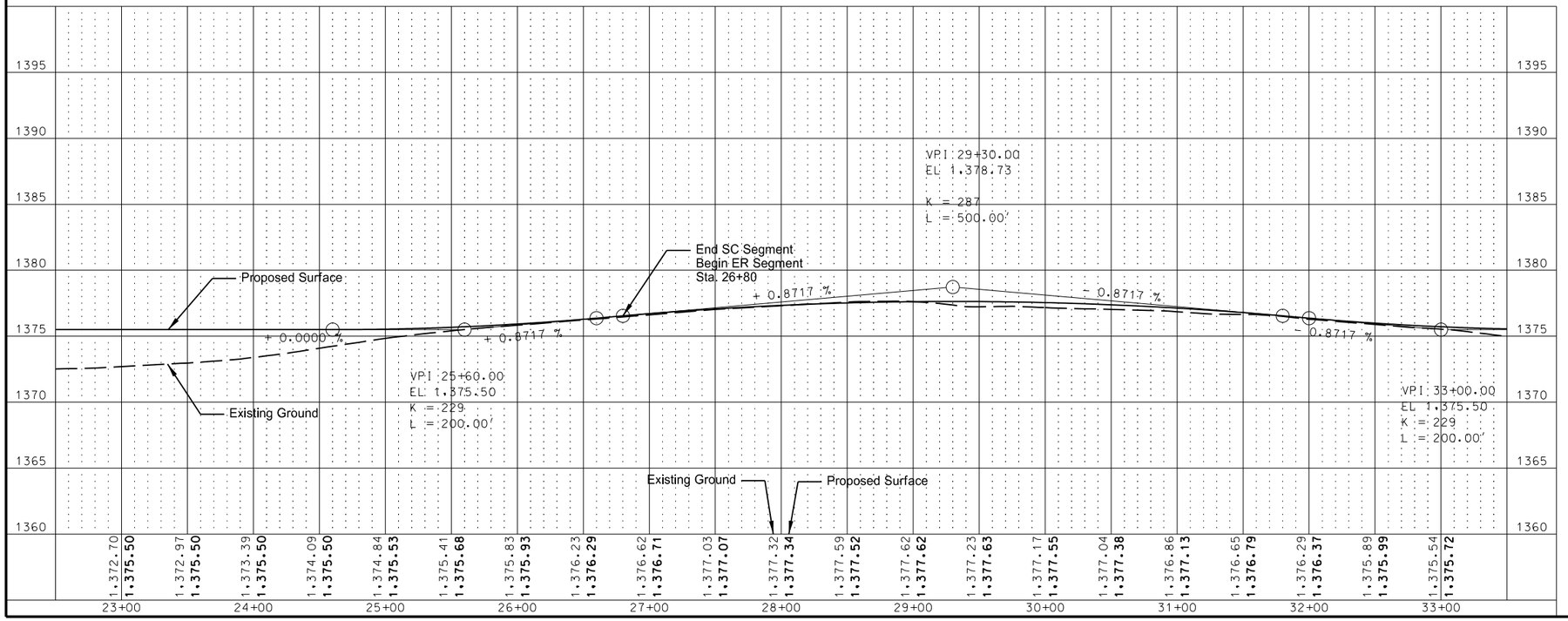
30+00



CULVERT TO REMAIN
Sta. 25+21 ~ 44' RT
18IN X 68 LF

SEC 25
T 131 N
R 61 W

Water Elevation:
SC Segment
1368.27 (May 2013)
ER Segment
1365.94 (March 2013)



GRAPHIC SCALE (in feet)
50 0 50 100
1" = 100'

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CER-SC-1112(064)
DICKEY COUNTY, NORTH DAKOTA

KLJ

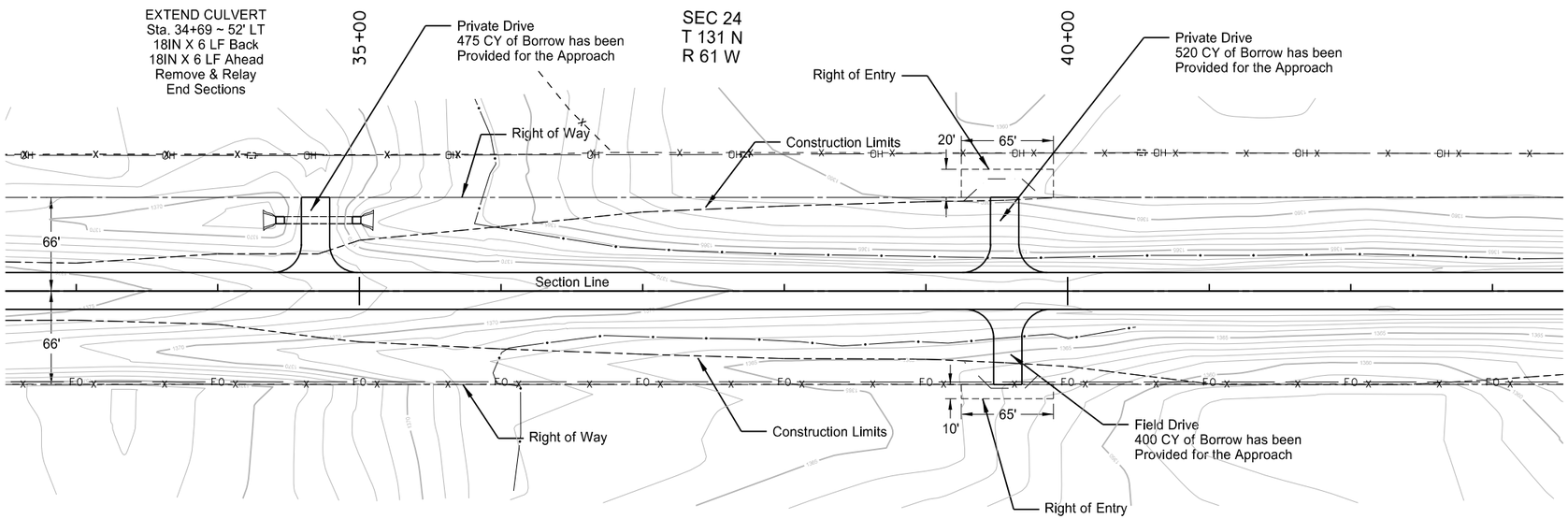
PLAN AND PROFILE
STA 23+00 TO STA 33+00

DRWN. BY	CHK'D. BY	PROJECT NO.
AB	JK	5313100

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	CER-SC-1112(064)	60	3

CULVERT TO REMAIN
Sta. 34+69 ~ 52' LT
18IN X 48 LF W/ End Sections

EXTEND CULVERT
Sta. 34+69 ~ 52' LT
18IN X 6 LF Back
18IN X 6 LF Ahead
Remove & Relay
End Sections



SEC 25
T 131 N
R 61 W

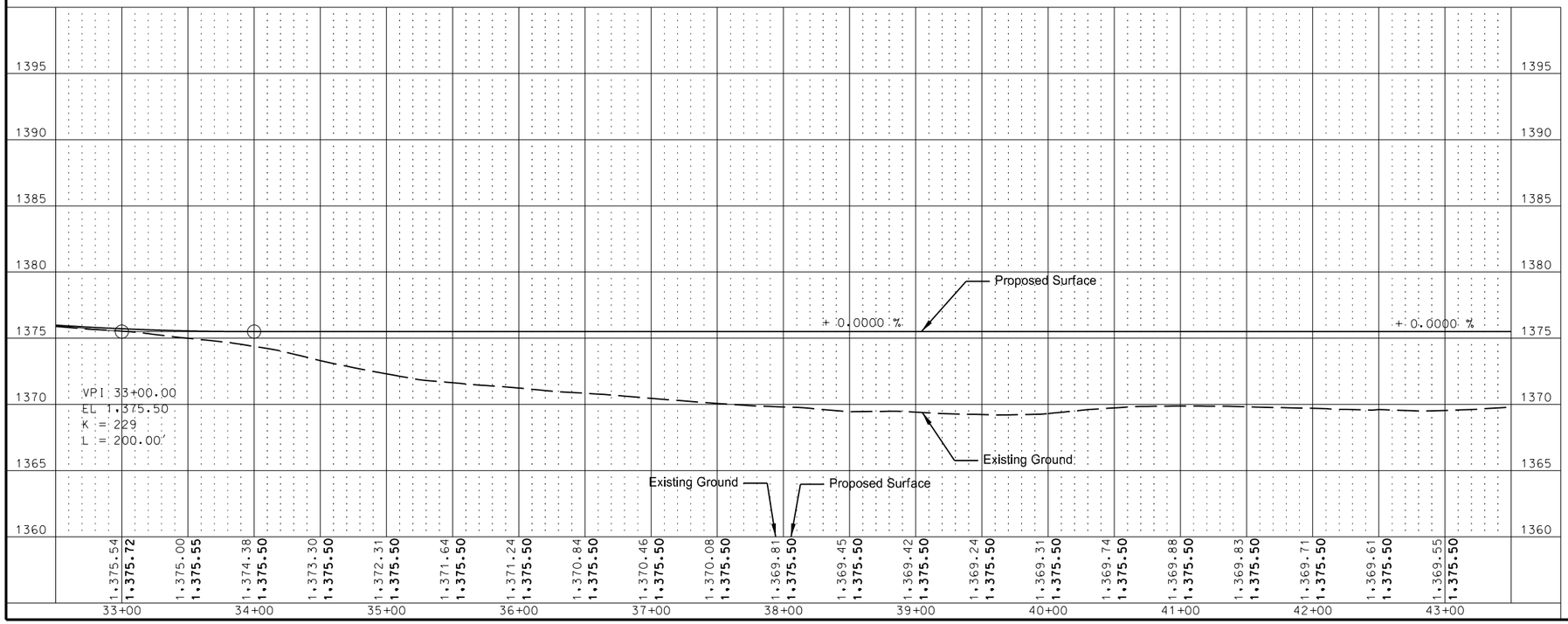
Water Elevation:
ER Segment
1365.94 (March 2013)

PIPE CORR STEEL .064IN 18IN

STA 34+69 ~ 52' LT	12 LF

REMOVE & RELAY END SECTION-ALL TYPE & SIZES

STA 34+39 ~ 52' LT	1 EA
STA 34+99 ~ 52' LT	1 EA
	2 EA



GRAPHIC SCALE (in feet)
50 0 50 100
1" = 100'

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CER-SC-1112(064)
DICKEY COUNTY, NORTH DAKOTA

KLJ

PLAN AND PROFILE
STA 33+00 TO STA 43+00

DRWN. BY	CHK'D. BY	PROJECT No.
AB	JK	5313100

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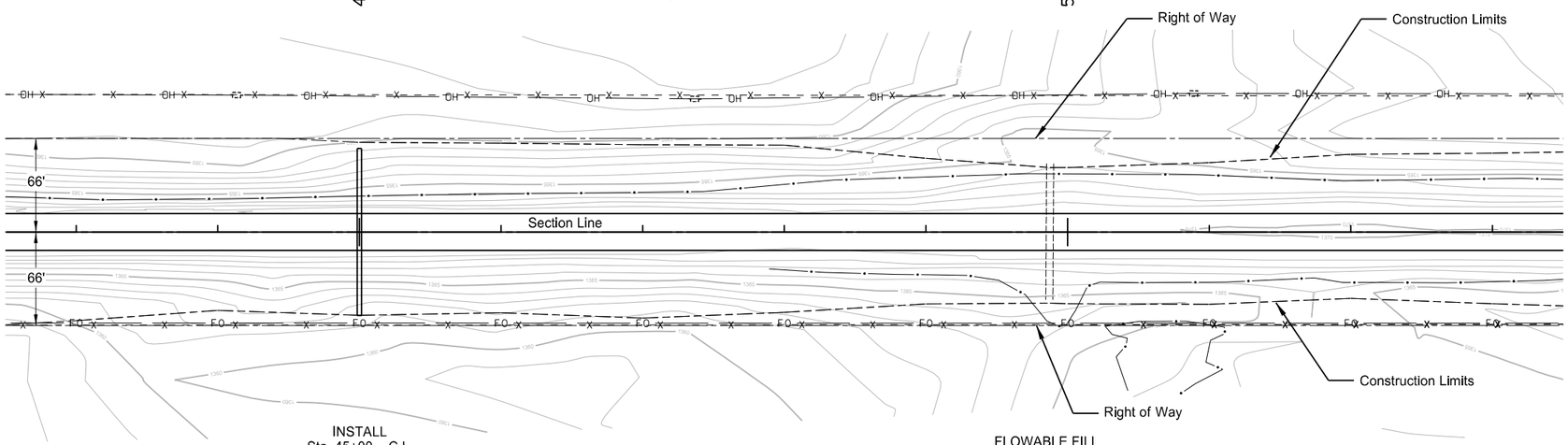
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	CER-SC-1112(064)	60	4

45+00

SEC 24
T 131 N
R 61 W

50+00

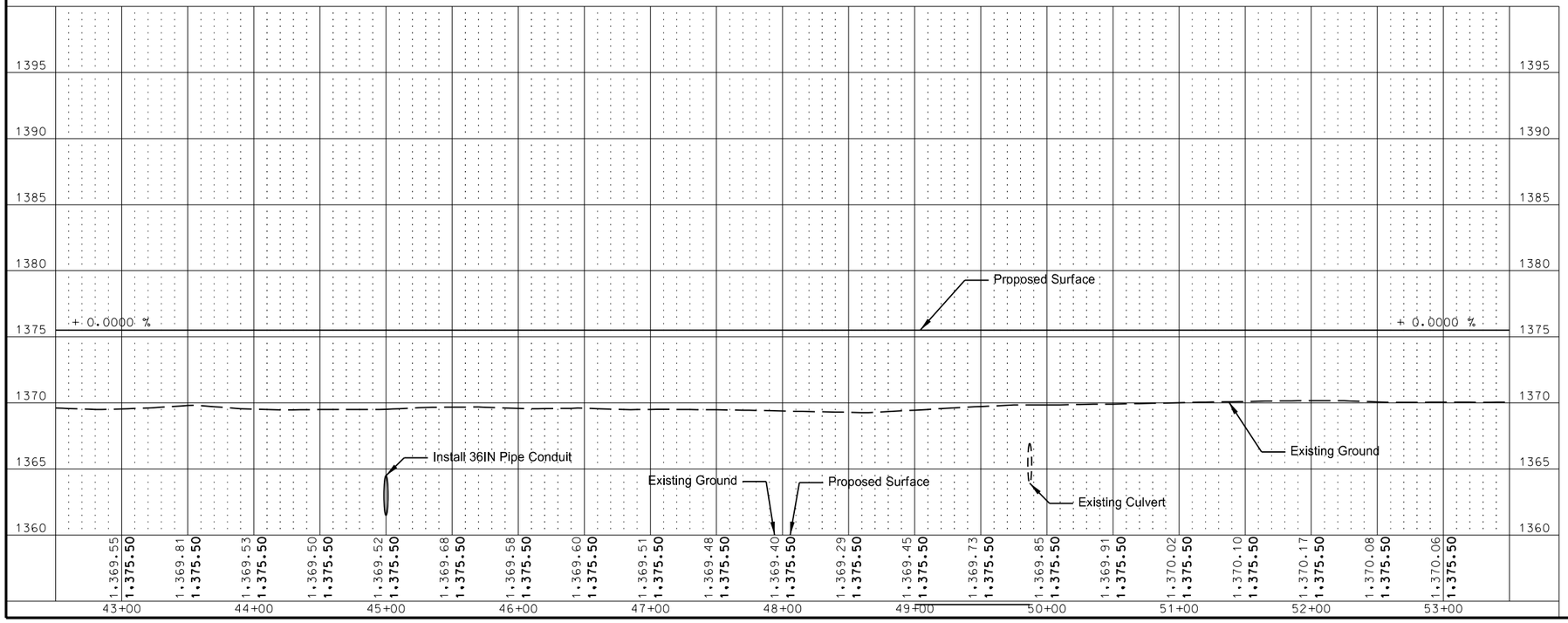


INSTALL
Sta. 45+00 ~ C.L.
36IN X 118 LF
N. Invert = 1361.50
S. Invert = 1361.50

FLOWABLE FILL
Sta. 49+87 ~ C.L.
For 36IN X 96 LF
Existing Culvert

SEC 25
T 131 N
R 61 W

Water Elevation:
ER Segment
1365.94 (March 2013)



FLOWABLE FILL
STA 49+87 ~ C.L. 26 CY

PIPE CONDUIT 36IN
STA 45+00 ~ C.L. 118 LF

GRAPHIC SCALE (in feet)
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1" = 100'

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CER-SC-1112(064)
DICKEY COUNTY, NORTH DAKOTA

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PLAN AND PROFILE
STA 43+00 TO STA 53+00

DRWN. BY	CHK'D. BY	PROJECT NO.
AB	JK	5313100

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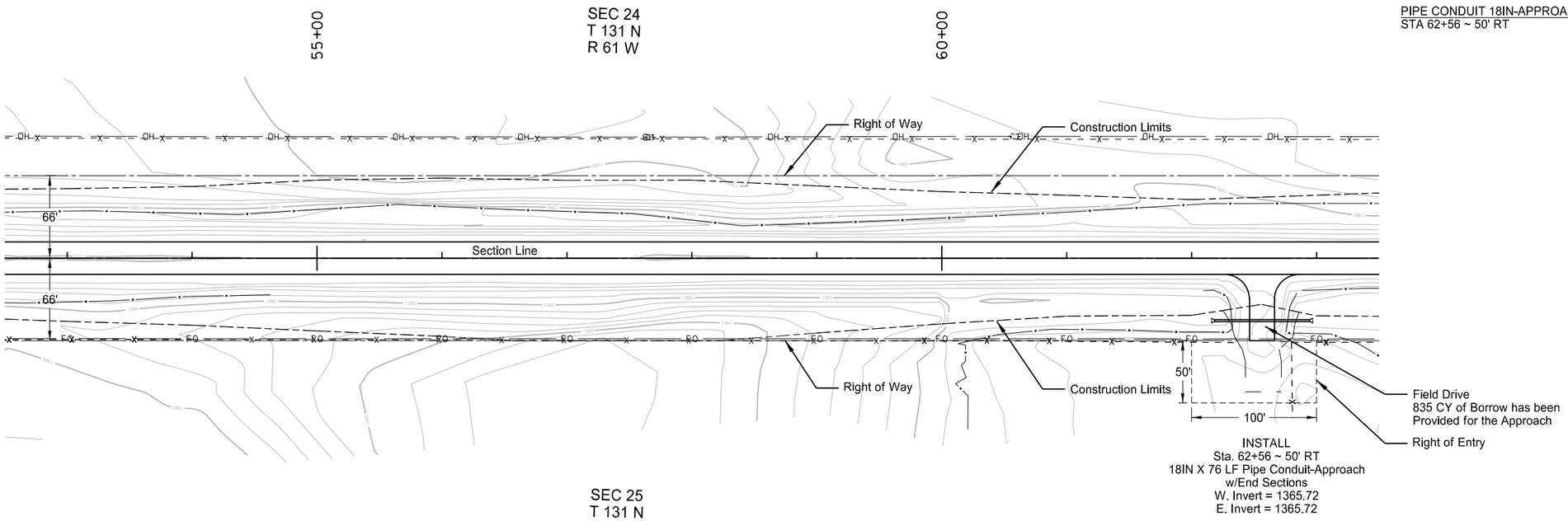
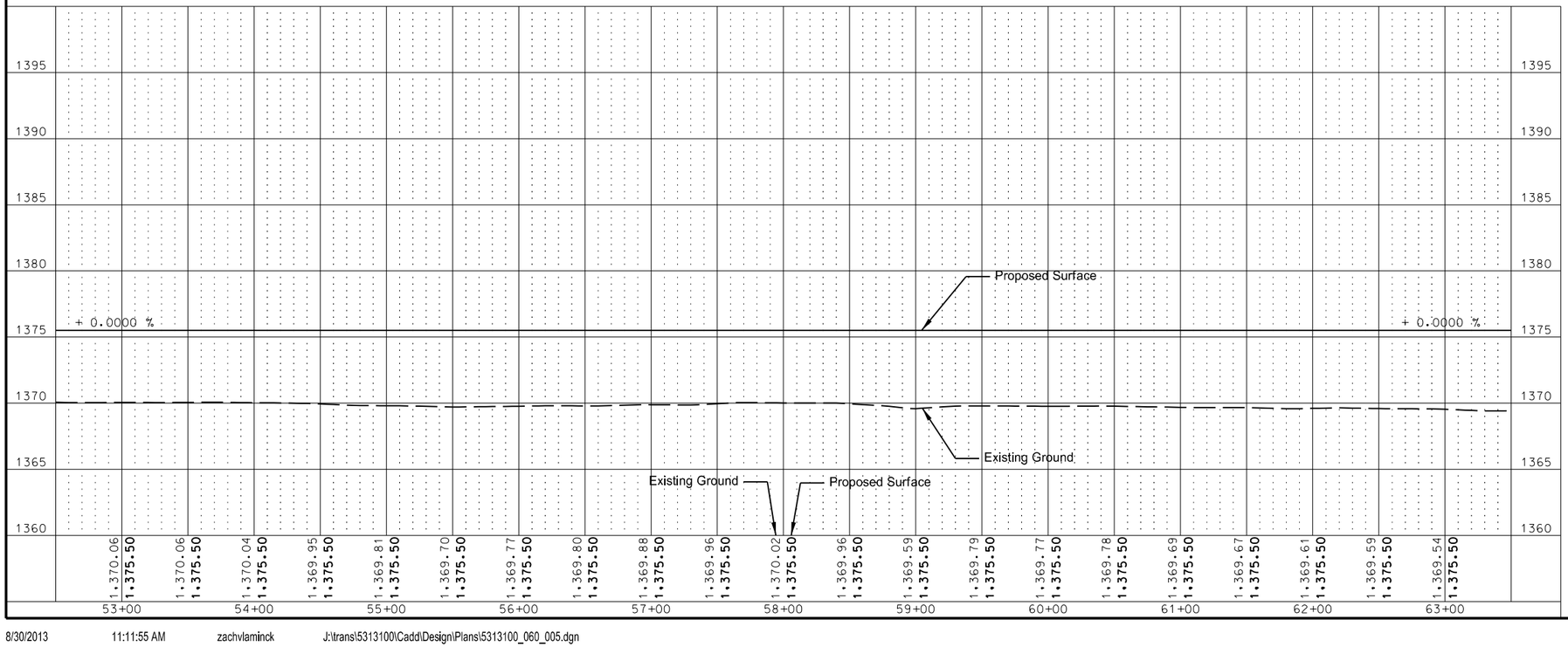
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	CER-SC-1112(064)	60	5

PIPE CONDUIT 18IN-APPROACH
STA 62+56 ~ 50' RT 76 LF



Water Elevation:
ER Segment
1365.94 (March 2013)



GRAPHIC SCALE (in feet)
50 0 50 100
1" = 100'

N

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CER-SC-1112(064)
DICKEY COUNTY, NORTH DAKOTA

KLJ

PLAN AND PROFILE
STA 53+00 TO STA 63+00

DRWN. BY	CHK'D. BY	PROJECT NO.
AB	JK	5313100

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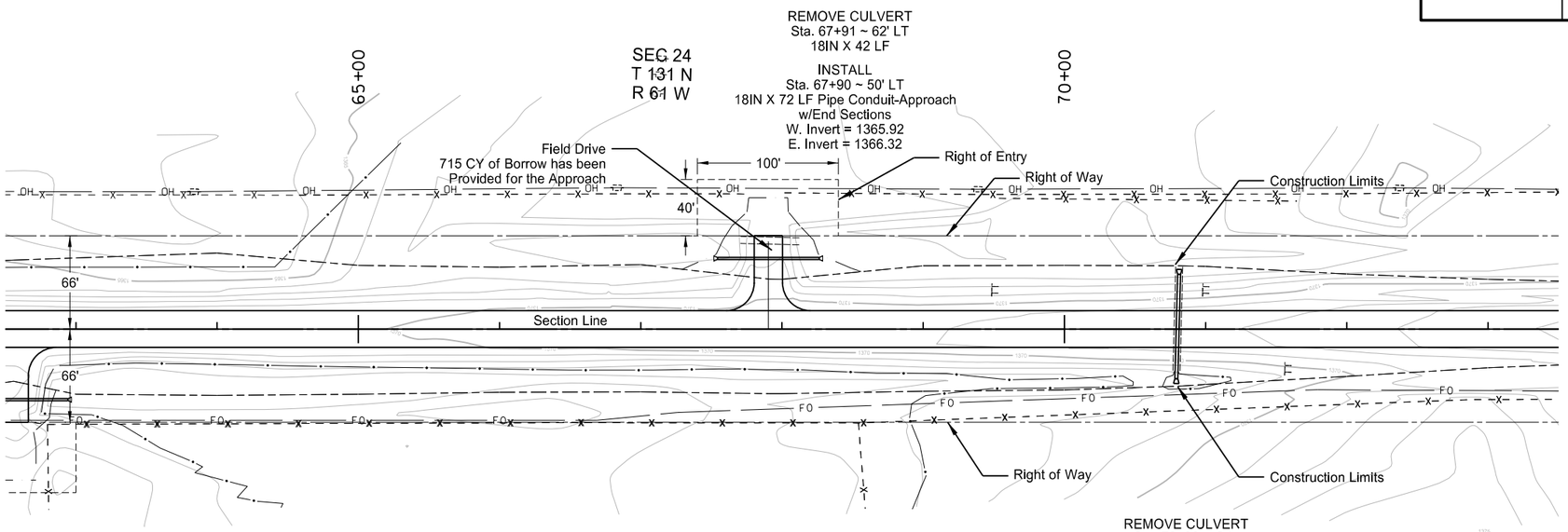
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	CER-SC-1112(064)	60	6



REMOVAL OF CULVERT-ALL TYPES & SIZES

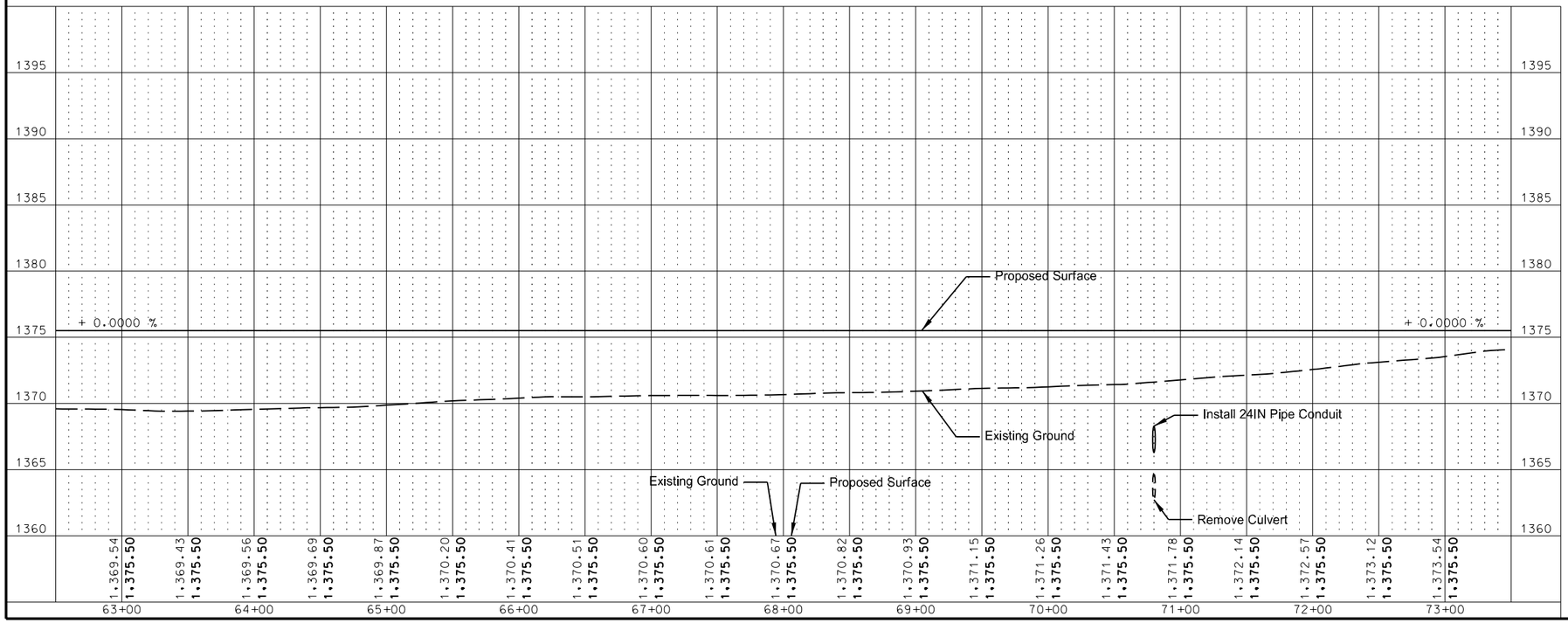
STA 67+91 ~ 62' LT	42 LF
STA 70+80 ~ C.L.	74 LF
	116 LF

PIPE CONDUIT 18IN-APPROACH

STA 67+90 ~ 50' LT	72 LF

PIPE CONDUIT 24IN

STA 70+80 ~ C.L.	74 LF



GRAPHIC SCALE (in feet)
50 0 50 100
1" = 100'

N

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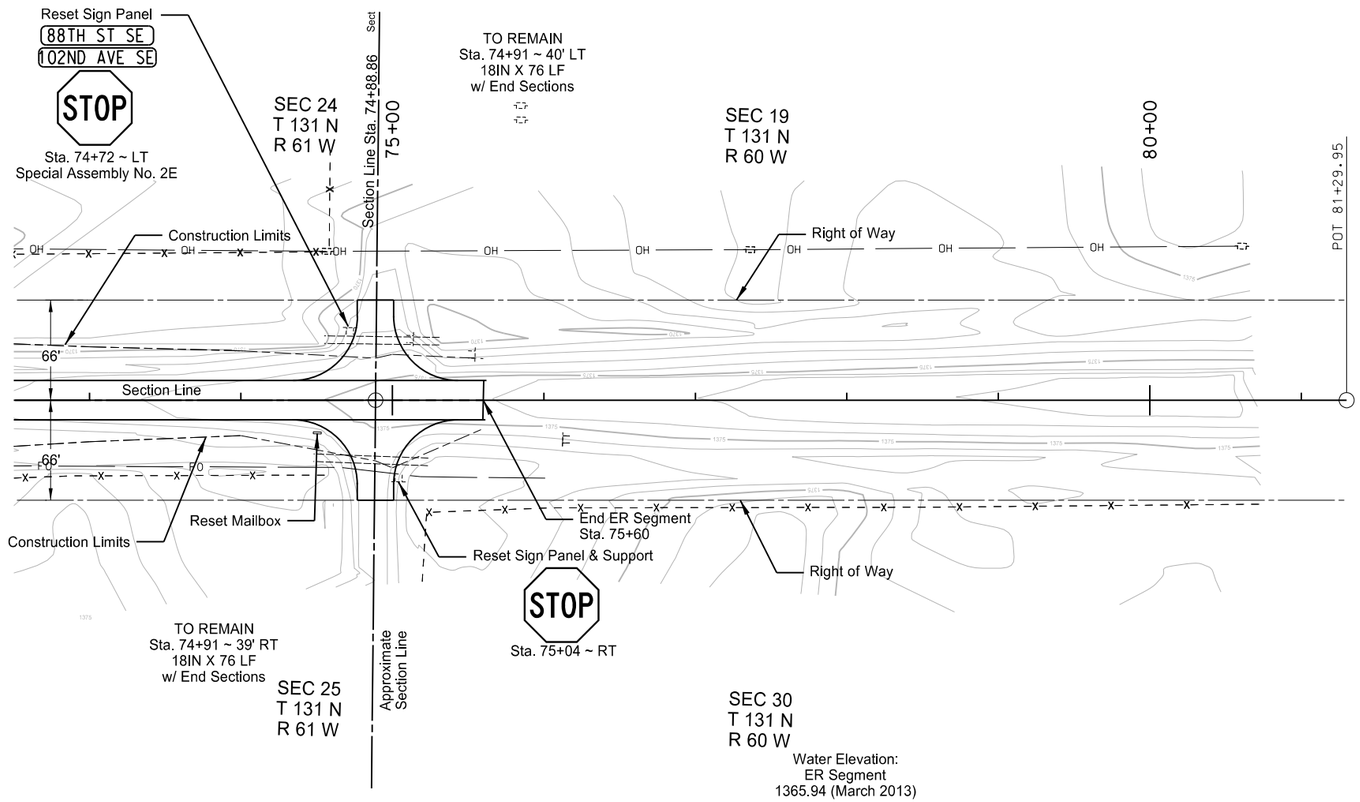
CER-SC-1112(064)
DICKEY COUNTY, NORTH DAKOTA

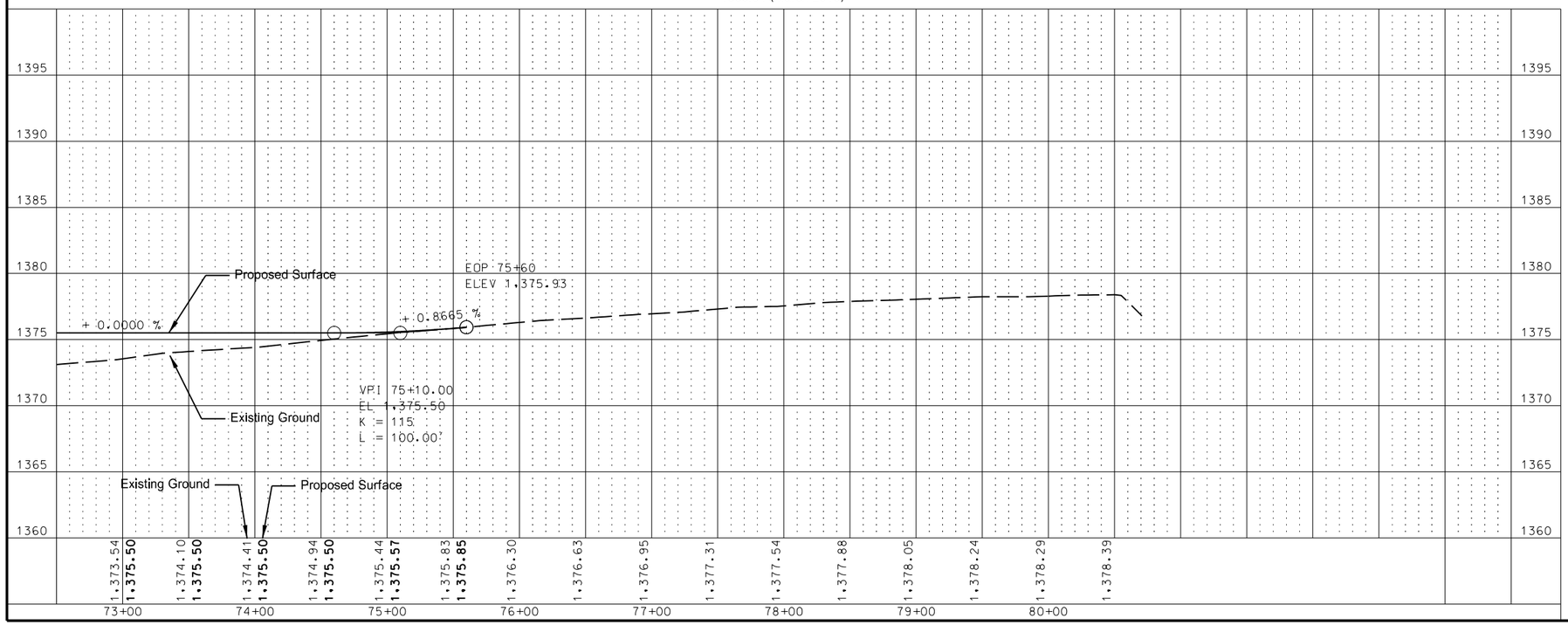
KLJ

PLAN AND PROFILE
STA 63+00 TO STA 73+00

DRWN. BY	CHK'D. BY	PROJECT NO.
AB	JK	5313100

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	CER-SC-1112(064)	60	7





STEEL GALV POSTS-TELESCOPING PERFORATED TUBE

STA 75+14 ~ LT	16.5 LF

RESET SIGN PANEL

STA 74+72 ~ LT	1 EA
STA 75+04 ~ RT	1 EA
STA 75+14 ~ LT	2 EA
	4 EA

RESET SIGN SUPPORT

STA 75+04 ~ RT	1 EA

RESET MAILBOX

STA 74+50 ~ RT	1 EA

GRAPHIC SCALE (in feet)
50 0 50 100
1" = 100'

N

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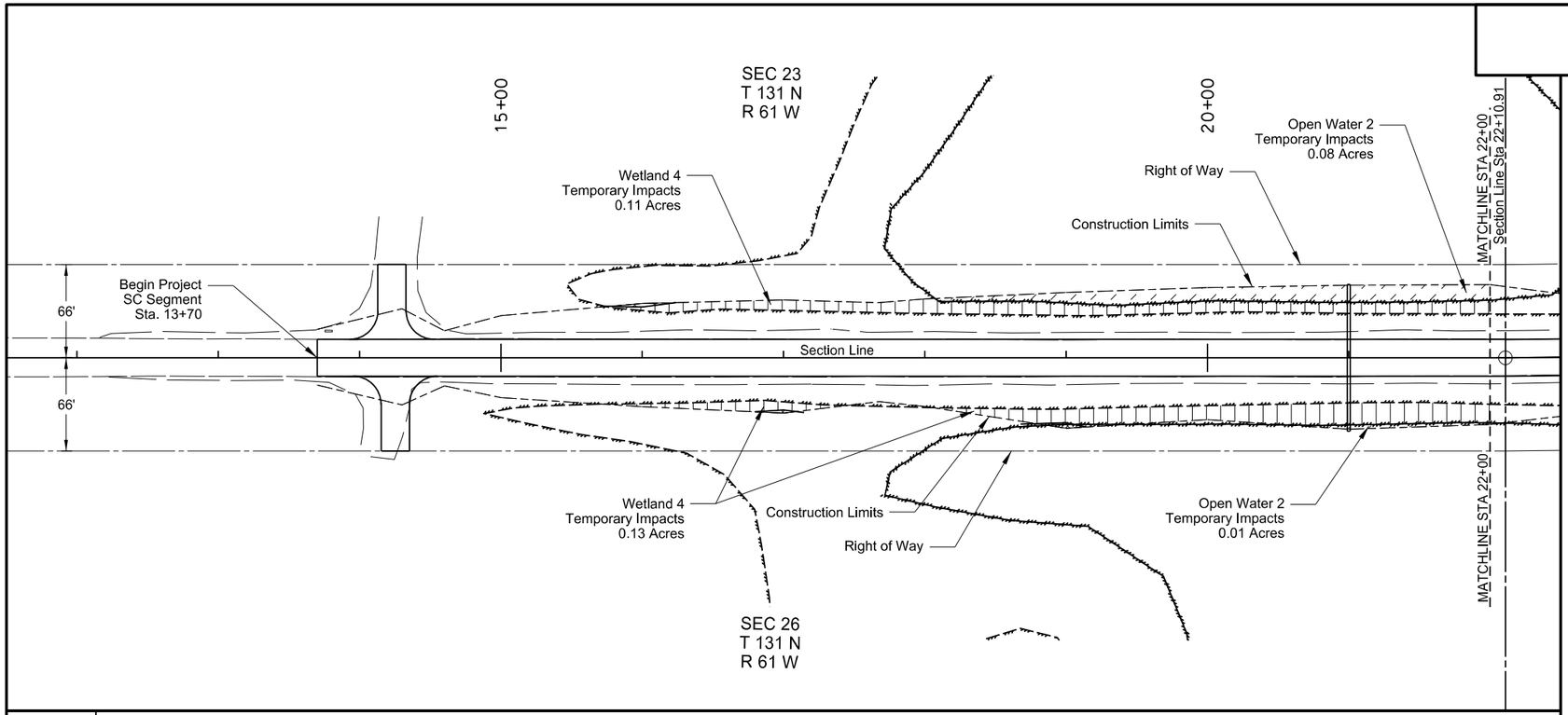
CER-SC-1112(064)
DICKEY COUNTY, NORTH DAKOTA

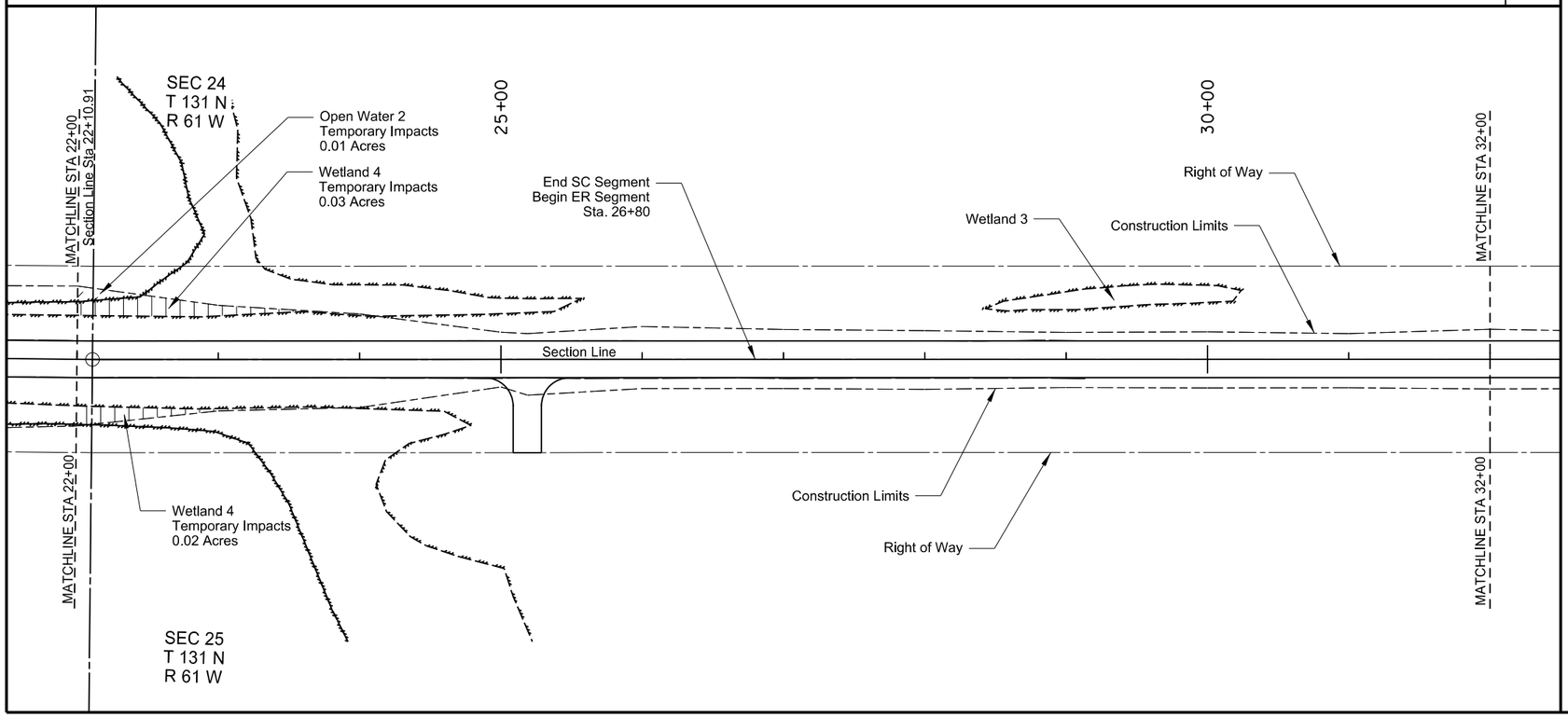
KLJ

PLAN AND PROFILE
STA 73+00 TO STA 75+60

DRWN. BY	CHK'D. BY	PROJECT NO.
AB	JK	5313100

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	CER-SC-1112(064)	75	1





USFWS EASEMENT IMPACT

TEMPORARY OPEN WATER IMPACT

PERMANENT OPEN WATER IMPACT

PERMANENT WETLAND IMPACT

TEMPORARY WETLAND IMPACT

DELINEATED WETLAND

GRAPHIC SCALE (in feet)
50 0 50 100
1" = 100'

N

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CER-SC-1112(064)
DICKEY COUNTY, NORTH DAKOTA

KLJ

WETLAND IMPACTS
STA 13+70 TO STA 32+00

DRWN. BY	CHK'D. BY	PROJECT NO.
JN	JL	5313100

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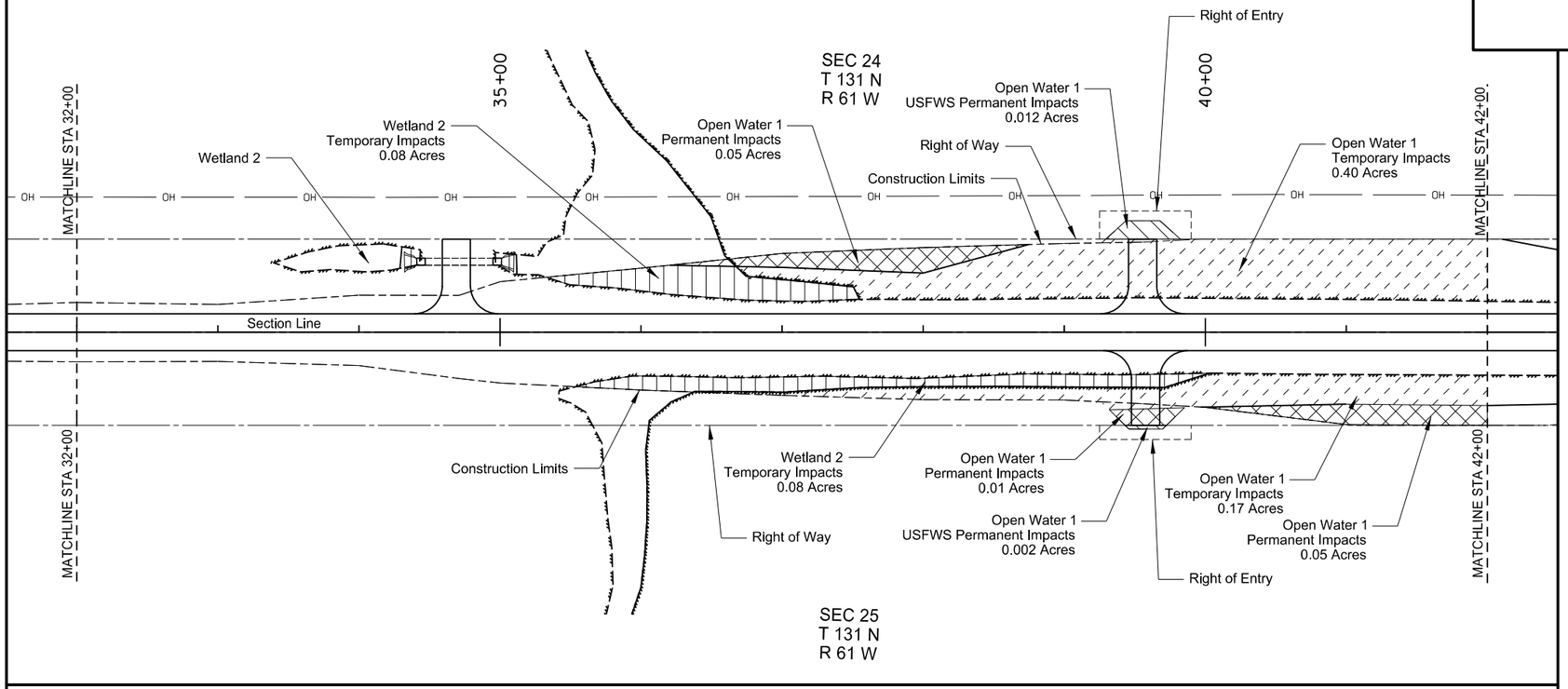
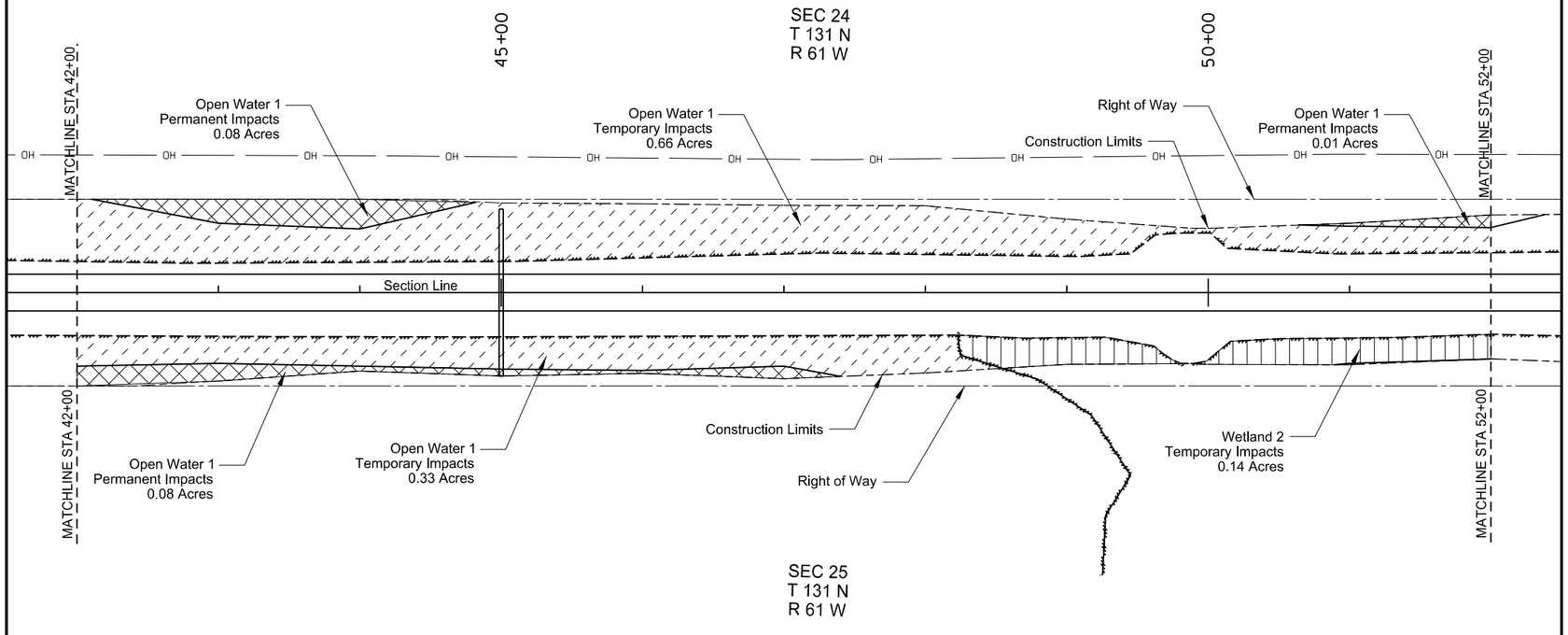
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	CER-SC-1112(064)	75	2





USFWS EASEMENT IMPACT

TEMPORARY OPEN WATER IMPACT

PERMANENT OPEN WATER IMPACT

PERMANENT WETLAND IMPACT

TEMPORARY WETLAND IMPACT

DELINEATED WETLAND

GRAPHIC SCALE (in feet)
50 0 50 100
1" = 100'

N

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CER-SC-1112(064)
DICKEY COUNTY, NORTH DAKOTA

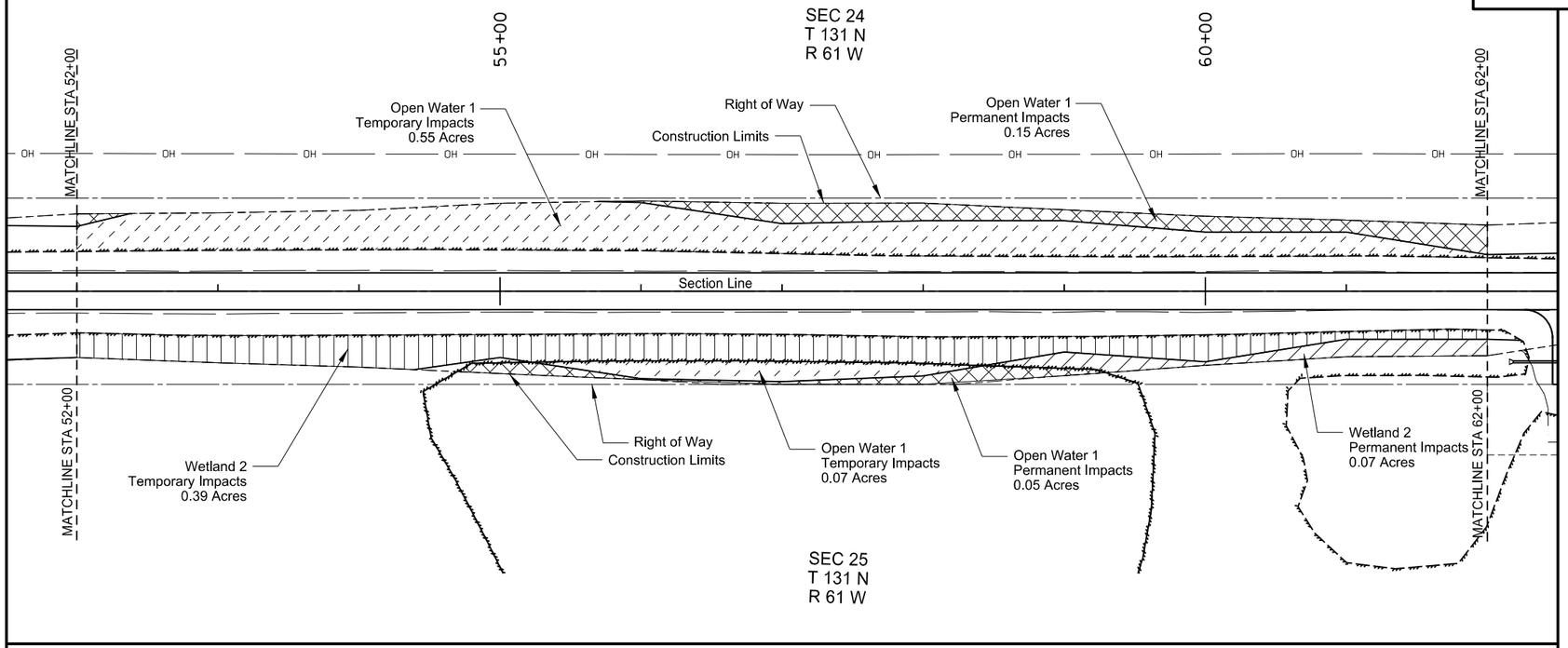
KLJ

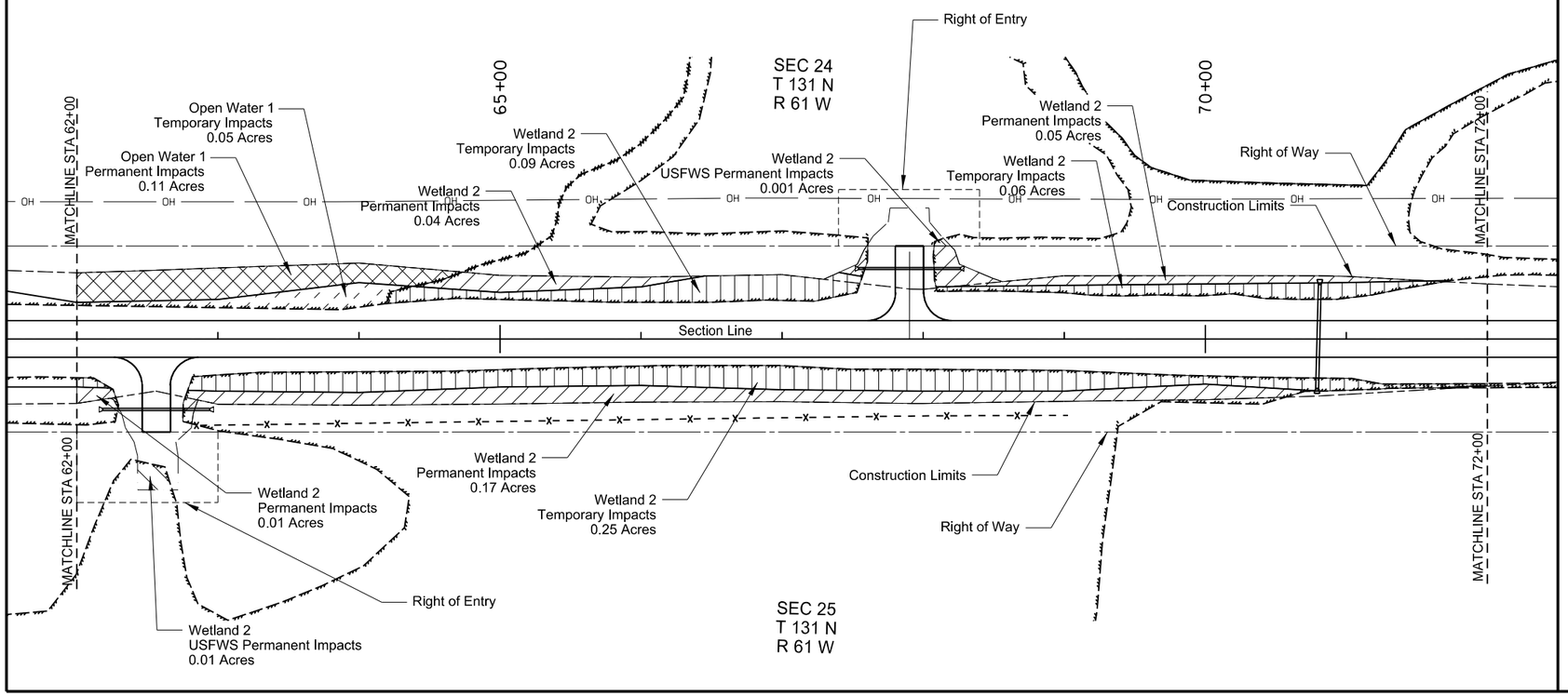
WETLAND IMPACTS STA 32+00 TO ST 52+00

DRWN. BY	CHK'D. BY	PROJECT NO.
JN	JL	5313100

8/30/2013 11:14:46 AM zachvlaminck J:\trans\5313100\Cadd\Design\Plans\5313100_075WL_002.dgn

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	CER-SC-1112(064)	75	3





USFWS EASEMENT IMPACT

TEMPORARY OPEN WATER IMPACT

PERMANENT OPEN WATER IMPACT

PERMANENT WETLAND IMPACT

TEMPORARY WETLAND IMPACT

DELINEATED WETLAND

GRAPHIC SCALE (in feet)
50 0 50 100
1" = 100'

N

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CER-SC-1112(064)
DICKEY COUNTY, NORTH DAKOTA

KLJ

WETLAND IMPACTS
STA 52+00 TO STA 72+00

DRWN. BY	CHK'D. BY	PROJECT NO.
JN	JL	5313100

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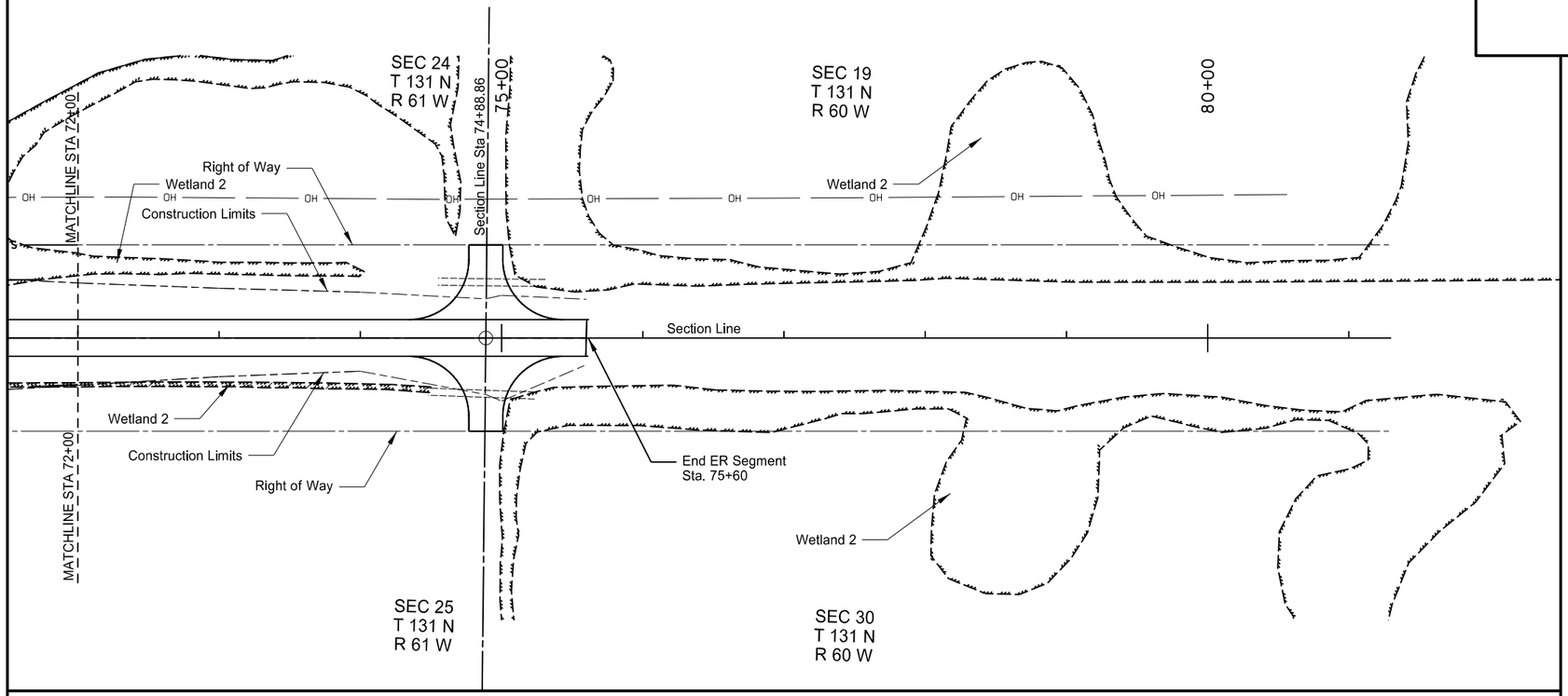
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	CER-SC-1112(064)	75	4



USFWS EASEMENT IMPACT

TEMPORARY OPEN WATER IMPACT

PERMANENT OPEN WATER IMPACT

PERMANENT WETLAND IMPACT

TEMPORARY WETLAND IMPACT

DELINEATED WETLAND

GRAPHIC SCALE (in feet)
50 0 50 100
1" = 100'

N

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CER-SC-1112(064)
DICKEY COUNTY, NORTH DAKOTA

KLJ

WETLAND IMPACTS
STA 72+00 TO STA 75+60

DRWN. BY	CHK'D. BY	PROJECT NO.
JN	JL	5313100

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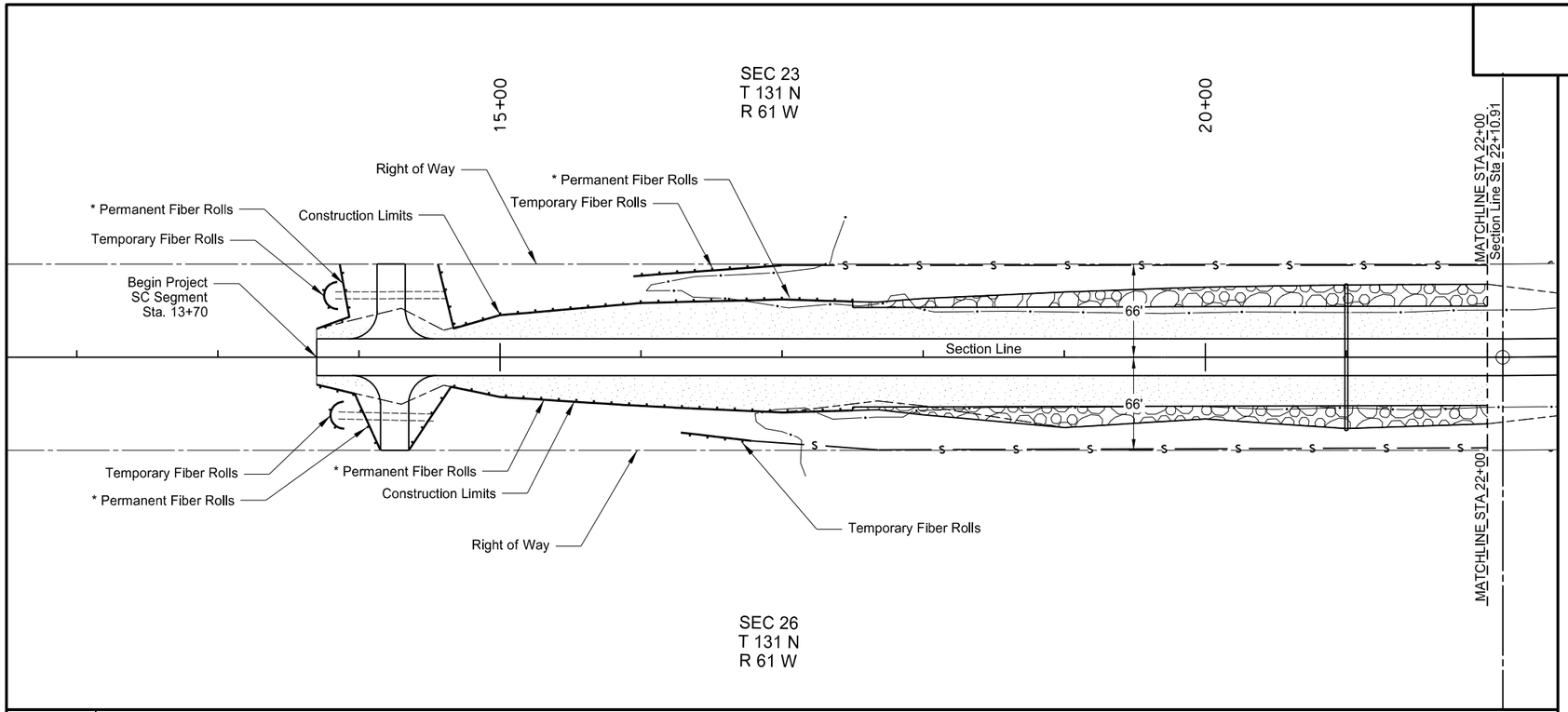
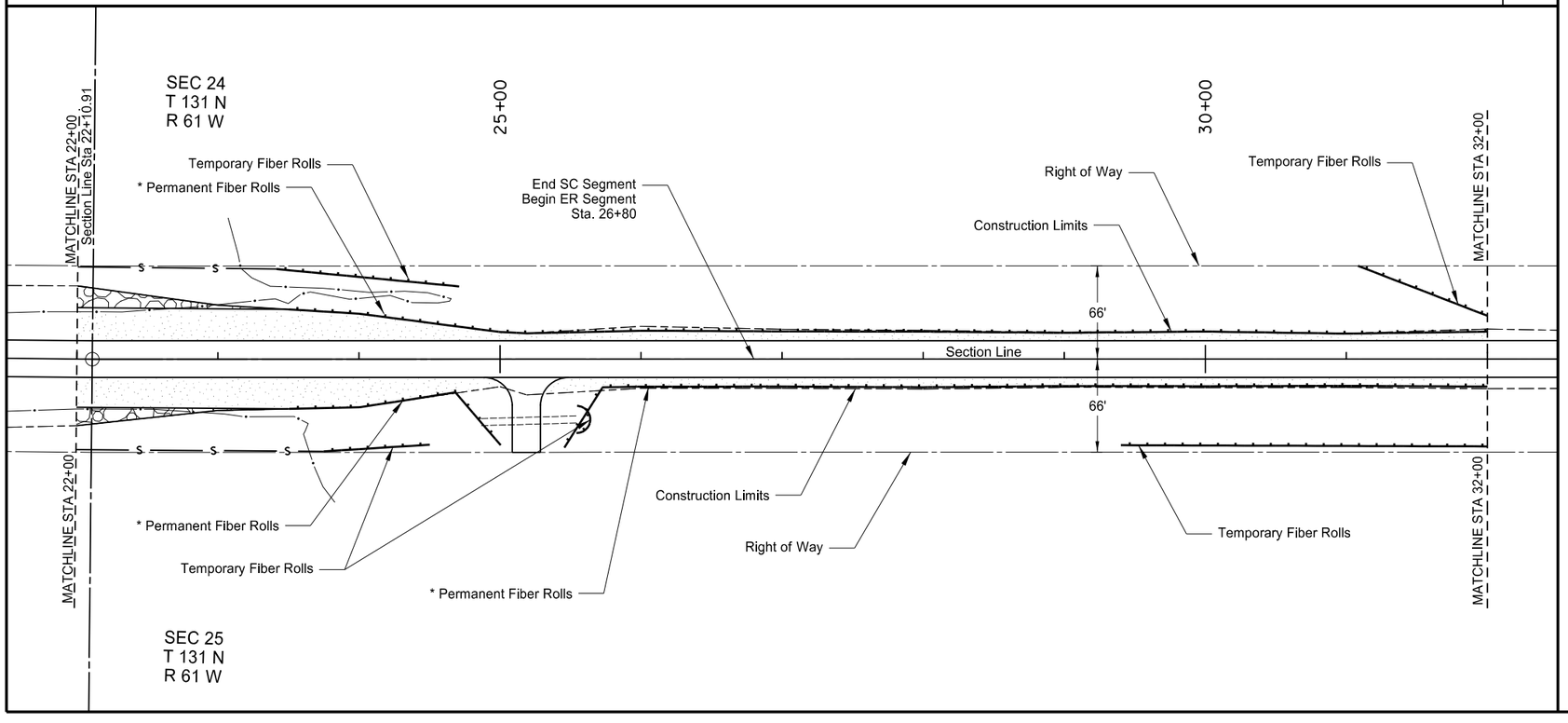
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	CER-SC-1112(064)	75	5





RIPRAP-LOOSE ROCK

STA 17+50 TO 23+50 ~ LT	542 CY
STA 17+50 TO 23+50 ~ RT	543 CY
	1,085 CY

FLOTATION SILT CURTAIN

STA 17+00 TO 23+40 ~ LT	640 LF
STA 16+80 TO 23+75 ~ RT	690 LF
	1,330 LF

FIBER ROLLS 12IN

STA 13+80 ~ LT	30 LF
STA 13+80 ~ RT	30 LF
STA 15+95 TO 17+00 ~ LT	105 LF
STA 16+30 TO 16+80 ~ RT	50 LF
STA 23+40 TO 24+70 ~ LT	130 LF
STA 23+75 TO 24+50 ~ RT	75 LF
STA 25+65 ~ RT	30 LF
STA 29+40 TO 32+00 ~ RT	260 LF
STA 31+10 TO 32+00 ~ LT	100 LF
	810 LF

*FIBER ROLLS 12IN

STA 13+70 TO STA 13+85 ~ LT	65 LF
STA 13+70 TO STA 14+15 ~ RT	70 LF
STA 14+35 TO STA 17+50 ~ RT	340 LF
STA 14+55 TO STA 17+50 ~ LT	330 LF
STA 23+50 TO STA 26+80 ~ LT	330 LF
STA 23+50 TO STA 25+00 ~ RT	170 LF
STA 25+45 TO STA 26+80 ~ RT	155 LF
STA 26+80 TO STA 32+00 ~ LT	520 LF
STA 26+80 TO STA 32+00 ~ RT	520 LF
	2,500 LF

**SEEDING-TYPE B-CL II

STA 13+70 TO 26+80 ~ LT	0.40 ACRE
STA 13+70 TO 26+80 ~ RT	0.38 ACRE
STA 26+80 TO 32+00 ~ LT	0.07 ACRE
STA 26+80 TO 32+00 ~ RT	0.07 ACRE
	0.92 ACRE

**MULCHING

STA 13+70 TO 26+80 ~ LT	0.40 ACRE
STA 13+70 TO 26+80 ~ RT	0.38 ACRE
STA 26+80 TO 32+00 ~ LT	0.07 ACRE
STA 26+80 TO 32+00 ~ RT	0.07 ACRE
	0.92 ACRE

* Note: Permanent fiber rolls to be placed at toe of slope/construction limits after seeding and mulching operations. Engineer may vary permanent fiber roll locations based on field conditions.

**Note: 0.60 acres have been included in the total quantity to seed and mulch the topsoil stockpile area.

RIPRAP-LOOSE ROCK

SEEDING-TYPE B-CL II & MULCHING

S FLOTATION SILT CURTAIN

FIBER ROLLS 12IN

GRAPHIC SCALE (in feet)
50 0 50 100
1" =100'

N

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CER-SC-1112(064)
DICKEY COUNTY, NORTH DAKOTA

KLJ

EROSION CONTROL
STA 13+70 TO STA 32+00

DRWN. BY	CHK'D. BY	PROJECT NO.
JN	JL	5313100

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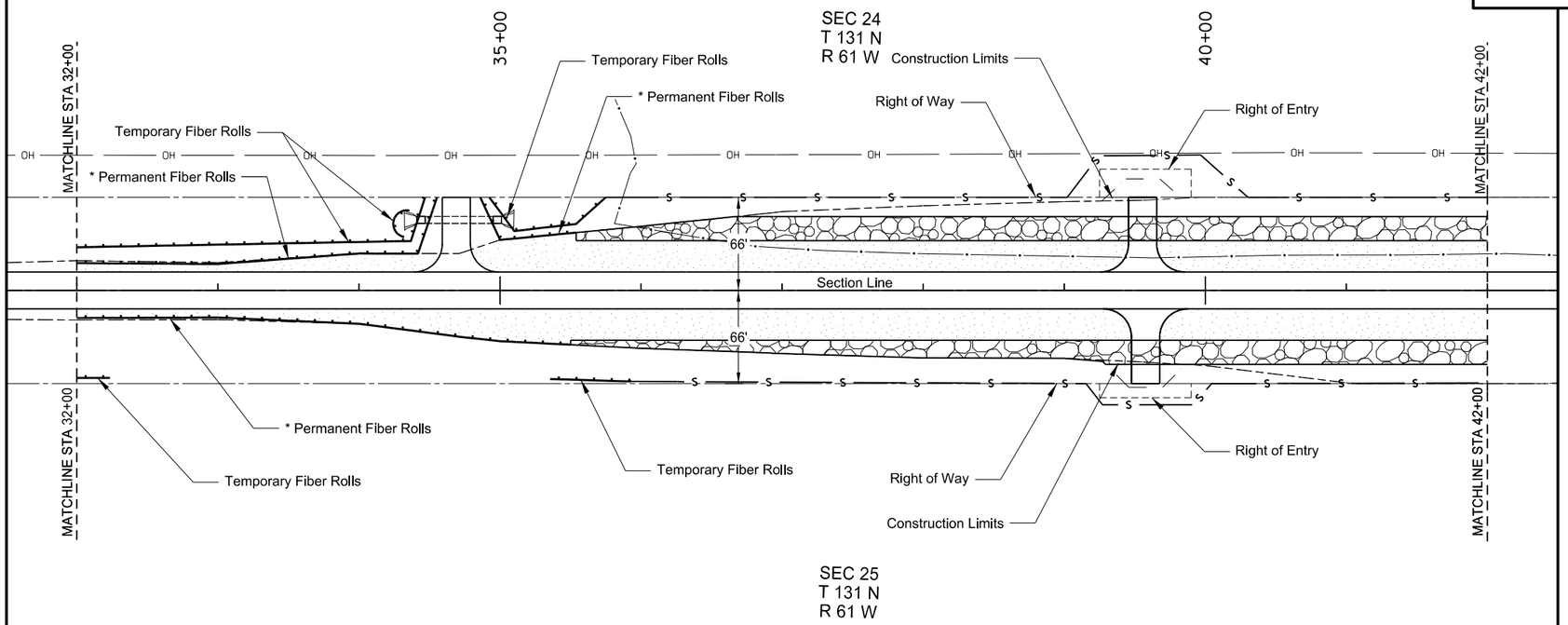
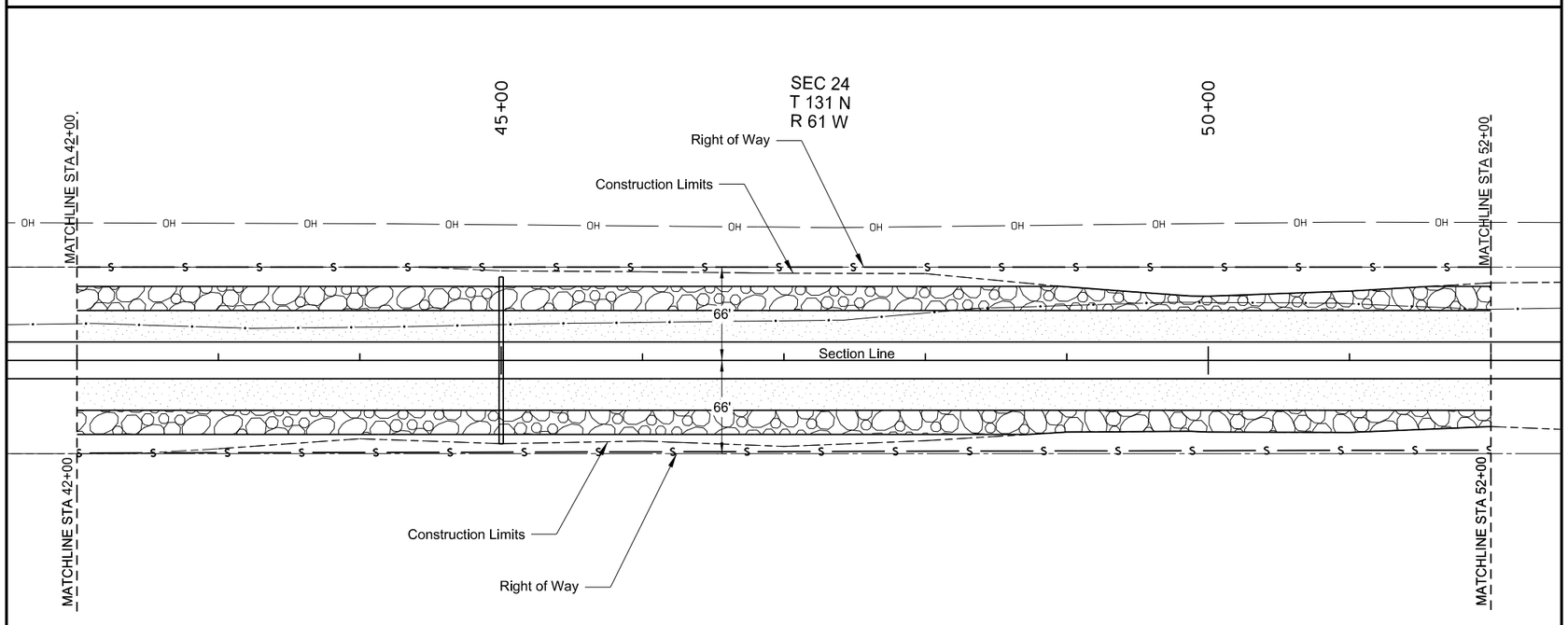
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	CER-SC-1112(064)	75	6





RIPRAP-LOOSE ROCK

STA 35+50 TO 52+00 ~ LT	1,925 CY
STA 35+50 TO 52+00 ~ RT	1,925 CY
	3,850 CY

FLOTATION SILT CURTAIN

STA 35+75 TO 52+00 ~ LT	1,650 LF
STA 35+95 TO 52+00 ~ RT	1,625 LF
	3,275 LF

FIBER ROLLS 12IN

STA 32+00 TO 34+45 ~ LT	270 LF
STA 32+00 TO 32+25 ~ RT	25 LF
STA 34+25 ~ LT	30 LF
STA 34+90 TO 35+75 ~ LT	100 LF
STA 35+35 TO 35+95 ~ RT	60 LF
	485 LF

*FIBER ROLLS 12IN

STA 32+00 TO 34+55 ~ LT	285 LF
STA 32+00 TO 35+50 ~ RT	350 LF
STA 34+85 TO 35+50 ~ LT	90 LF
	725 LF

**SEEDING-TYPE B-CL II

STA 32+00 TO 52+00 ~ LT	0.78 ACRE
STA 32+00 TO 52+00 ~ RT	0.78 ACRE
	1.56 ACRE

**MULCHING

STA 32+00 TO 52+00 ~ LT	0.78 ACRE
STA 32+00 TO 52+00 ~ RT	0.78 ACRE
	1.56 ACRE

* Note: Permanent fiber rolls to be placed at toe of slope/construction limits after seeding and mulching operations. Engineer may vary permanent fiber roll locations based on field conditions.

**Note: 0.60 acres have been included in the total quantity to seed and mulch the topsoil stockpile area.

RIPRAP-LOOSE ROCK

SEEDING-TYPE B-CL II & MULCHING

S — FLOTATION SILT CURTAIN

FIBER ROLLS 12IN

GRAPHIC SCALE (in feet)
50 0 50 100
1" =100'

N

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CER-SC-1112(064)
DICKEY COUNTY, NORTH DAKOTA

KLJ

EROSION CONTROL
STA 32+00 TO STA 52+00

DRWN. BY	CHK'D. BY	PROJECT NO.
JN	JL	5313100

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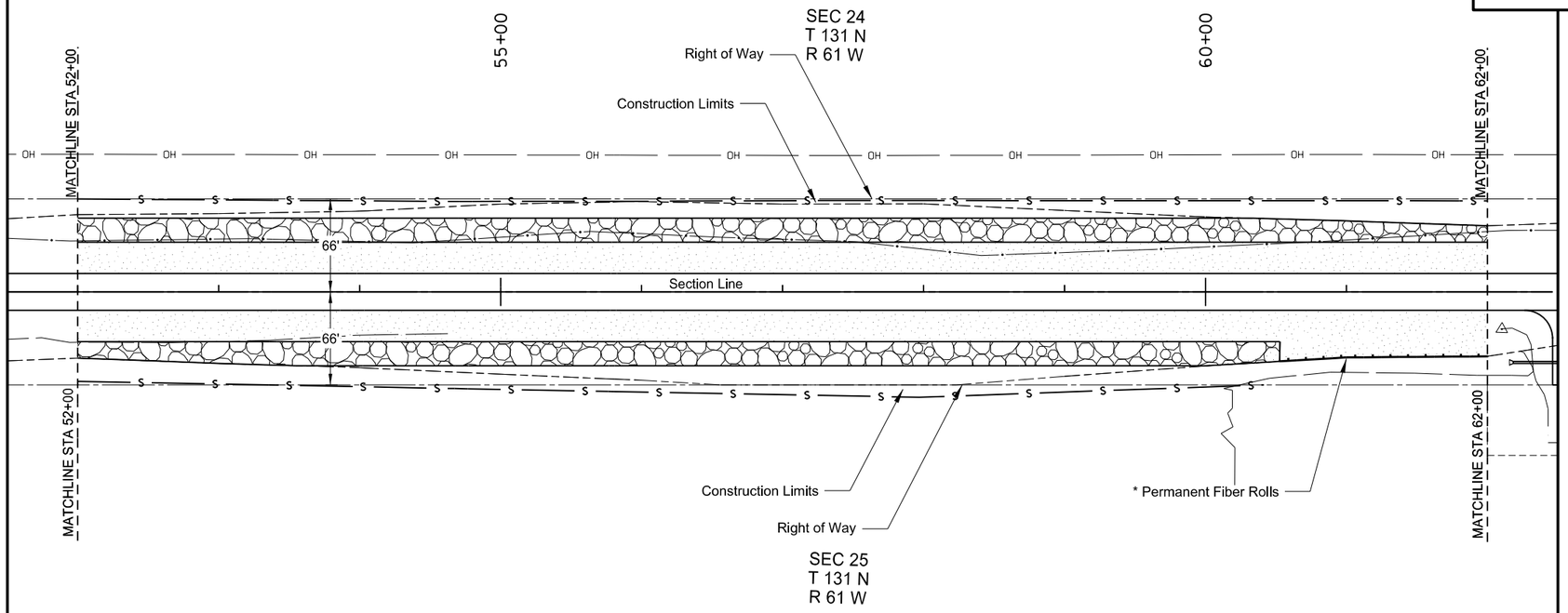
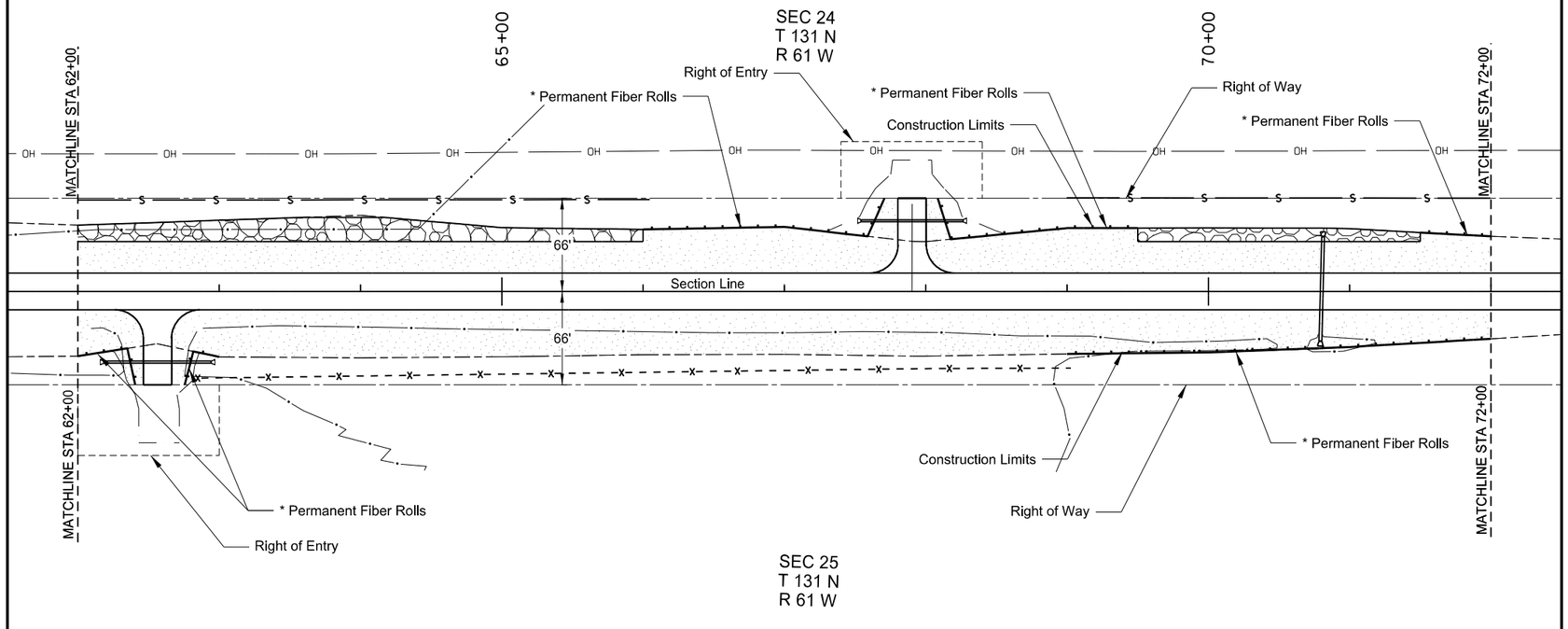
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	CER-SC-1112(064)	75	7





RIPRAP-LOOSE ROCK

STA 52+00 TO 66+00 ~ LT	1,600 CY
STA 52+00 TO 60+50 ~ RT	930 CY
STA 69+50 TO 71+50 ~ LT	200 CY
	2,730 CY

SILT FENCE SUPPORTED

STA 62+80 TO 69+00 ~ RT	620 LF

FLOTATION SILT CURTAIN

STA 52+00 TO 66+00 ~ LT	1,400 LF
STA 52+00 TO 60+40 ~ RT	840 LF
STA 69+00 TO 72+00 ~ LT	300 LF
	2,540 LF

*FIBER ROLLS 12IN

STA 60+50 TO 62+40 ~ RT	190 LF
STA 62+75 TO 63+00 ~ RT	45 LF
STA 66+00 TO 67+70 ~ LT	190 LF
STA 68+10 TO 69+50 ~ LT	165 LF
STA 69+00 TO 72+00 ~ RT	300 LF
STA 71+50 TO 72+00 ~ LT	50 LF
	940 LF

**SEEDING-TYPE B-CL II

STA 52+00 TO 72+00 ~ LT	0.95 ACRE
STA 52+00 TO 72+00 ~ RT	0.96 ACRE
	1.91 ACRE

**MULCHING

STA 52+00 TO 72+00 ~ LT	0.95 ACRE
STA 52+00 TO 72+00 ~ RT	0.96 ACRE
	1.91 ACRE

* Note: Permanent fiber rolls to be placed at toe of slope/construction limits after seeding and mulching operations. Engineer may vary permanent fiber roll locations based on field conditions.

**Note: 0.60 acres have been included in the total quantity to seed and mulch the topsoil stockpile area.

RIPRAP-LOOSE ROCK

SEEDING-TYPE B-CL II & MULCHING

S FLOTATION SILT CURTAIN

FIBER ROLLS 12IN

x- - - -x- SILT FENCE SUPPORTED

GRAPHIC SCALE (in feet)
50 0 50 100
1" =100'

N

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CER-SC-1112(064)
DICKEY COUNTY, NORTH DAKOTA

KLJ

EROSION CONTROL
STA 52+00 TO STA 72+00

DRWN. BY	CHK'D. BY	PROJECT NO.
JN	JL	5313100

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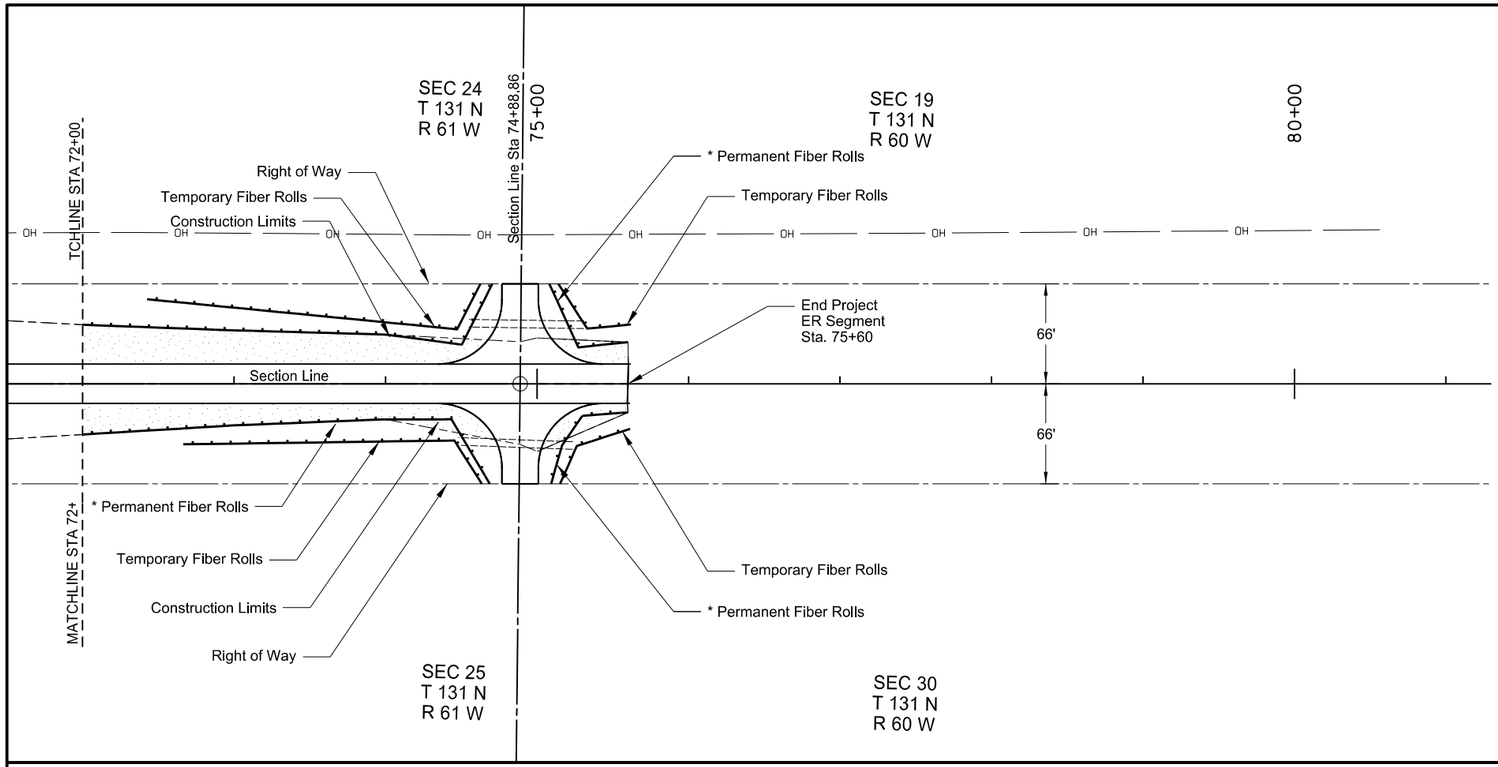

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	CER-SC-1112(064)	75	8

FIBER ROLLS 12IN	
STA 72+40 TO 74+65 ~ LT	240 LF
STA 72+65 TO 74+65 ~ RT	215 LF
STA 75+15 TO 75+60 ~ LT	65 LF
STA 75+15 TO 75+60 ~ RT	65 LF
	585 LF

*FIBER ROLLS 12IN	
STA 72+00 TO 74+70 ~ LT	295 LF
STA 72+00 TO 74+70 ~ RT	295 LF
STA 75+10 TO 75+60 ~ LT	80 LF
STA 75+10 TO 75+60 ~ RT	80 LF
	750 LF

**SEEDING-TYPE B-CL II	
STA 72+00 TO 75+60 ~ LT	0.11 ACRE
STA 72+00 TO 75+60 ~ RT	0.07 ACRE
	0.18 ACRE

**MULCHING	
STA 72+00 TO 75+60 ~ LT	0.11 ACRE
STA 72+00 TO 75+60 ~ RT	0.07 ACRE
	0.18 ACRE

* Note: Permanent fiber rolls to be placed at toe of slope/construction limits after seeding and mulching operations. Engineer may vary permanent fiber roll locations based on field conditions.

**Note: 0.60 acres have been included in the total quantity to seed and mulch the topsoil stockpile area.

RIPRAP-LOOSE ROCK

SEEDING-TYPE B-CL II & MULCHING

FLOTATION SILT CURTAIN

FIBER ROLLS 12IN

GRAPHIC SCALE (in feet)
50 0 50 100
1" =100'

N

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CER-SC-1112(064)
DICKEY COUNTY, NORTH DAKOTA

KLJ

EROSION CONTROL
STA 72+00 TO STA 75+60

DRWN. BY	CHK'D. BY	PROJECT NO.
JN	JL	5313100

PRELIMINARY SURVEY COORDINATE AND CURVE DATA - CER-SC-1112(064)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	CER-SC-1112(064)	81	1

HORIZONTAL ALIGNMENT

PNT	STATION	NORTHING	EASTING
POT	10+00	180,151.754	2,531,044.049
BOP SC	13+70	180,156.992	2,531,414.012
PI	22+10.91	180,168.897	2,532,254.841
EOP SC	26+80	180,180.355	2,532,723.787
BOP ER	26+80	180,180.355	2,532,723.787
EOP ER	75+60	180,299.556	2,537,602.331
POT	81+29.95	180,313.477	2,538,172.110

CURVE DATA

ARC DEFINITION

US PUBLIC LAND SURVEY DATA

DESC.	SEC-TWP-RGE	NORTHING	EASTING
SW Sec	Sec 19 T-131-N R-60-W	180,297.818	2,537,531.211
SW Sec	Sec 24 T-131-N R-61-W	180,168.897	2,532,254.841

SURVEY CONTROL POINTS

PNT	NORTHING	EASTING	ELEV	STA	OFFSET	CONTROL POINT DESCRIPTION
GPS 1	180,338.538	2,541,071.067	1,398.541	-	-	
RTK 6	180,099.857	2,532,536.491	1,373.852	24+90.79	75.90' RT	

NOTES:

Date Survey Completed 3/4/2013 and 5/13/2013

☐ Assumed Coordinates

☒ All coordinates on this sheet are North Dakota State Plane Coordinates.
They are derived from the "North Dakota Coordinate System of 1983", NAD83(CORS96), South Zone

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

INITIALIZING BENCH MARK OPUS

☒ NAVD-88 GEOID 09
☐ NGVD-29

☒ ENGLISH UNITS
☐ METRIC UNITS

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CER-SC-1112(064)
DICKEY COUNTY, NORTH DAKOTA

KLJ

SURVEY COORDINATE AND CURVE DATA

DRWN. BY	CHK'D. BY	PROJECT NO.
TO	JL	5313100

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	CER-SC-1112(064)	100	1

SIGN NUMBER	SIGN SIZE	DESCRIPTION	SC SEGMENT	ER SEGMENT	UNITS PER AMOUNT	UNITS SUB-TOTAL
D3-36	36"x6"	STREET NAME SIGN (Sign and installation only)	-	-	6	-
G20-1a-60	60"x24"	ROAD WORK NEXT __ MILES	1	1	34	68
G20-1b-60	60"x24"	WORK IN PROGRESS/ NO WORK IN PROGRESS (Sign and installation only)	-	-	26	-
G20-2a-48	48"x24"	END ROAD WORK	1	1	19	38
G20-4-36	36"x18"	PILOT CAR FOLLOW ME	-	1	18	18
G20-10-108	108"x48"	CONTRACTOR SIGN	-	-	64	-
G20-50a-72	72"x36"	ROAD WORK NEXT __ MILES RT & LT ARROWS	-	-	37	-
G20-52a-72	72"x24"	ROAD WORK NEXT __ MILES RT or LT ARROW	-	-	30	-
G20-55-96	96"x48"	SPEED LIMIT ENFORCED - MINIMUM FEE $80 WHEN WORKERS PRESENT	-	-	59	-
M1-1-36	36"x36"	ROUTE MARKER (Post and installation only)	-	-	10	-
M1-4-24	24"x24"	ROUTE MARKER (Post and installation only)	-	-	10	-
M1-5-24	24"x24"	ROUTE MARKER (Post and installation only)	-	-	10	-
M3-1-24	24"x12"	NORTH (Mounted on route marker post)	-	-	7	-
M3-2-24	24"x12"	EAST (Mounted on route marker post)	-	-	7	-
M3-3-24	24"x12"	SOUTH (Mounted on route marker post)	-	-	7	-
M3-4-24	24"x12"	WEST (Mounted on route marker post)	-	-	7	-
M4-8-24	24"x12"	DETOUR (Mounted on route marker post)	-	-	7	-
M4-9-30	30"x24"	DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT	-	-	15	-
M4-10-48	48"x18"	DETOUR ARROW RIGHT or LEFT	-	-	23	-
M5-1-21	21"x15"	ARROW AHD AND RT or LT(Mounted on route marker post)	-	-	7	-
M5-2-21	21"x15"	ARROW AHD UP & RT or LT (Mounted on route marker post)	-	-	7	-
M6-1-21	21"x15"	ARROW RT or LT (Mounted on route marker post)	-	-	7	-
M6-2-21	21"x15"	ARROW UP & RT or LT (Mounted on route marker post)	-	-	7	-
M6-3-21	21"x15"	ARROW AHD (Mounted on route marker post)	-	-	7	-
R1-1-48	48"x48"	STOP	-	-	32	-
R1-1a-18	18"x18"	STOP and SLOW PADDLE Back to Back	1	1	5	10
R1-2-60	60"x60"	YIELD	-	-	29	-
R2-1-48	48"x60"	SPEED LIMIT __	2	2	39	156
R2-1a-24	24"x18"	MINIMUM FEE $80 (Mounted on Speed Limit post)	-	-	10	-
R3-7-48	48"x48"	LEFT or RIGHT LANE MUST TURN LEFT or RIGHT	-	-	35	-
R4-1-48	48"x60"	DO NOT PASS	1	1	39	78
R4-7-48	48"x60"	KEEP RIGHT SYMBOL	-	-	39	-
R5-1-48	48"x48"	DO NOT ENTER	-	-	35	-
R6-1-36	36"x12"	ONE WAY RIGHT or LEFT	-	-	13	-
R7-1-12	12"x18"	NO PARKING	-	-	11	-
R10-6-24	24"x36"	STOP HERE ON RED	-	-	16	-
R11-2-48	48"x30"	ROAD CLOSED	1	1	28	56
R11-2a-48	48"x30"	STREET CLOSED	-	-	28	-
R11-3a-60	60"x30"	ROAD CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY	1	1	31	62
R11-3c-60	60"x30"	STREET CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY	-	-	31	-
R11-4a-60	60"x30"	STREET CLOSED TO THRU TRAFFIC	-	-	31	-
W1-3-48	48"x48"	RIGHT or LEFT SHARP REVERSE CURVE ARROW	-	-	35	-
W1-4-48	48"x48"	RIGHT or LEFT REVERSE CURVE ARROW	-	-	35	-
W1-4b-48	48"x48"	DOUBLE RIGHT or LEFT REVERSE CURVE ARROW	-	-	35	-
W1-6-48	48"x24"	LARGE ARROW	-	-	26	-
W3-1a-48	48"x48"	STOP AHEAD SYMBOL	-	-	35	-
W3-3-48	48"x48"	SIGNAL AHEAD SYMBOL	1	1	35	70
W3-4-48	48"x48"	BE PREPARED TO STOP	1	1	35	70
W3-5-48	48"x48"	SPEED REDUCTION AHEAD	1	1	35	70
W4-2-48	48"x48"	RIGHT or LEFT LANE TRANSITION SYMBOL	-	-	35	-
W5-1-48	48"x48"	ROAD NARROWS	-	-	35	-
W5-8-48	48"x48"	THRU TRAFFIC RIGHT LANE	-	-	35	-
W5-9-48	48"x48"	ROAD WORK TRAFFIC ONLY DOWN & LT or RT ARROW	-	-	35	-
W6-3-48	48"x48"	TWO WAY TRAFFIC SYMBOL	-	-	35	-
W8-1-48	48"x48"	BUMP	1	1	35	70
W8-3-48	48"x48"	PAVEMENT ENDS	1	1	35	70
W8-7-48	48"x48"	LOOSE GRAVEL	-	-	35	-
W8-9a-48	48"x48"	SHOULDER DROP-OFF	-	-	35	-
W8-11-48	48"x48"	UNEVEN LANES	1	1	35	70
W8-12-48	48"x48"	NO CENTER STRIPE	-	-	35	-
W8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY	1	1	35	70
W8-54-48	48"x48"	TRUCKS ENTERING AHEAD or __ FT.	-	-	35	-
W8-55-48	48"x48"	TRUCKS CROSSING AHEAD or __ FT.	-	-	35	-
W8-56-48	48"x48"	TRUCKS EXITING HIGHWAY	-	-	35	-
W9-3a-48	48"x48"	CENTER LANE CLOSED SYMBOL	-	-	35	-
W12-2-48	48"x48"	LOW CLEARANCE SYMBOL	-	-	35	-
W13-1-24	24"x24"	__ MPH ADVISORY SPEED PLATE (Mounted on warning sign post)	-	-	11	-
W13-4-48	48"x60"	RAMP ARROW	-	-	39	-
W14-3-48	48"x36"	NO PASSING ZONE	-	-	23	-
W20-1-48	48"x48"	ROAD WORK AHEAD or _FT or _ MILE	2	2	35	140
W20-2-48	48"x48"	DETOUR AHEAD or __ FT	-	-	35	-
W20-3-48	48"x48"	ROAD or STREET CLOSED AHEAD or __ FT.	-	-	35	-
W20-4-48	48"x48"	ONE LANE ROAD AHEAD or __ FT.	1	1	35	70
W20-5-48	48"x48"	RIGHT or LEFT LANE CLOSED AHEAD or __ FT.	-	-	35	-
W20-7a-48	48"x48"	FLAGGING SYMBOL	1	1	35	70

SIGN NUMBER	SIGN SIZE	DESCRIPTION	SC FUNDS	ER FUNDS	UNITS PER AMOUNT	UNITS SUB-TOTAL
W20-7k-24	24"x18"	__ FEET (Mounted on warnlng slgn post)	1	1	10	20
W20-8-48	48"x48"	STREET CLOSED	-	-	35	-
W20-51-48	48"x48"	EQUIPMENT WORKING	-	-	35	-
W20-52-54	54"x12"	NEXT __ MILES (Mounted on warning sign post)	1	1	12	24
W21-1a-48	48"x48"	MEN WORKING SYMBOL	-	-	35	-
W21-2-48	48"x48"	FRESH OIL	1	1	35	70
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or __ FT	-	-	35	-
W21-5-48	48"x48"	SHOULDER WORK	1	1	35	70
W21-5a-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED	-	-	35	-
W21-5b-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED AHEAD or __ FT.	-	-	35	-
W21-6a-48	48"x48"	SURVEY CREW AHEAD	-	-	35	-
W21-50-48	48"x48"	BRIDGE PAINTING AHEAD or __ FT.	-	-	35	-
W21-51-48	48"x48"	MATERIAL ON ROADWAY	-	-	35	-
W22-8-48	48"x48"	FRESH OIL LOOSE ROCK	-	-	35	-
R9-9-12	24"x12"	SIDEWALK CLOSED	-	-	12	-

SPEC & CODE

	SC SEGMENT	UNITS	711
	ER SEGMENT	UNITS	729
704-1000	TRAFFIC CONTROL SIGNS	TOTAL UNITS	1,440

SPEC & CODE	DESCRIPTION	UNIT	SC SEGMENT	ER SEGMENT
704-0100	FLAGGING	MHR	110	320
704-1041	ATTENUATION DEVICE-TYPE B-55	EACH		
704-1043	ATTENUATION DEVICE-TYPE B-65	EACH		
704-1044	ATTENUATION DEVICE-TYPE B-70	EACH		
704-1050	TYPE I BARRICADES	EACH		
704-1051	TYPE II BARRICADES	EACH		
704-1052	TYPE III BARRICADES	EACH	7	7
704-1060	DELINEATOR DRUMS	EACH		
704-1065	TRAFFIC CONES	EACH		
704-1067	TUBULAR MARKERS	EACH	26	99
704-1070	DELINEATOR	EACH		
704-1080	STACKABLE VERTICAL PANELS	EACH	52	198
704-1081	VERTICAL PANELS - BACK TO BACK	EACH		
704-1085	SEQUENCING ARROW PANEL - TYPE A	EACH		
704-1086	SEQUENCING ARROW PANEL - TYPE B	EACH		
704-1087	SEQUENCING ARROW PANEL - TYPE C	EACH		
704-1088	SEQUENCING ARROW PANEL - TYPE C - CROSSOVER	EACH		
704-1095	TYPE B FLASHERS	EACH		
704-1185	PILOT CAR	HR	55	160
704-3501	PORTABLE PRECAST CONCRETE MED BARRIER	EACH		
704-3510	PRECAST CONCRETE MED BARRIER - STATE FURNISHED	EACH		
762-0200	RAISED PAVEMENT MARKERS	EACH		
762-0420	SHORT TERM 4IN LINE-TYPE R	LF		
762-0430	SHORT TERM 4IN LINE-TYPE NR	LF	2,085	6,540
762-1500	OBLITERATION OF PVMT MK	SF		
772-2110	FLASHING BEACON - POST MOUNTED	EACH		

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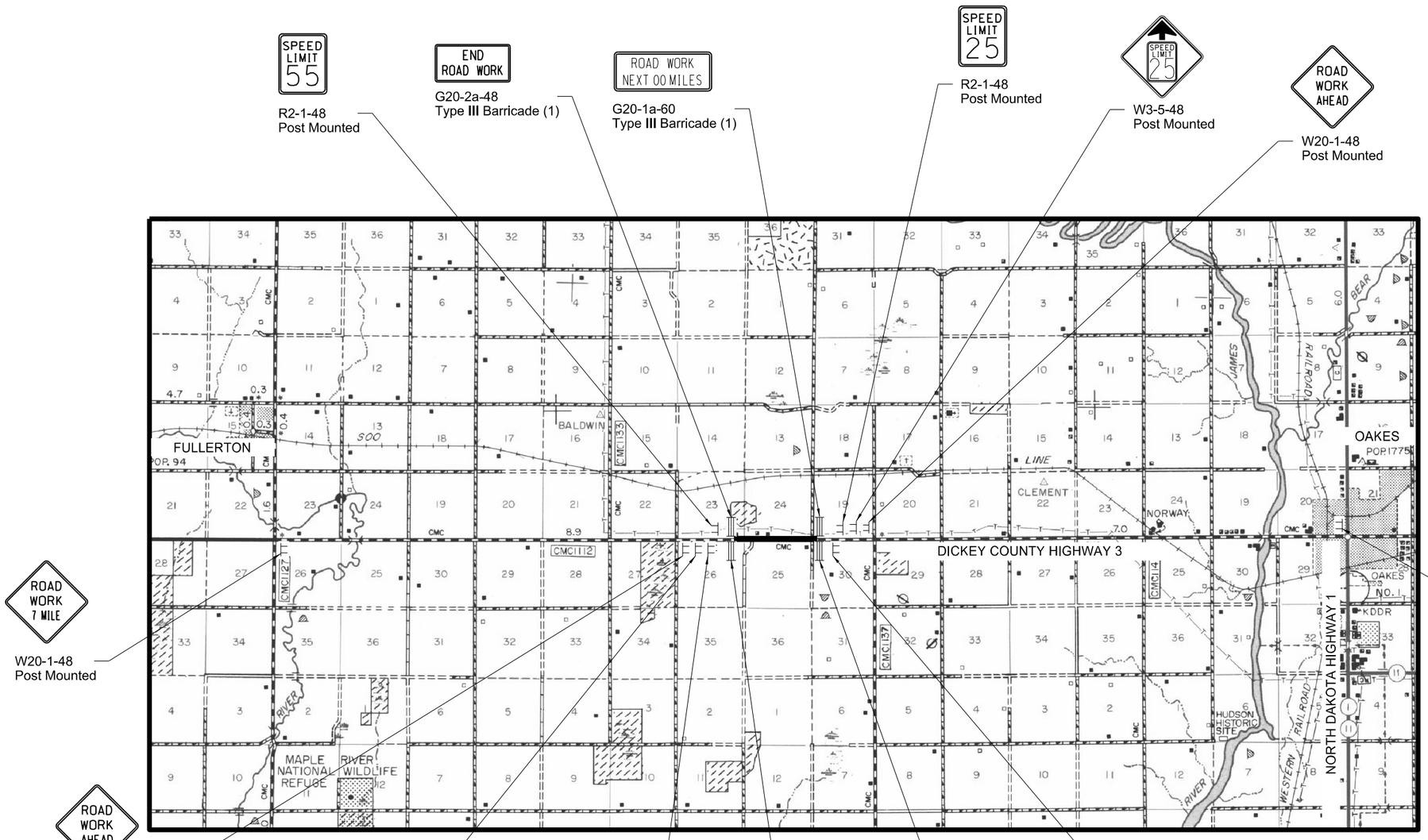
CER-SC-1112(064)
DICKEY COUNTY, NORTH DAKOTA

KLJ

TRAFFIC CONTROL DEVICES LIST

DRWN. BY	CHK'D. BY	PROJECT NO.
AM	JL	5313100

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	CER-SC-1112(064)	100	2



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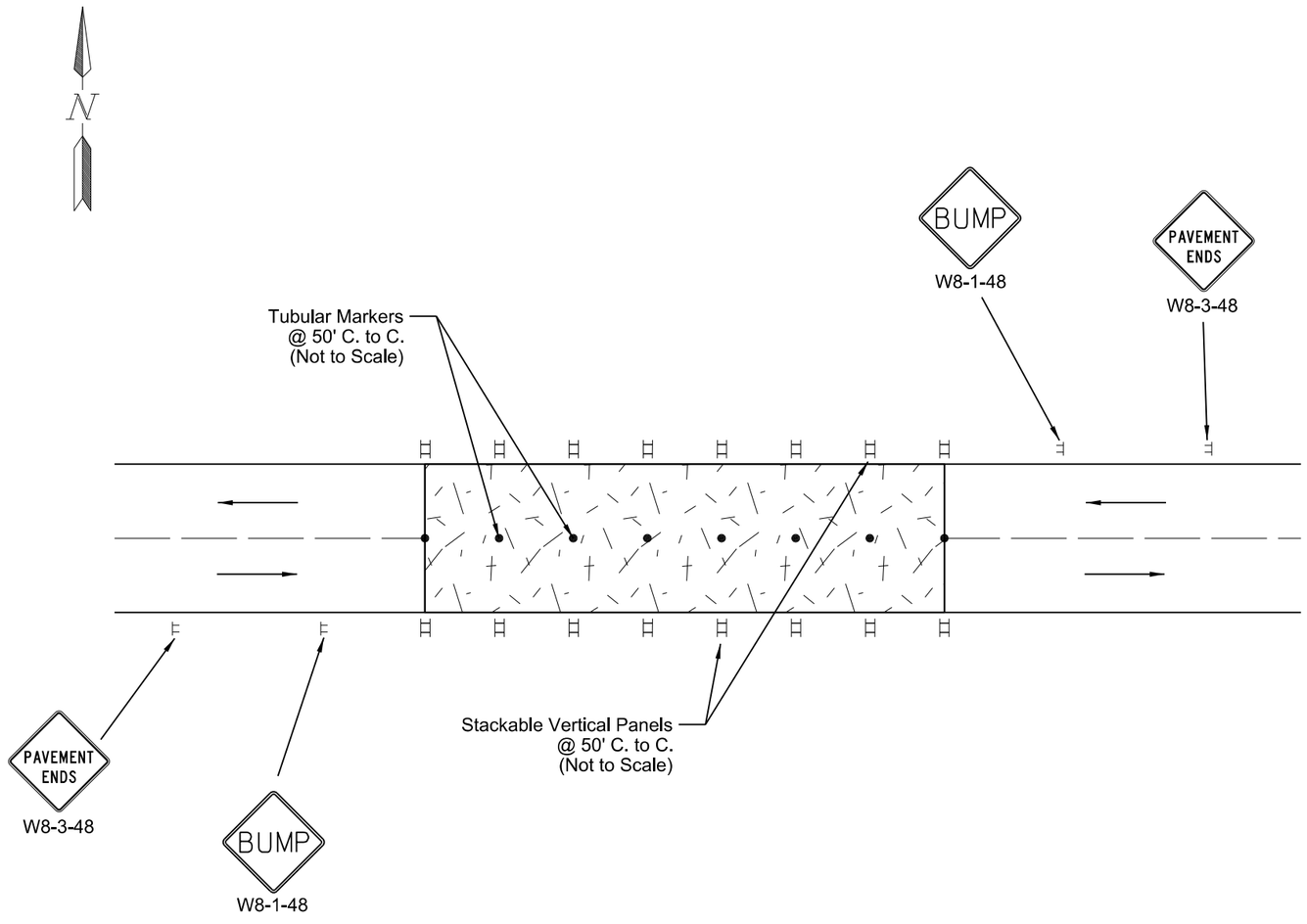
CER-SC-1112(064)
DICKEY COUNTY, NORTH DAKOTA

KLJ

TRAFFIC CONTROL SIGNING LAYOUT

DRWN. BY	CHK'D. BY	PROJECT NO.
AM	JL	5313100

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	CER-SC-1112(064)	100	3



Grade Raise Area

Notes:

* See Standard D-704-15 Type A for when work is present.

* See Standard D-704-26 for sign spacings.

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CER-SC-1112(064)
DICKEY COUNTY, NORTH DAKOTA

KLJ

CONSTRUCTION SIGNING FOR NON-WORKING HOURS

DRWN. BY	CHK'D. BY	PROJECT NO.
-	-	5313100

8/30/2013 11:21:17 AM zachvlaminck J:\trans\5313100\Cadd\Design\Plans\5313100_100WZ_003.dgn

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
N.D.	CER-SC-1112(064)	110	1

Sta/RP	Sign No.	Assembly No.	Flat Sheet For Signs IV SF	Flat Sheet For Signs XI SF	Sign Support Length 1st LF	2nd LF	3rd LF	4th LF	Support Size	Max Post Len LF	Sleeve Length 1st LF	2nd LF	3rd LF	4th LF	Sleeve Size	Anchor EA	Anchor LF	Anchor Size	Reset Sign Panel EA	Reset Sign Support EA	Break-Away EA	Comments
74+72 Lt	SA 2E				12.5				2.5 x 2.5 12 ga	14.3						1	4	3 x 3 7 ga	3			
75+04 Rt	R1-1	1							2 x 2 12 ga										1	1		
Sub Total			0.0	0.0		**Total**	12.5									**Total**	4		4	1	0	
Grand Total			0.0	0.0		**Total**	12.5									**Total**	4		4	1	0	

Basis of Estimate
Sign Support Lengths

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

Rural Roadway - 60"

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Sign Summary
Perforated Tube

NDDOT ABBREVIATIONS

D-20-1

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

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

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NDDOT ABBREVIATIONS

D-20-2

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
06-15-10	
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04-20-11	Added Items
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NDDOT ABBREVIATIONS

D-20-3

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

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

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NDDOT UTILITY COMPANY ABBREVIATIONS

D-20-10

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

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

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

Line Styles

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

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

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

Line Styles

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

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

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Symbols

D-20-30

North Arrow (Half Scale)

Truck Mounted Attenuator

Type I Barricade

Type II Barricade

Type III Barricade

Catch Basin

Cairn or Stone Circle

Video Detection Camera

Storm Drain Cap or Stub

Corrugated Metal End Section 18 Inch

Corrugated Metal End Section 24 Inch

Corrugated Metal End Section 30 Inch

Corrugated Metal End Section 36 Inch

Corrugated Metal End Section 42 Inch

Corrugated Metal End Section 48 Inch

Concrete Foundation

Ground Connection Conductor

Neutral Connection Conductor

Phase 1 Connection Conductor

Phase 2 Connection Conductor

Traffic Cone

Signal Controller

Pad Mounted Signal Controller

Alignment Data Point

Emergency Vehicle Detector

Attenuation Device

Diamond Grade Delineator Type A

Diamond Grade Delineator Type B

Diamond Grade Delineator Type C

Diamond Grade Delineator Type D

Diamond Grade Delineator Type E

Flexible Delineator

Flexible Delineator Type A

Flexible Delineator Type B

Flexible Delineator Type C

Flexible Delineator Type D

Flexible Delineator Type E

Delineator Type A

Delineator Type A Reset

Delineator Type B

Delineator Type B Reset

Delineator Type C

Delineator Type D

Delineator Type E

Delineator Drums

Spot Elevation

Existing Access Control Arrow

Existing Artifact

Existing Flashing Beacon

Existing Benchmark

Existing Railroad Battery Box

Existing Bush or Shrub

Existing Gas Cap or Stub

Existing Sanitary Cap or Stub

Existing Storm Drain Cap or Stub

Existing Water Cap or Stub

Existing Sanitary Cleanout

Existing Concrete Foundation

Existing Traffic Signal Controller

Existing Pad Mounted Signal Controller

Existing Sixteenth Section Corner

Existing Quarter Section Corner

Existing Section Corner

Existing Railroad Crossbuck

Existing Satellite Dish

Existing Fuel Dispensers

Existing Flexible Delineator Type A

Existing Flexible Delineator Type B

Existing Flexible Delineator Type C

Existing Flexible Delineator Type D

Existing Flexible Delineator Type E

Existing Delineator Type A

Existing Delineator Type B

Existing Delineator Type C

Existing Delineator Type D

Existing Delineator Type E

Existing EFB Misc

Existing Flashing Beacon

Existing Pipe Mounted Flasher

Existing Pad Mounted Feed Point

Existing Pipe Mounted Feed Point with Pad

Existing Pole Mounted Feed Point

Existing Railroad Frog

Existing Snow Gate 18

Existing Snow Gate 28

Existing Snow Gate 40

Existing Headwall

Existing Pedestrian Head with Number

Existing Signal Head

Existing Sprinkler Head

Existing Fire Hydrant

Existing Catch Basin Drop Inlet

Existing Curb Inlet

Existing Manhole Inlet

Existing Junction Box

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

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Symbols

D-20-31

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

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

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Symbols

D-20-32

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

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

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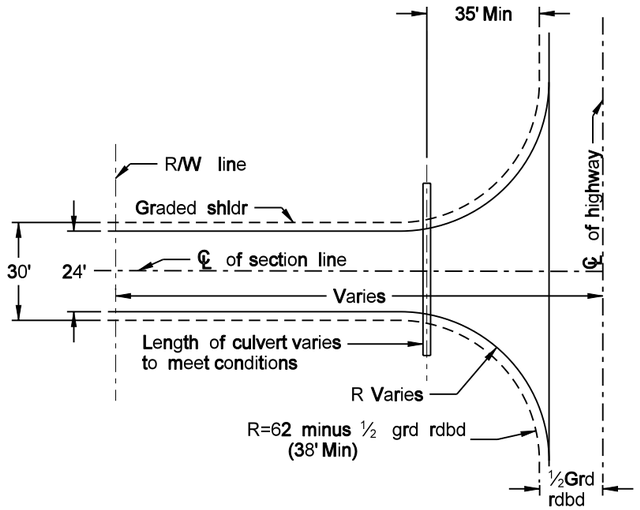
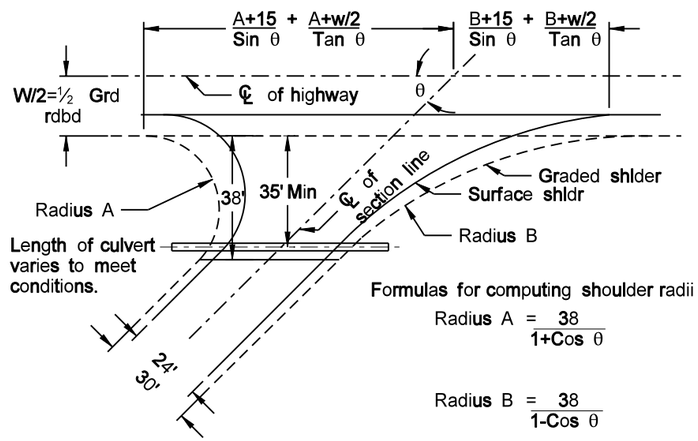
SECTION LINE & PRIVATE DRIVE APPROACHES (RURAL)



PLAN VIEW SECTION LINE APPROACH (WITHOUT SKEW)

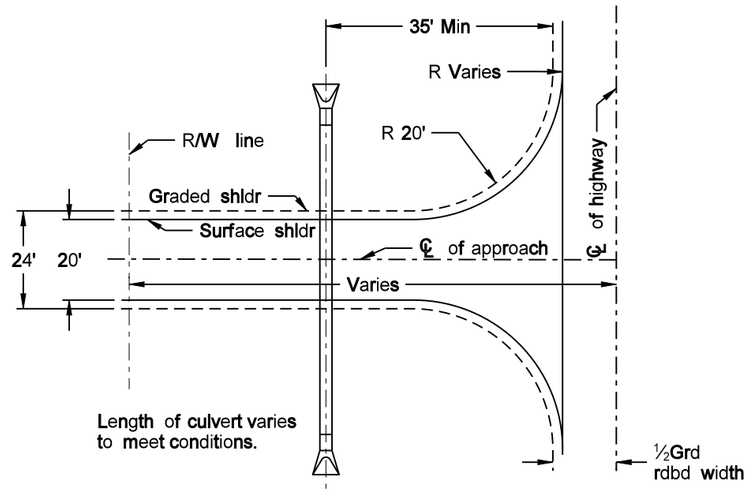


Formulas for computing shoulder radii

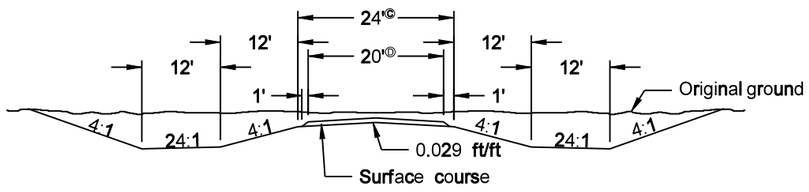
$$\text{Radius A} = \frac{38}{1+\cos\theta}$$

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

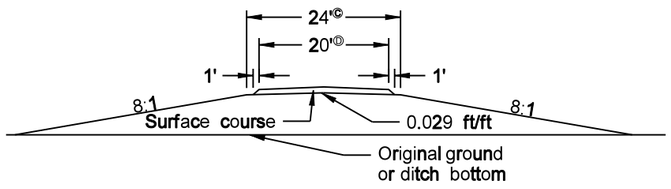
PLAN VIEW SECTION LINE APPROACH (SKEWED)



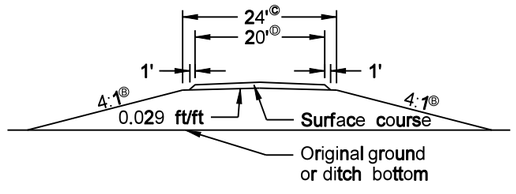
PLAN VIEW PRIVATE DRIVE APPROACH



SECTION A-A



SECTION B-B



SECTION C-C

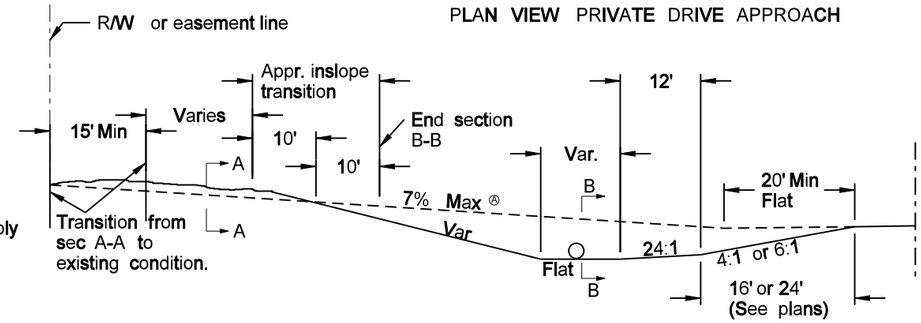
NOTES:

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

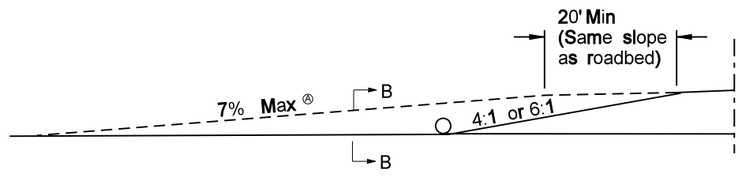
FOOT NOTES

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

APPROACH GRADE ON FILL SECTION OVER 12 FEET



APPROACH GRADE ON CUT SECTION



APPROACH GRADE ON FILL SECTION 12 FEET OR LESS

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

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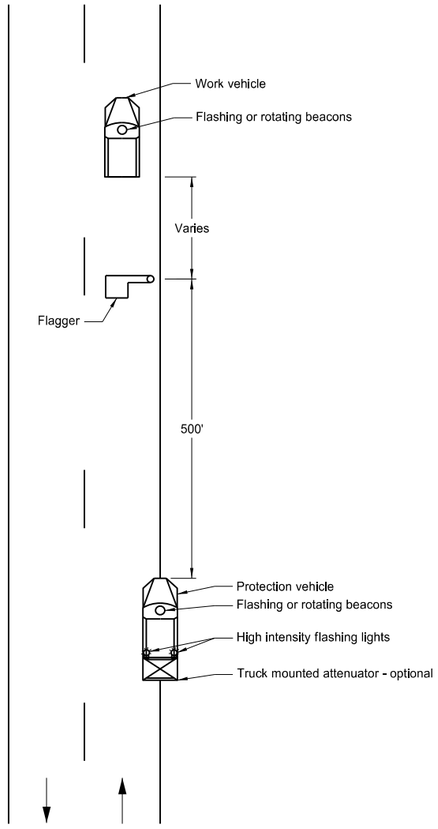
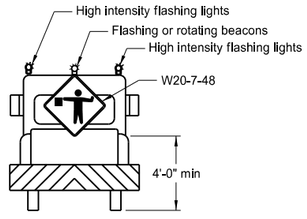
TRAFFIC CONTROL FOR CORING OF HOT BITUMINOUS PAVEMENT

D-704-2

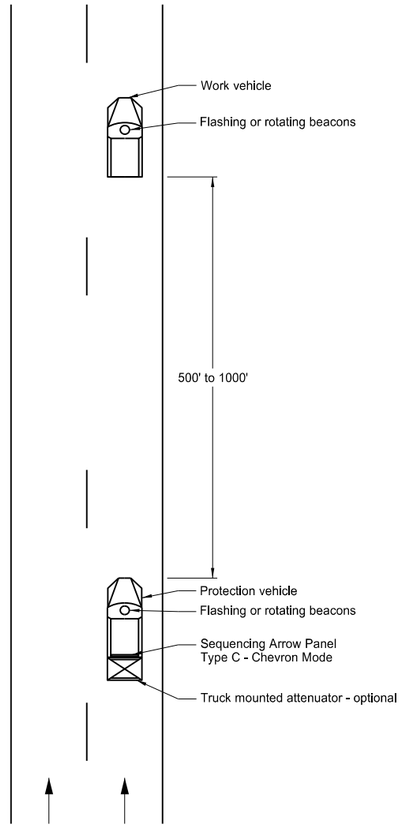
Two Lane, Two Way Roadways

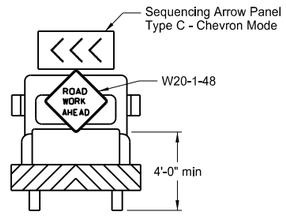




Typical Protection Vehicle

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.

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

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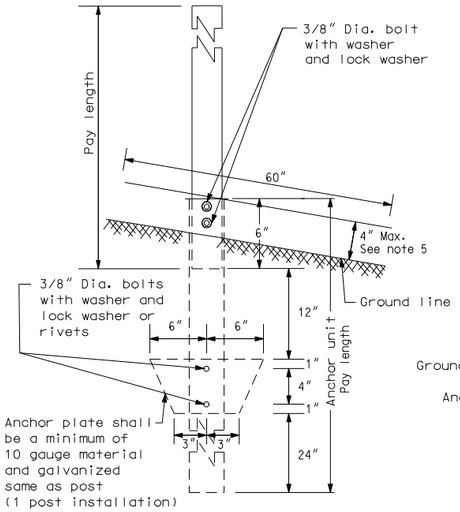
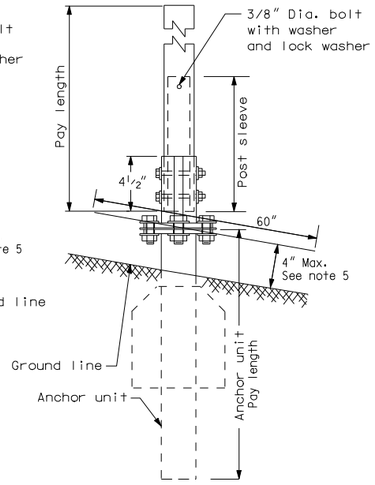
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

PERFORATED TUBE

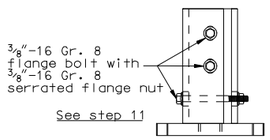
D-704-7

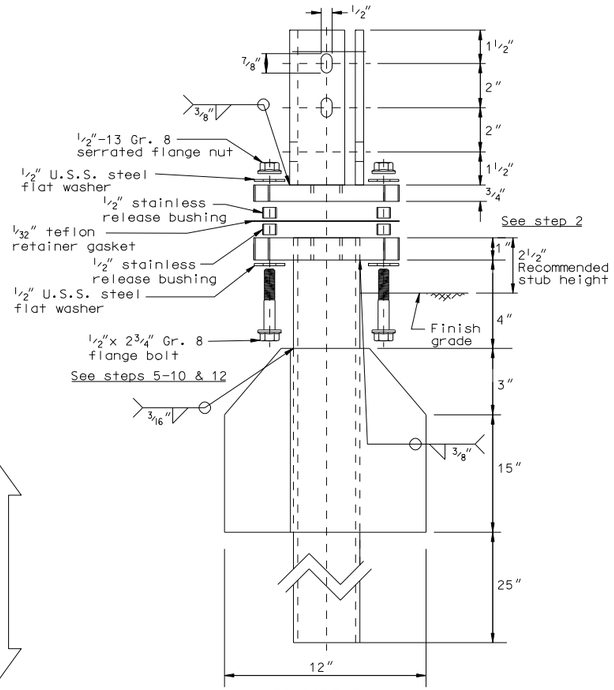


ANCHOR UNIT AND POST ASSEMBLY

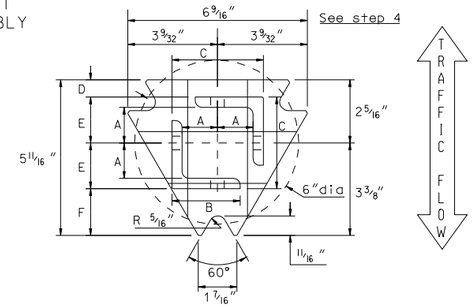


SLIP BASE ANCHOR UNIT AND POST SLEEVE ASSEMBLY





MULTI-DIRECTIONAL SLIP BASE ASSEMBLY

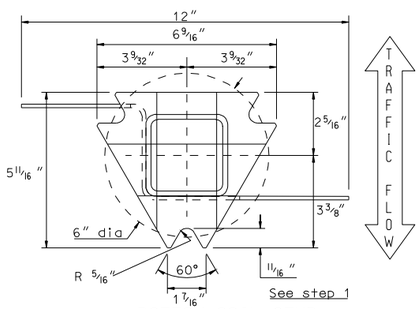


TOP POST RECEIVER

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

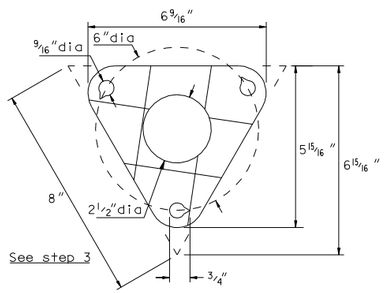
TOP POST RECEIVER DATA TABLE						
Square Post Sizes	A	B	C	D	E	F
2 3/16" x 10 Ga. Square Post	1 9/64"	2 1/2"	3 1/32"	25/32"	1 33/64"	1 7/8"
2 1/2" x 10 Ga. Square Post	1 9/32"	2 1/2"	3 5/16"	5/8"	1 21/32"	1 3/4"

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



BOTTOM SOIL STUB

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



BOLT RETAINER FOR BASE CONNECTION

Materials: 1/32" reprocessed Teflon

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

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

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

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

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

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

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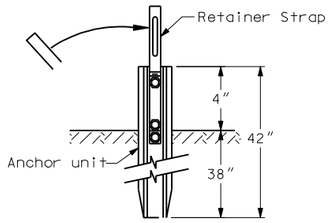
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

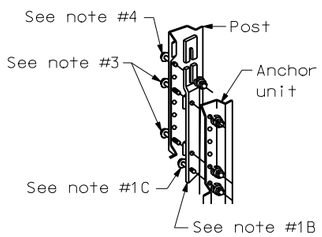
FLANGED CHANNEL



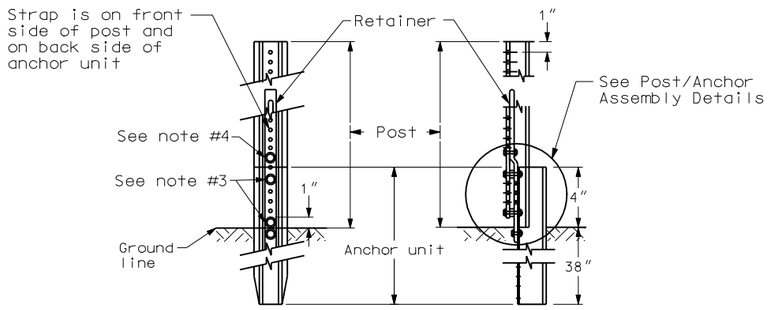
Anchor Unit &
Strap Assembly Detail

STEPS OF INSTALLATION

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

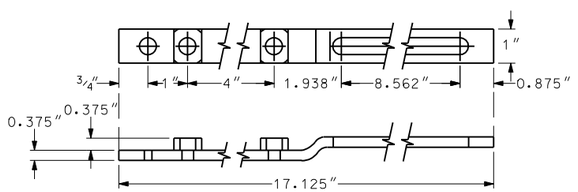


Post/Anchor
Assembly Details



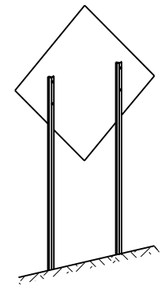
Front View Side View

Sign Post Assembly Detail

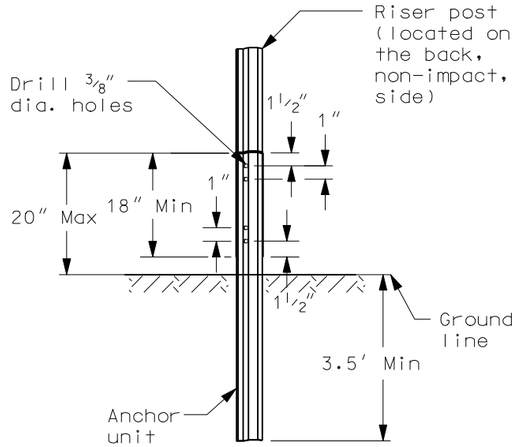


Retainer/Spacer Strap Detail

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



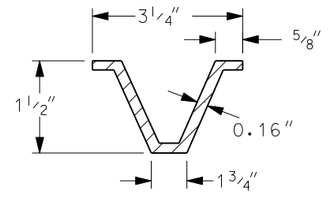
Typical
Installation



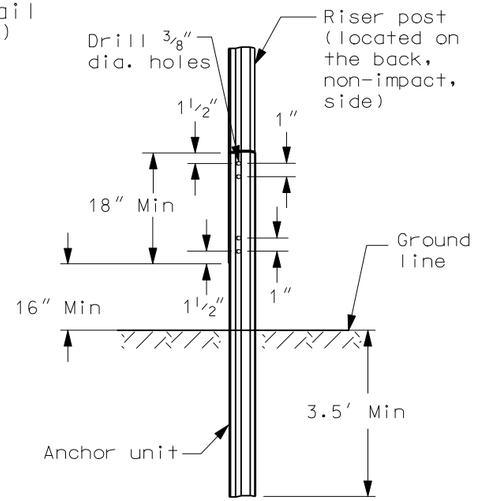
U-Channel Splice
Option 1

3 LB/FT U POSTS

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



U-Post Detail
(3 lb/ft)

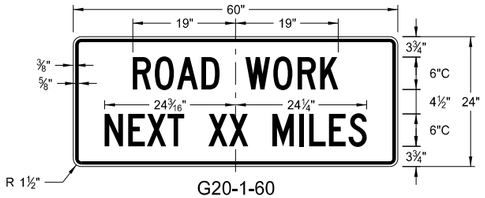


U-Channel Splice
Option 2

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

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

CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS



G20-1-60
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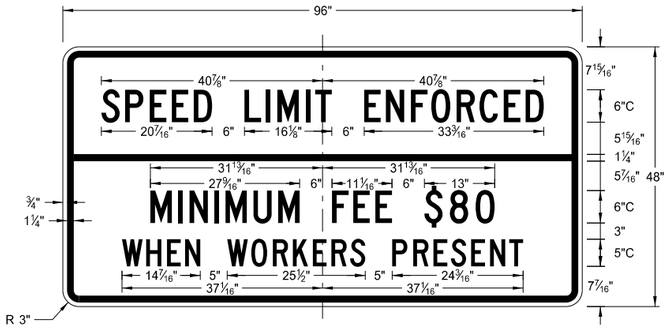
Background: orange

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



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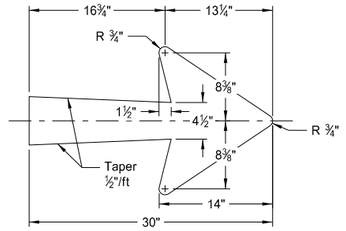
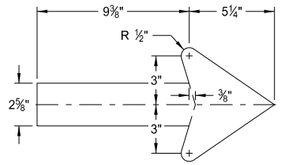
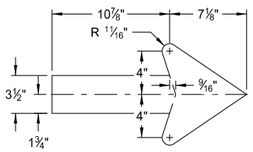


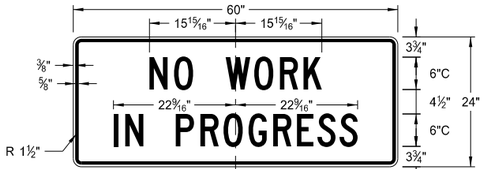
E5-1-48



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



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



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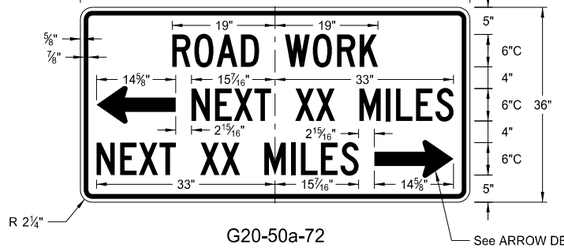

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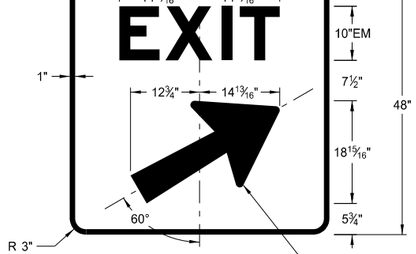

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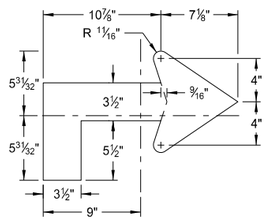
Background: green



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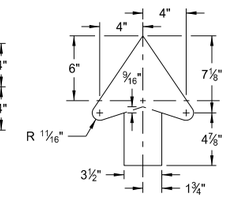
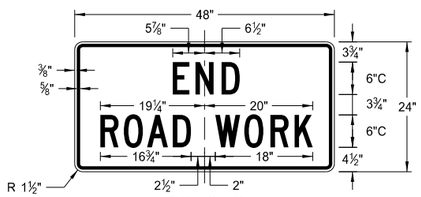
Advanced Right or Left



M4-9-30
Straight

ARROW DETAILS



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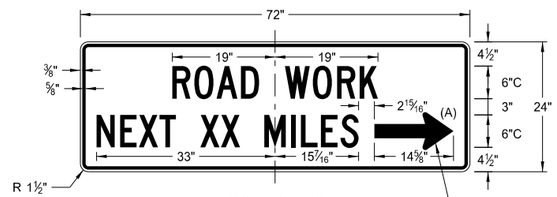

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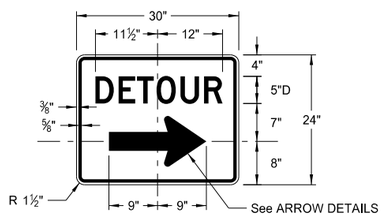


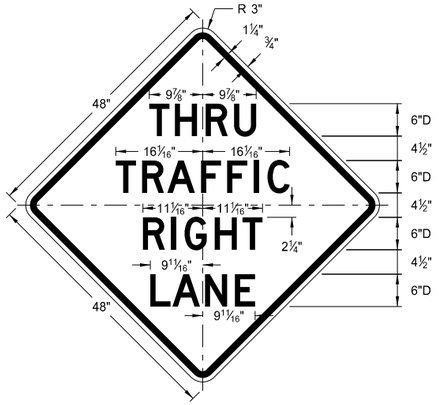
M4-9(L or R)-30 &
M4-9-30
Legend: black (non-refl)
Background: orange

NOTES:

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

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

CONSTRUCTION SIGN DETAILS
WARNING SIGNS



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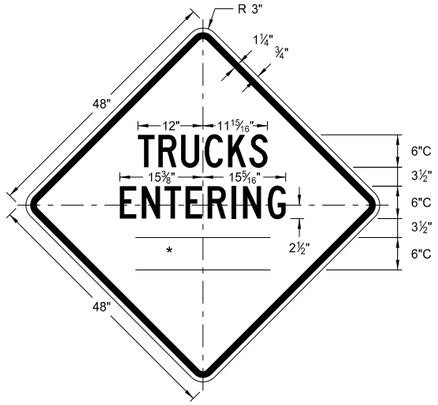

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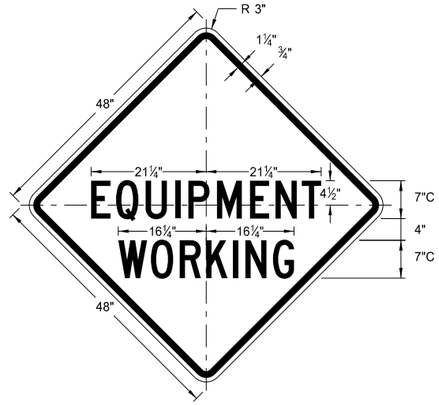

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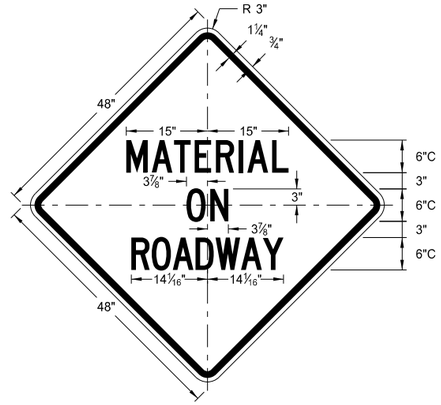
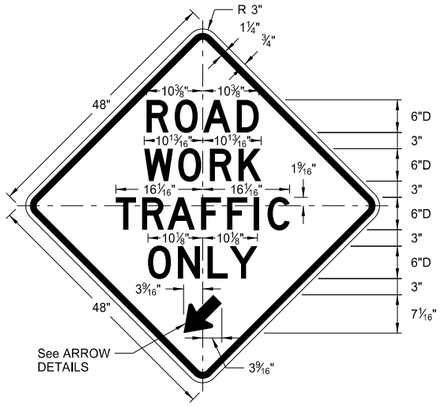


W21-51-48
Legend: black (non-refl)
Background: orange

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

* DISTANCE MESSAGES



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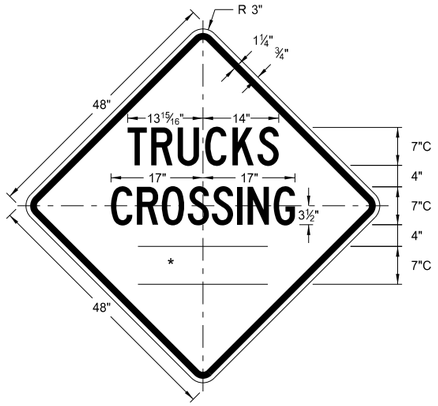

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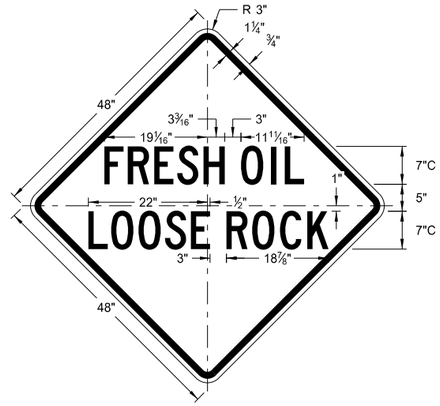

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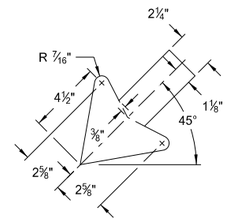
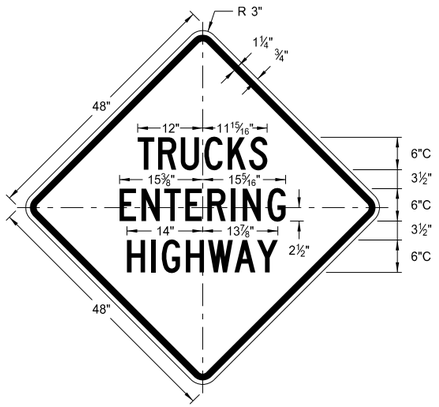


W5-9-48

ARROW DETAILS



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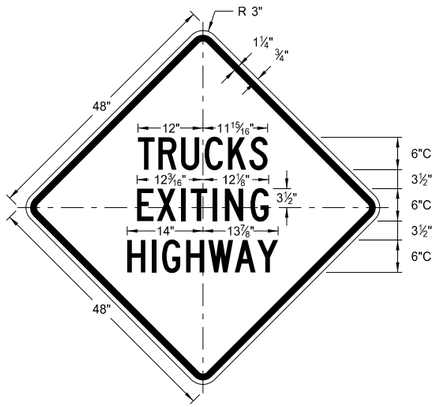

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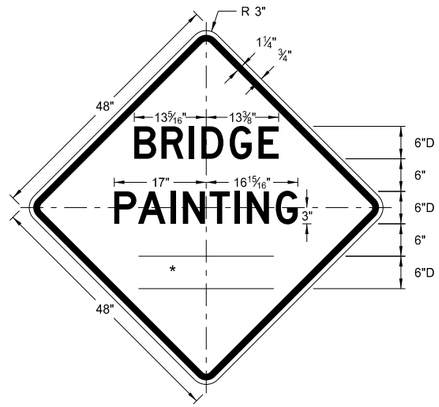

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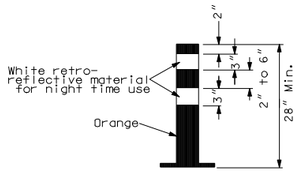
Background: orange

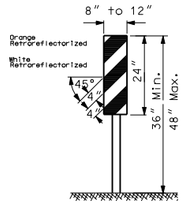
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

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

BARRICADE DETAILS AND CHANNELIZING DEVICES



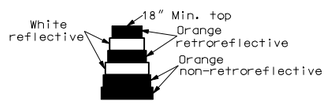
TUBULAR MARKER



VERTICAL PANEL

(Retroreflective sheeting shall be placed on both sides)

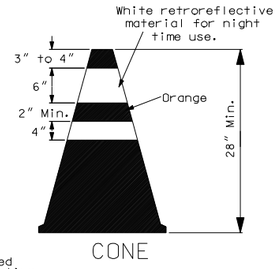
NOTE: Vertical panels used on the expressways or other high speed roadways shall be 12" by 24"



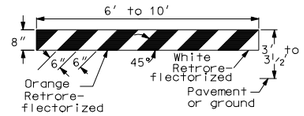
DELINEATOR DRUM

36" Min. height

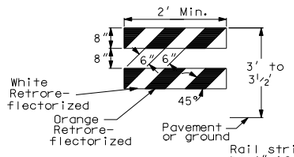
The markings on drums shall be orange and white stripes 4 to 6 inches wide. There shall be at least two orange and two white stripes. Where drums have ribs or indentations, there shall be no retroreflectorized sheeting in this area. This space shall be no more than 2 inches wide. The drum surface shall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



CONE

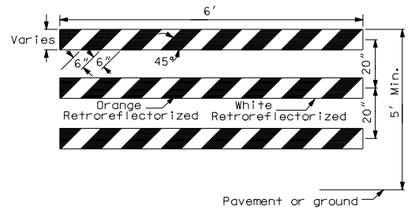


TYPE I BARRICADE



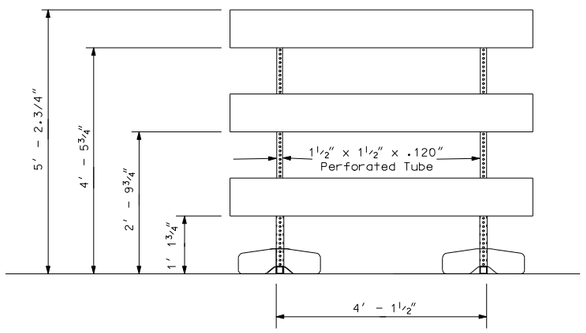
Rail stripe width shall be 4" if barricade length is less than 36".

TYPE II BARRICADE

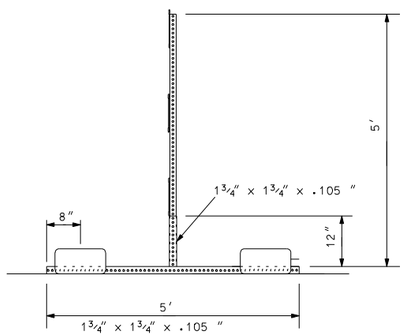


TYPE III BARRICADE

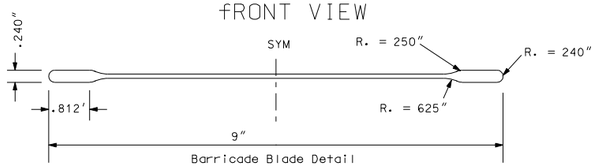
BARRICADES:
Number of retroreflectorized rail faces:
Type I - 2 (One each direction)
Type II - 4 (Two each direction)
Type III- 6 (Three in each direction)



FRONT VIEW



END VIEW



Barricade Blade Detail

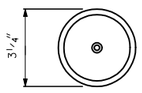
Ballast = 45lb sandbag at the end of each leg.

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

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

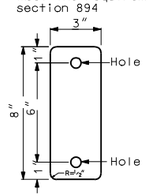
Masts slide inside vertical portion of legs. No bolts or fastenings devices used.

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



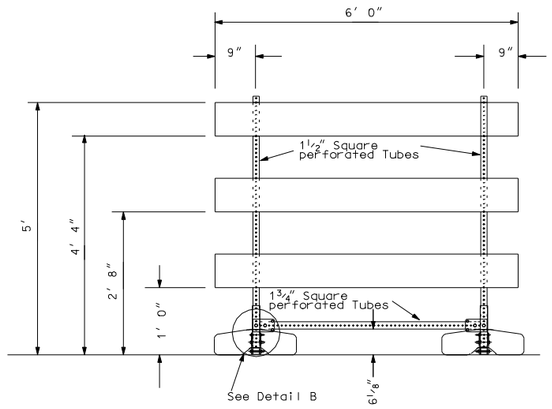
ACRYLIC PLASTIC REFLECTOR

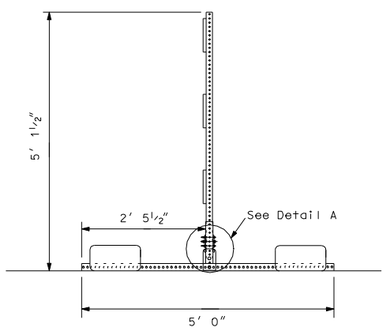
Delineator reflector shall meet the requirements of section 894

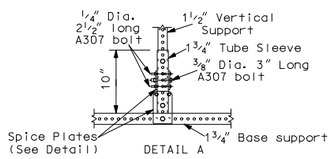


DELINEATOR REFLECTOR

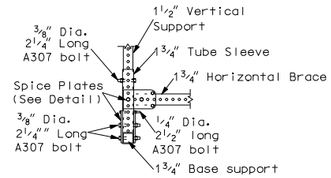
3"x8"- 18 Gauge galvanized steel sheet or 0.080" aluminum plate with white retroreflective sheeting (Type 3A or 3B) as specified in section 894 of the Standard Specifications.



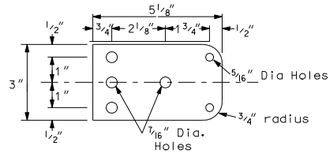




DETAIL A



DETAIL B



SPLICE PLATE

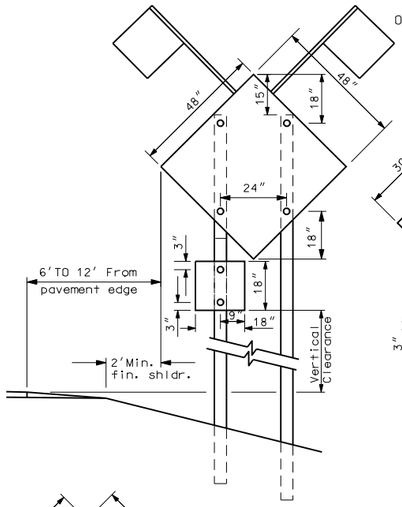
BARRICADE ASSEMBLY DETAIL
(Use when Plastic I-Beam w/ 1½" Hollow Core Flanges or 1" x 8" x72" wood boards.

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

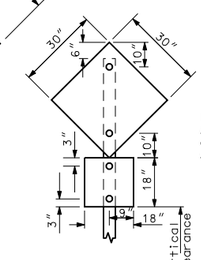
This document was originally issued and sealed by MARK S GAYDOS Registration Number PE-4518, on 06/29/05 and the original document is stored at the North Dakota Department of Transportation

D-704-14

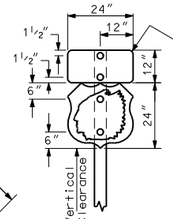
CONSTRUCTION SIGN AND BARRICADE ASSEMBLY DETAILS



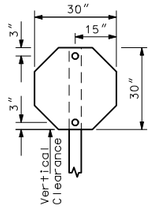
POST MOUNTING
48"x48" Signs



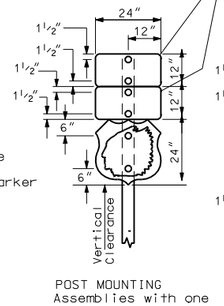
POST MOUNTING
30"x30" Signs



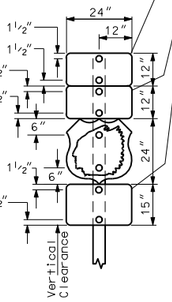
POST MOUNTING
Assemblies with one cardinal direction sign & one route marker



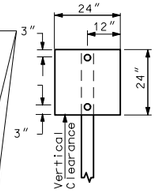
POST MOUNTING
Sign R1-1-30



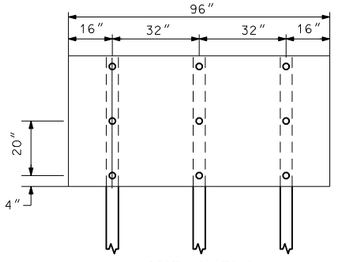
POST MOUNTING
Assemblies with one cardinal direction sign, one detour sign & one route marker



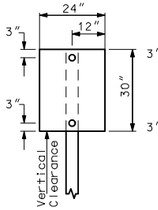
POST MOUNTING
Assemblies with one cardinal direction sign, one detour sign, one route marker & one directional arrow.



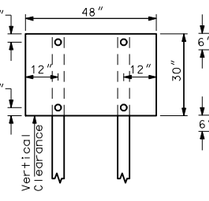
POST MOUNTING
24"x24" Signs



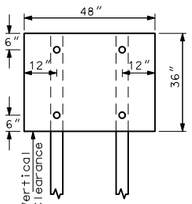
POST MOUNTING
48"x96" Signs



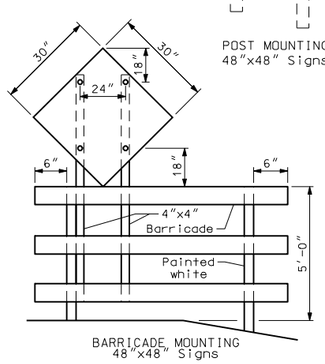
POST MOUNTING
24"x30" Signs



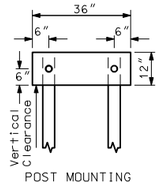
POST MOUNTING
48"x30" Signs



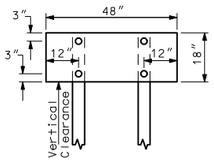
POST MOUNTING
48"x36" Signs



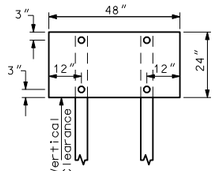
BARRICADE MOUNTING
48"x48" Signs



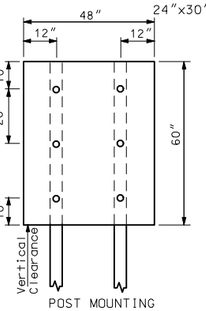
POST MOUNTING
36"x12" Signs



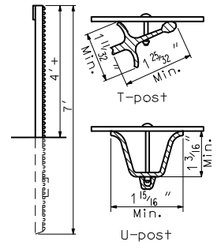
POST MOUNTING
48"x18" Signs



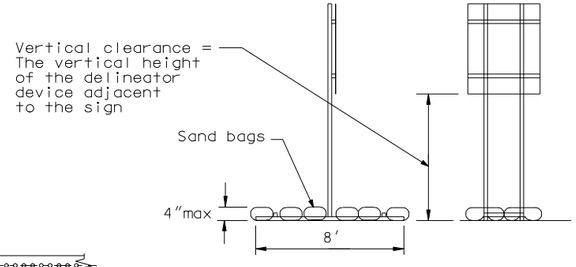
POST MOUNTING
48"x24" Signs



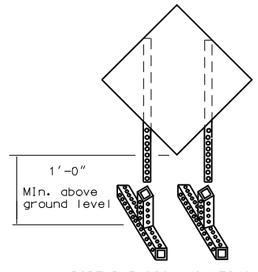
POST MOUNTING
48"x60" Signs



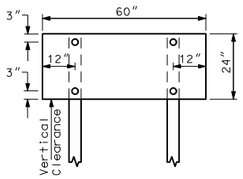
DELINEATOR ATTACHMENT AND POST MOUNTING DETAILS



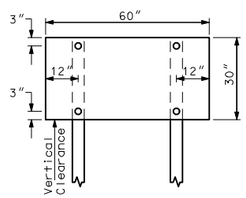
SKID MOUNTED SIGNS



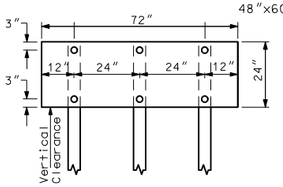
PORTABLE SIGN MOUNTING



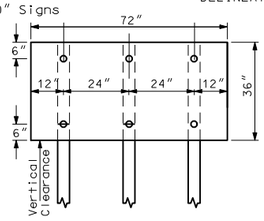
POST MOUNTING
60"x24" Signs



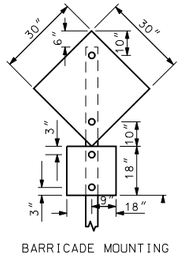
POST MOUNTING
60"x30" Signs



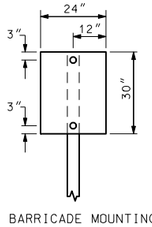
POST MOUNTING
72"x24" Signs



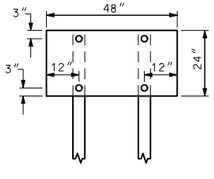
POST MOUNTING
72"x36" Signs



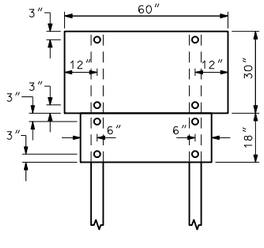
BARRICADE MOUNTING
30"x30" Signs



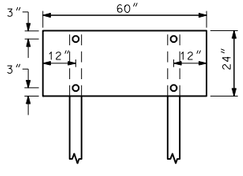
BARRICADE MOUNTING
24"x30" Signs



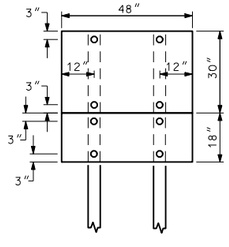
BARRICADE MOUNTING
48"x24" Signs



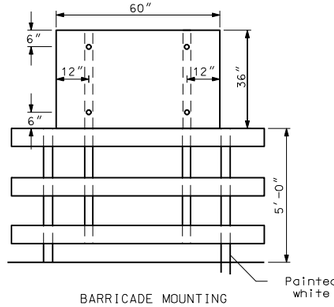
BARRICADE MOUNTING
60"x30" & 48"x18" Signs



BARRICADE MOUNTING
60"x24" Signs



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



BARRICADE MOUNTING
G20-1-60 Signs

NOTES:

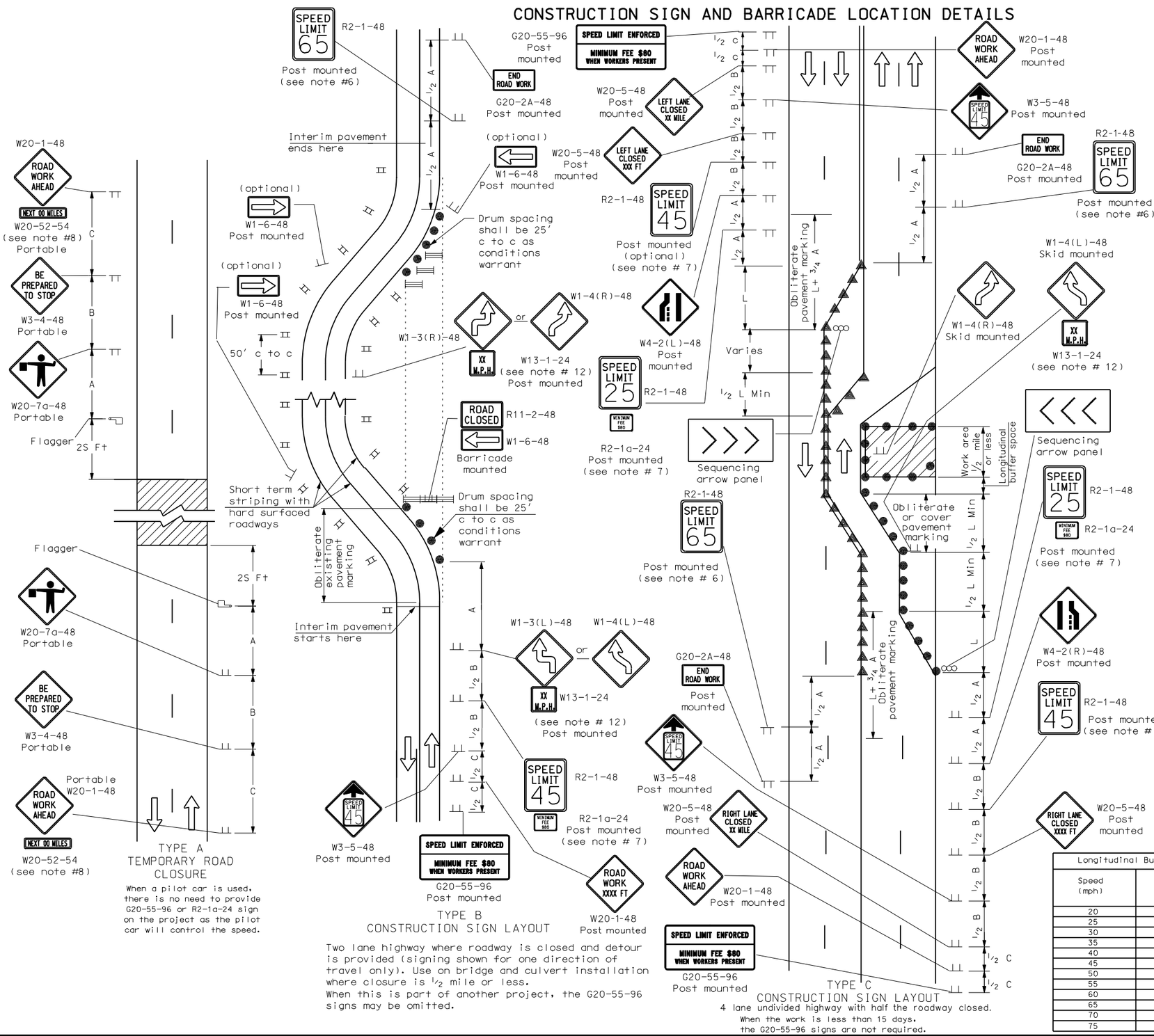
1. Barricade and Sign Supports: Wooden supports shall be painted white. Steel supports shall be galvanized or painted.
2. Barricade Mounting Signs: The bottom of the sign shall be flush with the top of the top rail. Wood sign posts shall be 4"x4" min. SFS or equivalent steel posts. All barricades and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

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

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

CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS

D-704-15



Notes

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

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

KEY

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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

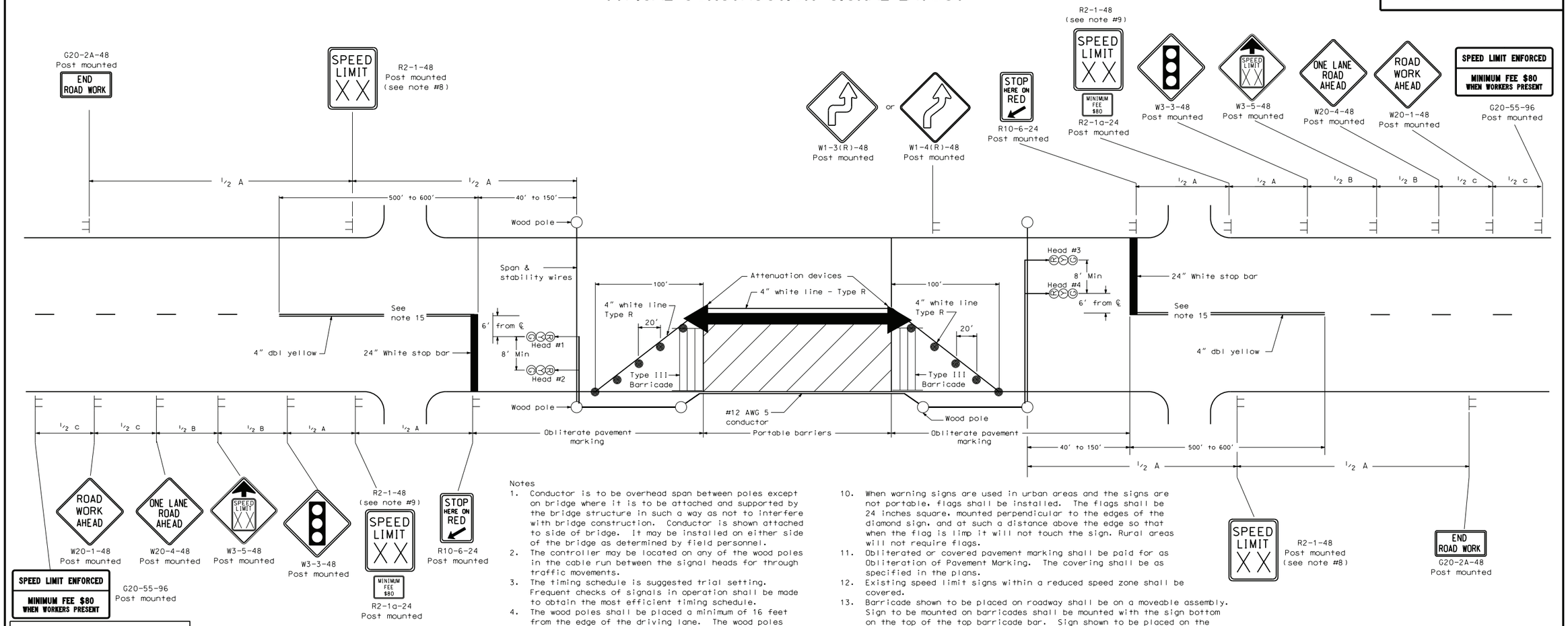
10-1-86

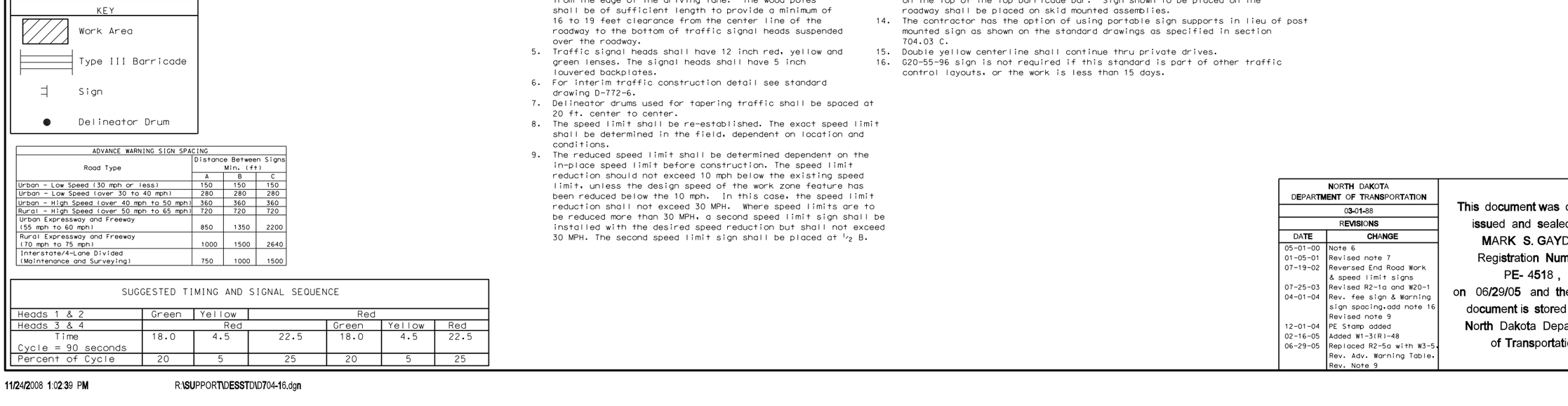
REVISIONS

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

TYPICAL CONSTRUCTION SIGNAL LAYOUT

D-704-16





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

SUGGESTED TIMING AND SIGNAL SEQUENCE						
Heads 1 & 2	Green	Yellow	Red			
Heads 3 & 4		Red		Green	Yellow	Red
Time Cycle = 90 seconds	18.0	4.5	22.5	18.0	4.5	22.5
Percent of Cycle	20	5	25	20	5	25

Notes

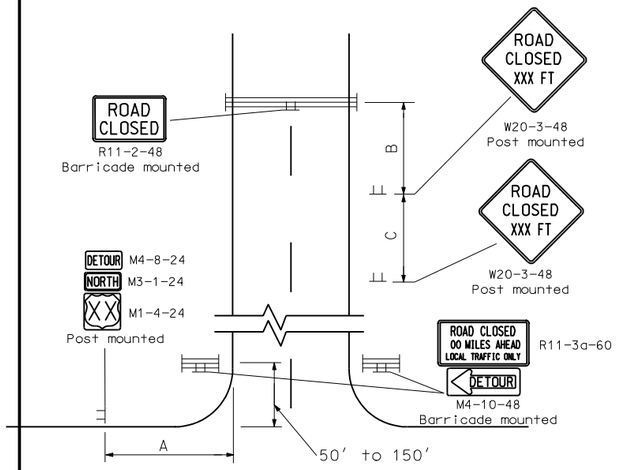
1. Conductor is to be overhead span between poles except on bridge where it is to be attached and supported by the bridge structure in such a way as not to interfere with bridge construction. Conductor is shown attached to side of bridge. It may be installed on either side of the bridge as determined by field personnel.
2. The controller may be located on any of the wood poles in the cable run between the signal heads for through traffic movements.
3. The timing schedule is suggested trial setting. Frequent checks of signals in operation shall be made to obtain the most efficient timing schedule.
4. The wood poles shall be placed a minimum of 16 feet from the edge of the driving lane. The wood poles shall be of sufficient length to provide a minimum of 16 to 19 feet clearance from the center line of the roadway to the bottom of traffic signal heads suspended over the roadway.
5. Traffic signal heads shall have 12 inch red, yellow and green lenses. The signal heads shall have 5 inch louvered backplates.
6. For interim traffic construction detail see standard drawing D-772-6.
7. Delineator drums used for tapering traffic shall be spaced at 20 ft. center to center.
8. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
9. The reduced speed limit shall be determined dependent on the in-place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at ½ B.
10. 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.
11. Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be as specified in the plans.
12. Existing speed limit signs within a reduced speed zone shall be covered.
13. Barricade shown to be placed on roadway shall be on a moveable assembly. Sign to be mounted on barricades shall be mounted with the sign bottom on the top of the top barricade bar. Sign shown to be placed on the roadway shall be placed on skid mounted assemblies.
14. The contractor has the option of using portable sign supports in lieu of post mounted sign as shown on the standard drawings as specified in section 704.03 C.
15. Double yellow centerline shall continue thru private drives.
16. G20-55-96 sign is not required if this standard is part of other traffic control layouts, or the work is less than 15 days.

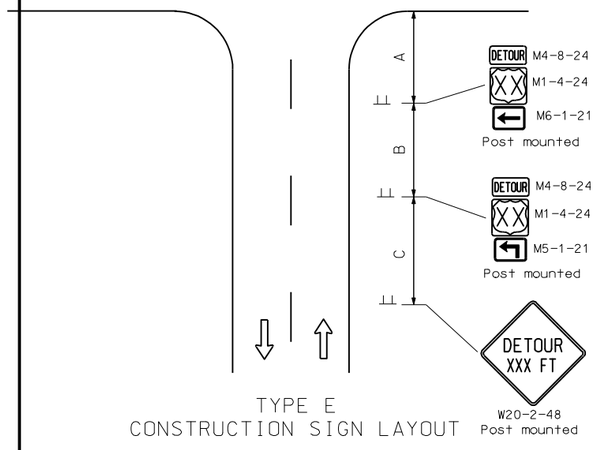
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
03-01-88	
REVISIONS	
DATE	CHANGE
05-01-00	Note 6
01-05-01	Revised note 7
07-19-02	Reversed End Road Work & speed limit signs
07-25-03	Revised R2-1a and W20-1
04-01-04	Rev. fee sign & Warning sign spacing.add note 16 Revised note 9
12-01-04	PE Stamp added
02-16-05	Added W1-3(R)-48
06-29-05	Replaced R2-5a with W3-5. Rev. Adv. Warning Table. Rev. Note 9

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

CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS

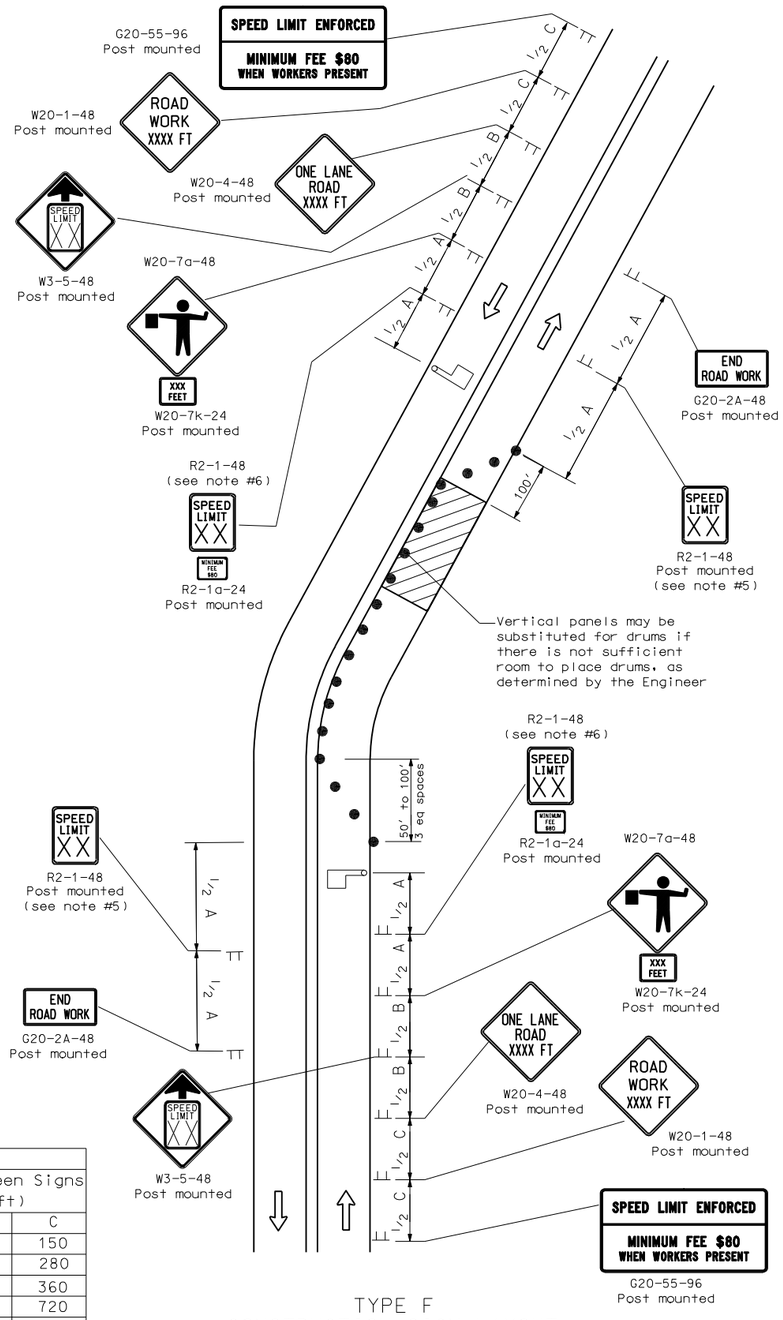
D-704-19





TYPE E
CONSTRUCTION SIGN LAYOUT

Used where a road is closed beyond a detour point. Signing shown for one direction only. Sign not shown on detour shall be shown in plans and installed and maintained by the contractor.



TYPE F
CONSTRUCTION SIGN LAYOUT

Two lane highway with one lane closed. Flagger is at a point where it is visible to approaching traffic.

Notes
1. Variables
   S = Numerical value of speed limit or 85th percentile.
   W = The width of taper
   L = Minimum length of taper, or S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or
   $W \times S^2/60$ for urban, residential, and other streets with speeds of 40 mph or less.
2. Barricade shown to be placed on roadway shall be on a moveable assembly. Sign to be mounted on barricades shall be mounted with the sign bottom on the top of the top barricade bar. Sign shown to be placed on the roadway shall be placed on skid mounted assemblies.
3. Delineator drums used for tapering traffic shall be placed at 3 equal spaces. Delineator drums for tangents shall be spaced at 2 times dimension "S".
4. Sequencing Arrow Panels
   Panels should normally be placed at the beginning of the taper. Where shoulder width does not provide sufficient room, the panel should be moved closer to the work area so that it can be placed on the roadway surface.
   Type A shall be used on roadways with slow moving traffic speeds and low volume (25 mph and 750 ADT or less).
   Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph and 5000 ADT or less).
   Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph and 5000 ADT).
5. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
6. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
7. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
8. Existing speed limit signs within a reduced speed zone shall be covered.
9. Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
10. Where necessary, safe speed to be determined by the Engineer.
11. The contractor has the option of using portable sign supports in lieu of post mounted sign as shown on the standard drawings as specified in section 704.03 C.
12. G20-55-96 or R2-1a-24 sign are not required when a pilot car operation is used.

KEY

● Delineator Drum	Type I Barricade	Flagger
⊢ Type A Delineator	Type II Barricade	Sequencing Arrow Panel
⊢ Sign	Type III Barricade	Work/Hazard Area
▲ Cone		

ADVANCE WARNING SIGN SPACING

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
10-1-86

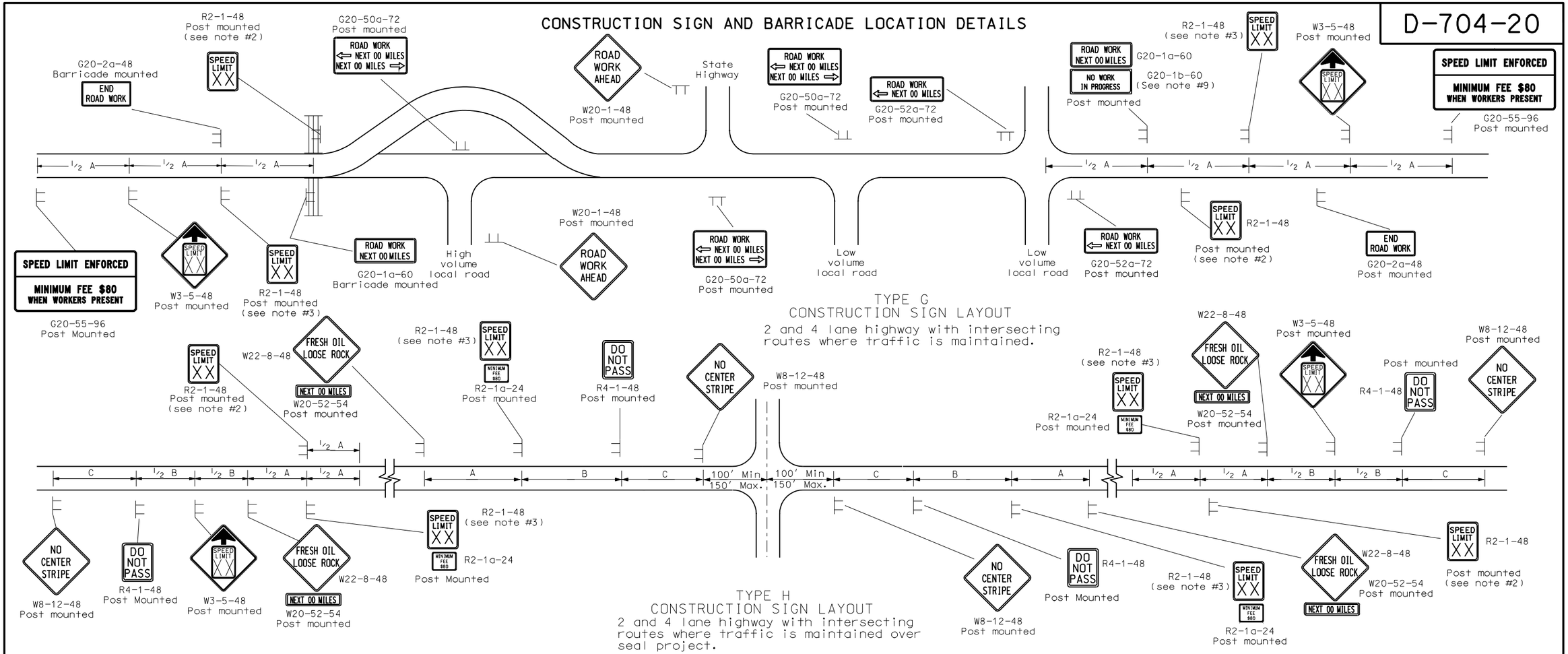
REVISIONS

DATE	CHANGE
07-19-02	Reversed End Road Work & Speed Limit Signs
07-25-03	Revised R2-1a and W20-1
01-16-04	Revised type F
04-01-04	Revised fee sign & Warning sign spacing. Rev. note 6. add note 12
12-01-04	PE stamp added
06-29-05	Added W3-5 to type F. Rev. Adv. Warning Table. Rev. Note 6
04-05-06	Showed signing for opposite direction
02-16-07	Added W3-5-48 to opposite direction of Type F layout

This document was originally issued and sealed by MARK S GAYDOS Registration Number PE-4518, on02/16/2007and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS

D-704-20



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

KEY

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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

10-1-86

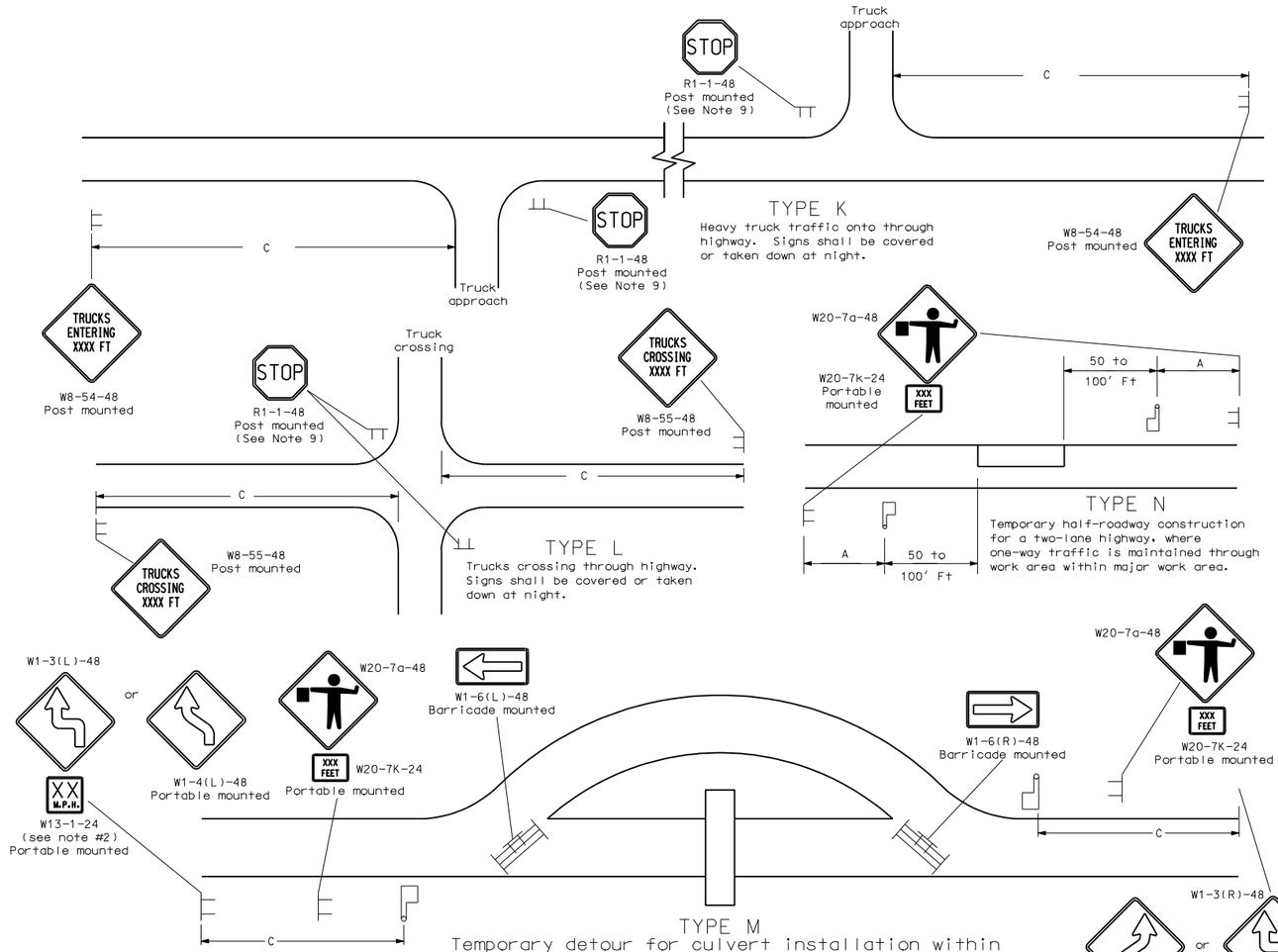
REVISIONS

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

This document was originally issued and sealed by MARK S. GAYDOS, Registration Number PE-4518, on 04/05/06 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS

D-704-22



Notes

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

KEY

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

ADVANCE WARNING SIGN SPACING

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

10-1-86

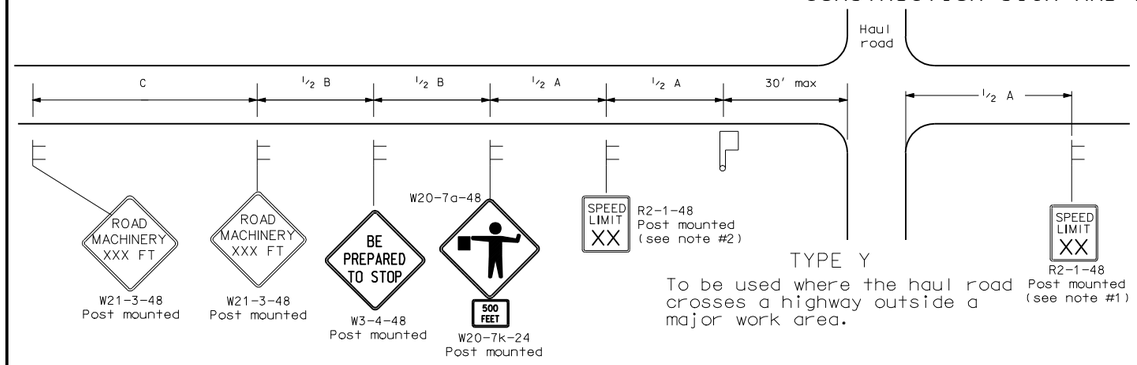
REVISIONS

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

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

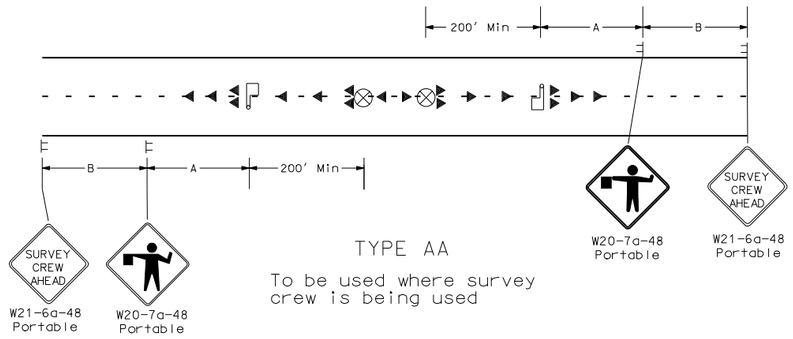
CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS

D-704-26



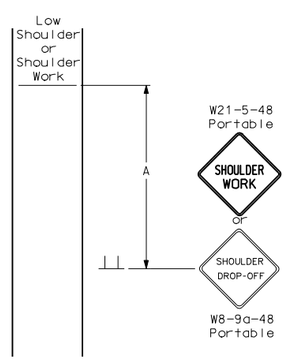
TYPE Y

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



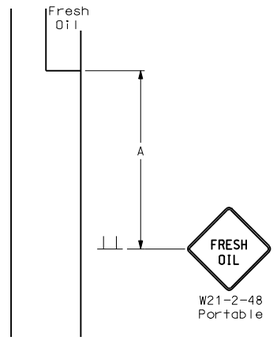
TYPE AA

To be used where survey crew is being used



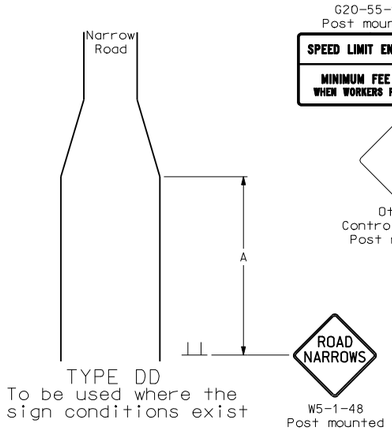
TYPE BB

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



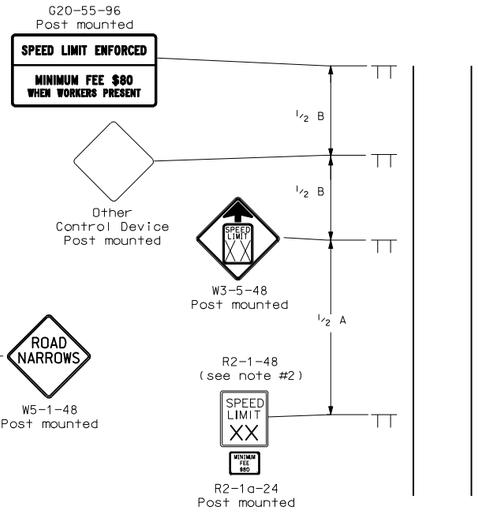
TYPE CC

To be used where the sign conditions exist



TYPE DD

To be used where the sign conditions exist

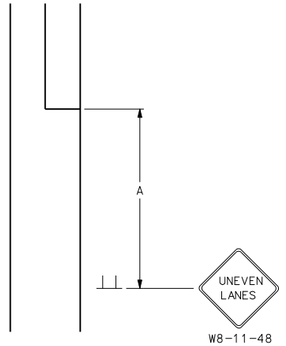


TYPE Z

To be used where speed zone is needed

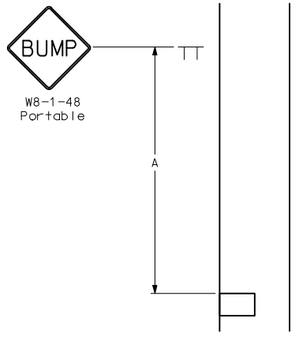
Notes

1. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
2. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 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.
5. The contractor has the option of using portable sign supports in lieu of post mounted sign as shown on the standard drawings as specified in section 704.03 C.
6. G20-55-96 or R2-1a-24 signs are not required if this standard is part of other traffic control layouts, or the work is less than 5 days.



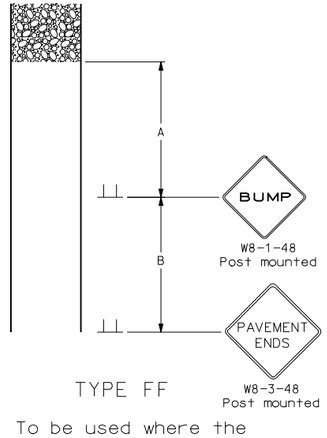
TYPE GG

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

KEY

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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

10-1-86

REVISIONS

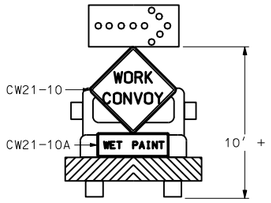
DATE	CHANGE
09-03-96	70 mph
01-31-97	Sign spacing
10-01-99	General Revision
07-19-02	Revised spacing of Speed Limit Signs
01-30-03	Pavement end sign
07-25-03	Revised R2-1a
04-01-04	Rev. fee sign & warning sign spacing. Add note 6
12-01-04	PE Stamp added
06-29-05	Replaced R2-5a with W3-5. Rev. Adv. Warning Table. Rev. Note 2
07-05-05	Changed W20-7b to W3-4

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

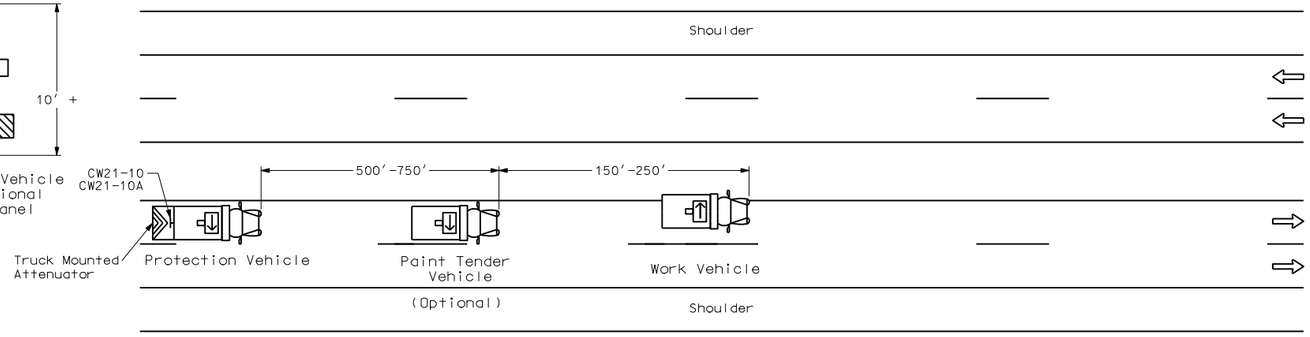
TRAFFIC CONTROL PLAN FOR MOVING OPERATIONS ON CONVENTIONAL HIGHWAYS

(Pavement Marking)

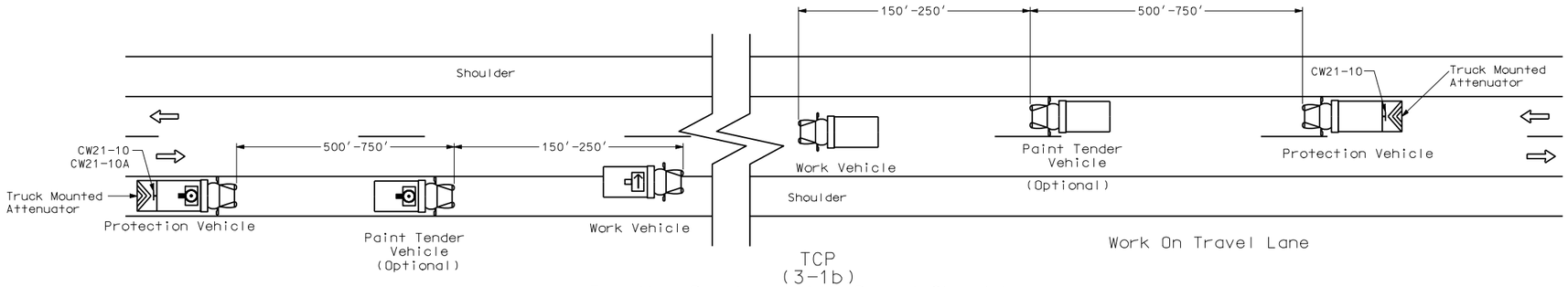
D-704-27



Typical Protection Vehicle
with Right Directional
Flashing Arrow Panel

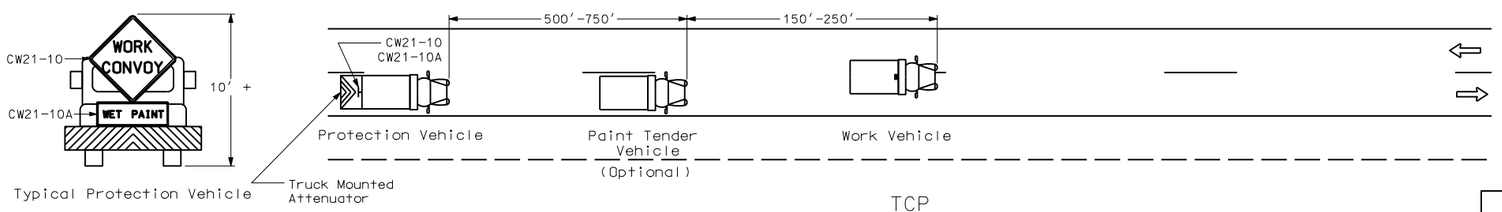


TCP
(3-1a)
Undivided Multi lane Roadway



TCP
(3-1b)

Work On Shoulder — Two-Way Roadway with Paved Shoulders — Work On Travel Lane

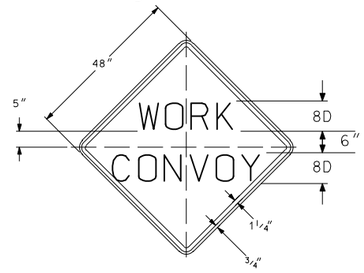


Typical Protection Vehicle

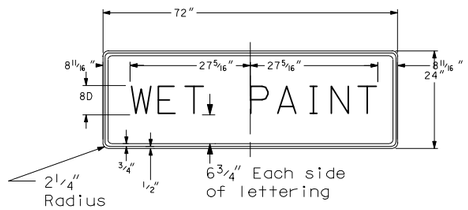
TCP
(3-1c)
Two-Way Roadway without Paved Shoulders

Notes
1. If the contractor chooses to place more vehicles in the convoy than are shown, these vehicles shall have the truck mounted attenuator and shall be at the contractors expense.
2. All traffic control devices shall be in accordance with the "Manual on Uniform Traffic Control Devices" (MUTCD), latest edition.
3. The use of yellow rotating beacons or strobe lights on vehicles is required unless otherwise stated elsewhere in the plans.
4. Flashing arrow panels shall be Type B or Type C. The panel operation shall be controlled from inside the vehicle.
5. Each vehicle shall have two-way radio communication capability.
6. When work convoys must change lanes, the protection vehicle should change lanes first to shadow other convoy vehicles.
7. Vehicle spacing between the protection vehicle and paint tender 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/or change lanes as they approach the trail vehicle.
8. Sign Colors
   Letters = Black
   Border = Black
   Background = Orange

Sign Details



CW21-10



CW21-10A

KEY

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
01-22-92	
REVISIONS	
DATE	CHANGE
02-24-93	General
03-15-95	General
06-21-95	Remove caution mode
10-01-99	General Revisions
07-25-00	General Revisions
12-01-04	PE Stamp added

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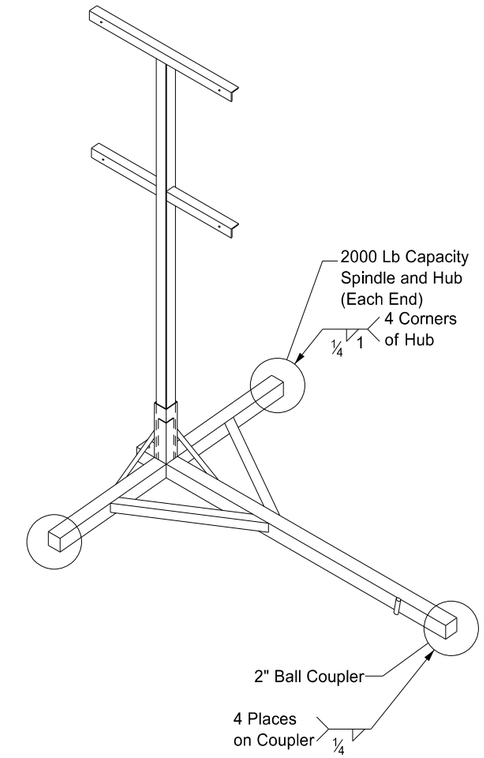
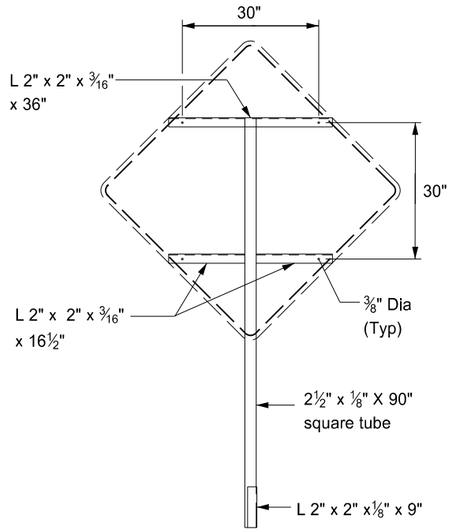
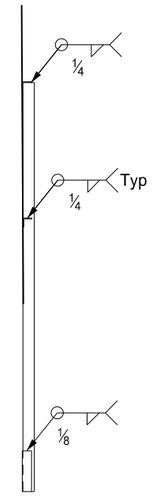
PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



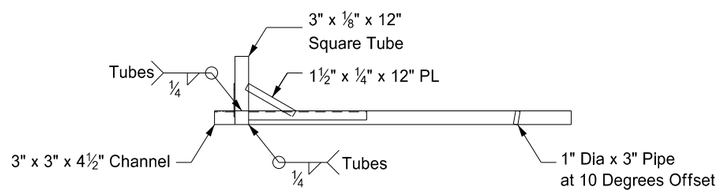


FRONT

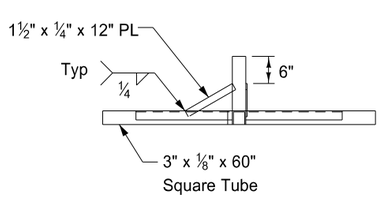


RIGHT

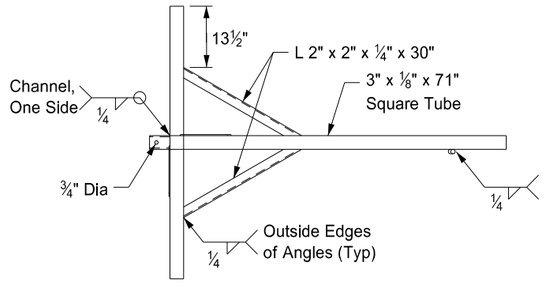
SIGN SUPPORT



FRONT



RIGHT



TOP

TRAILER

Notes:

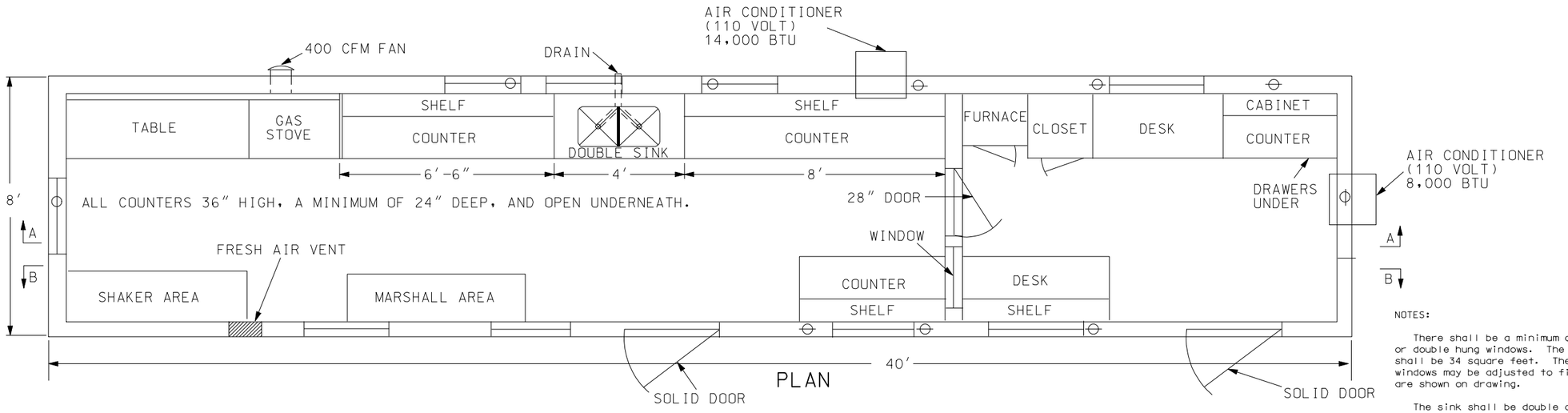
1. The maximum weight of the assembly is 250 pounds.
2. Use a 14" wheel and tire.
3. Automotive and equipment axle assemblies may not be used for trailer-mounted sign supports.
4. Other NCHRP 350 crash tested assemblies are acceptable.

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

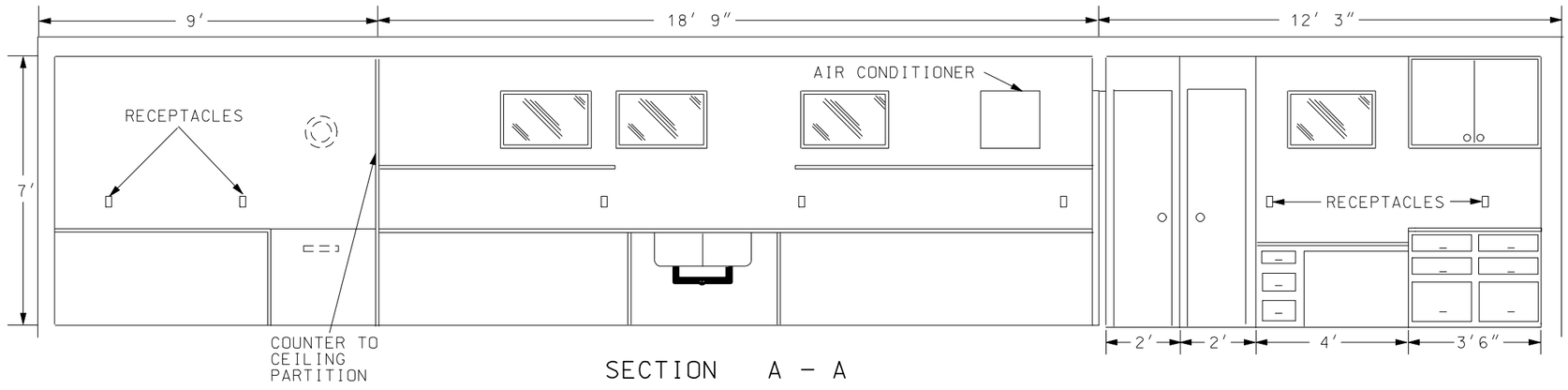
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 11/23/10 and the original document is stored at the North Dakota Department of Transportation

TYPE C FIELD LABORATORY

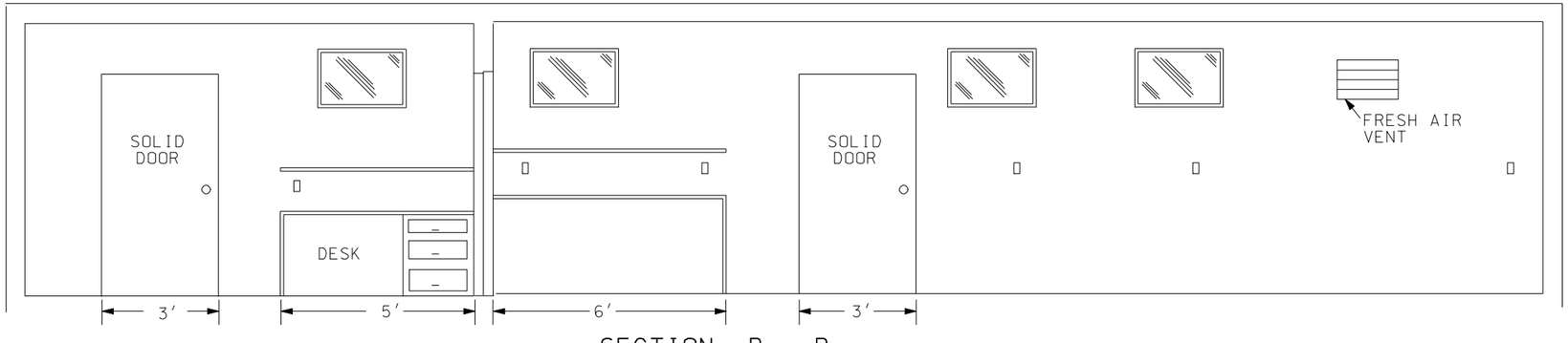
D-706-1



PLAN



SECTION A - A



SECTION B - B

NOTES:

There shall be a minimum of 6 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 wasteline. A trap is not required. Water service lines shall be copper or plastic having a diameter of ½ 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 marshall area shall be heavily reinforced.

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

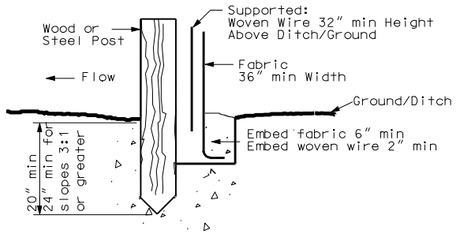
Electrical service entrance shall be wired for 100 amps, and have separate circuits for air conditioners. Convenience outlets shall have a minimum spacing of 4 feet in counter areas.

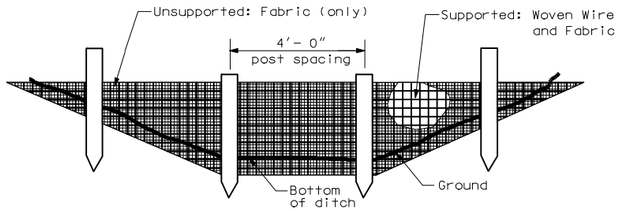
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
05-05-88	Drawing and notes
06-20-03	General revisions
12-01-04	PE Stamp added

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

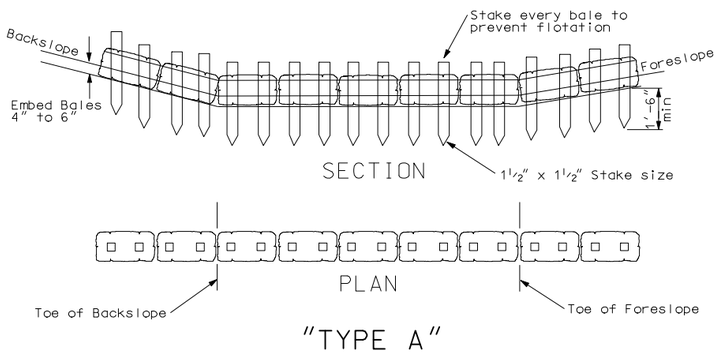
EROSION AND SILTATION CONTROLS

D-708-2

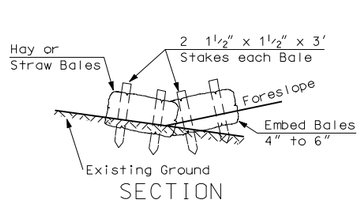


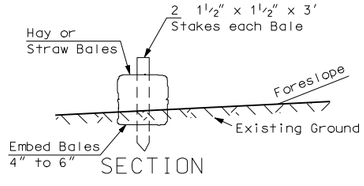


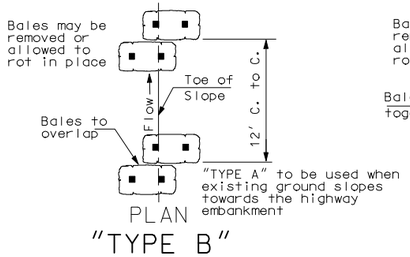
SILT FENCE
Supported and Unsupported



"TYPE A"

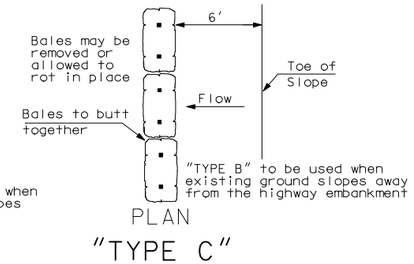






"TYPE A" to be used when existing ground slopes towards the highway embankment

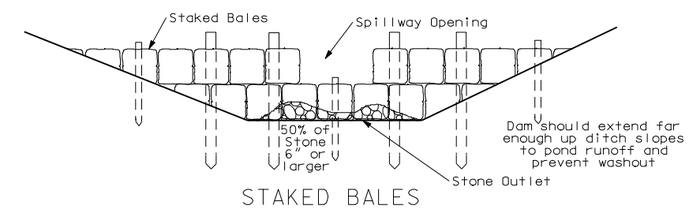
"TYPE B"



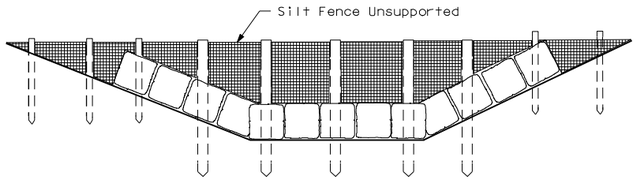
"TYPE B" to be used when existing ground slopes away from the highway embankment

"TYPE C"

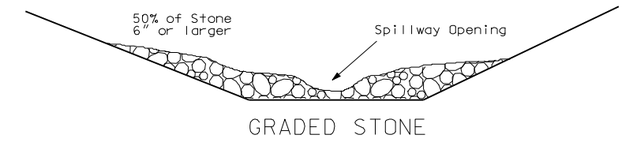
BALED HAY OR STRAW EROSION CHECKS



STAKED BALES

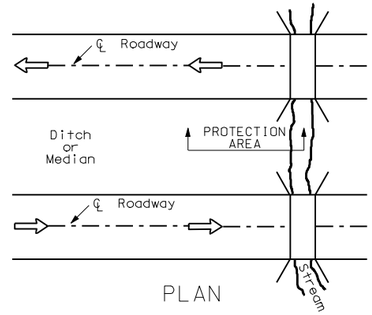


FENCE-BACKED BALES

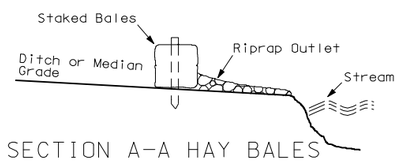


GRADED STONE

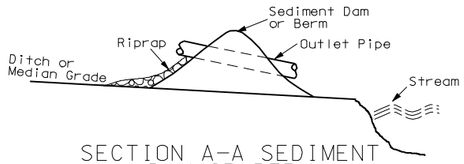
DITCH EROSION DAMS



PLAN

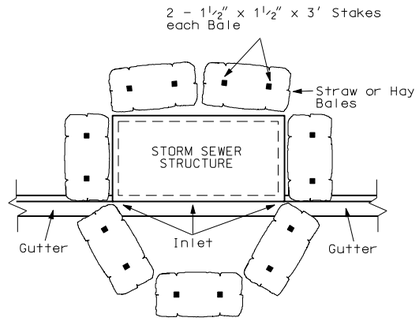


SECTION A-A HAY BALES

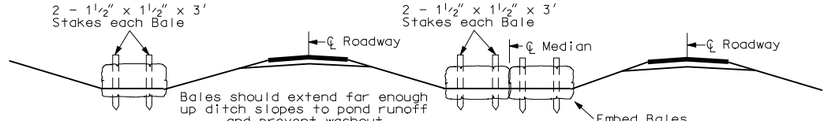


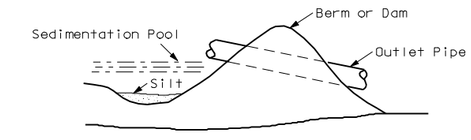
SECTION A-A SEDIMENT DAM OR BERM

MEDIAN OR DITCH PROTECTION AT STREAM CROSSING

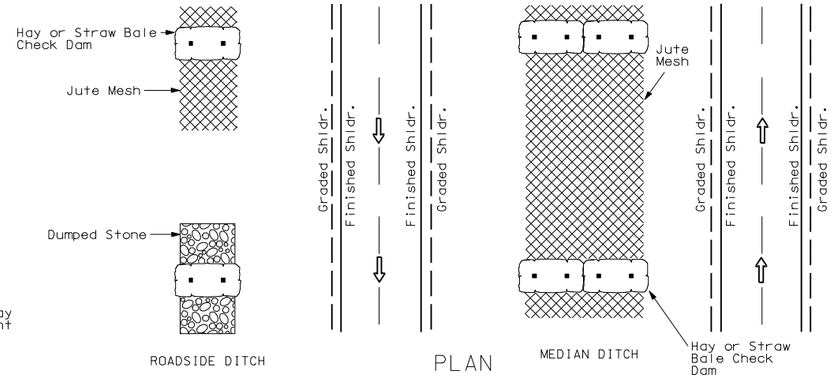


STORM SEWER INLET EROSION & SILTATION BARRIER





SMALL SEDIMENT DAM OR BERM



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

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

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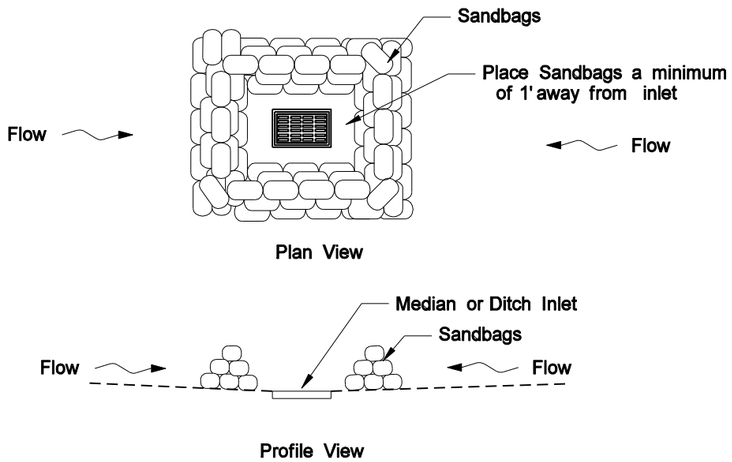
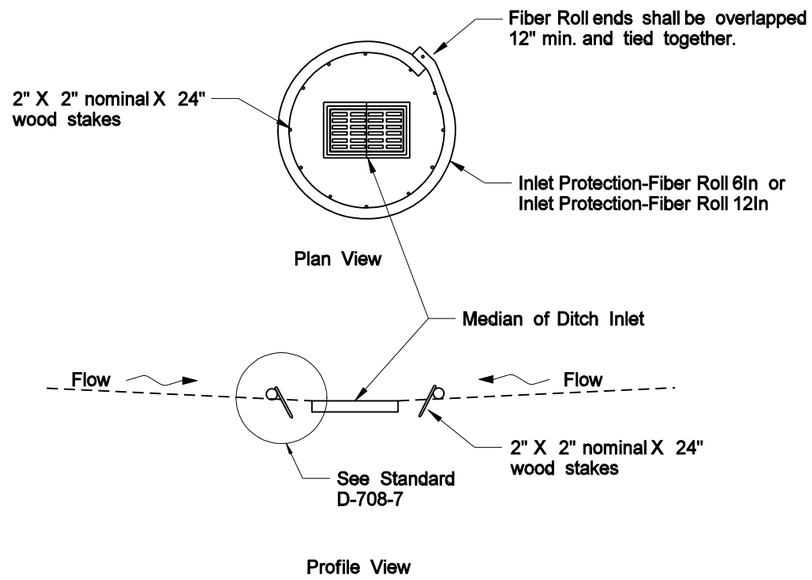
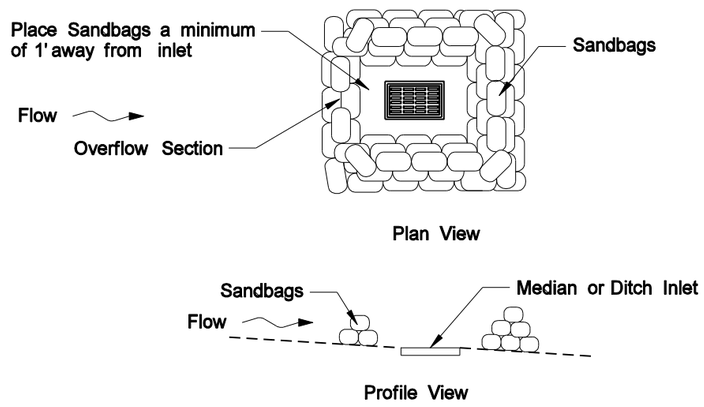
EROSION CONTROL
MEDIAN OR DITCH INLET PROTECTION

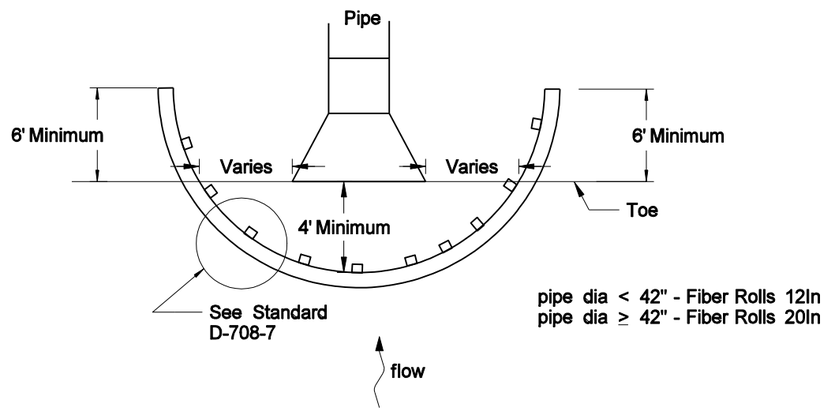


SANDBAG PROTECTION
LOW POINT





SANDBAG PROTECTION
ON SLOPE



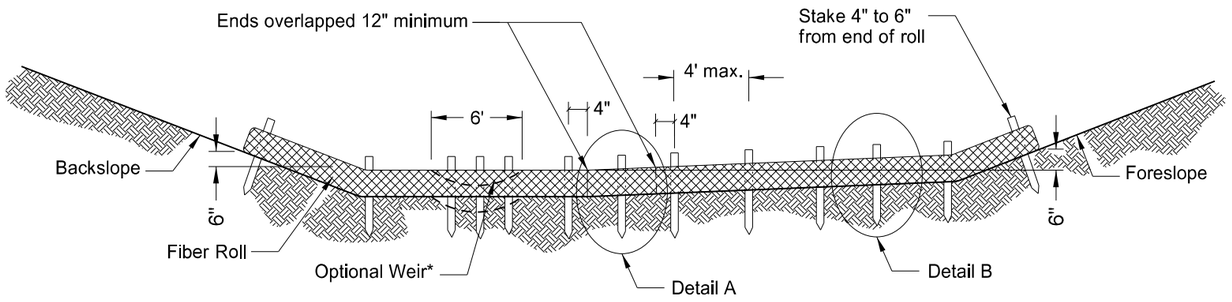
pipe dia < 42" - Fiber Rolls 12In
pipe dia ≥ 42" - Fiber Rolls 20In

FIBER ROLL PROTECTION
INLET OF PIPE END

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

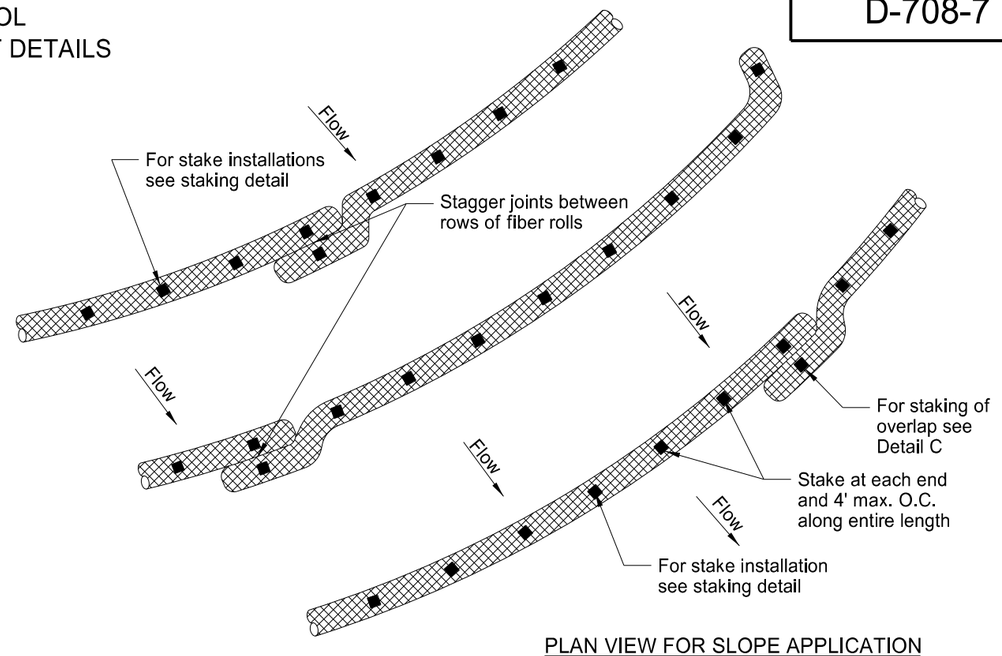
This document was originally issued and sealed by MARK S GAYDOS Registration Number PE-4518, on 12/14/07 and the original document is stored at the North Dakota Department of Transportation

EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

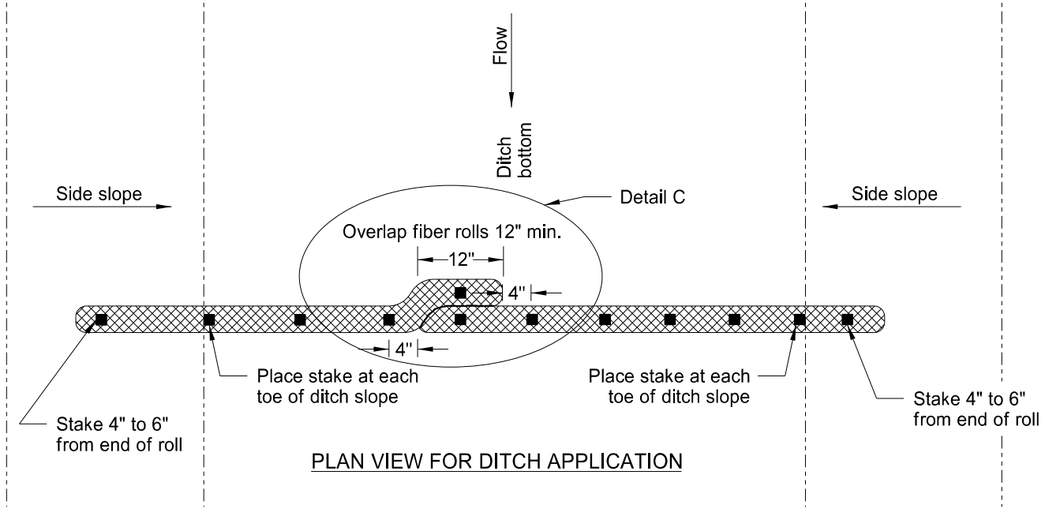


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up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

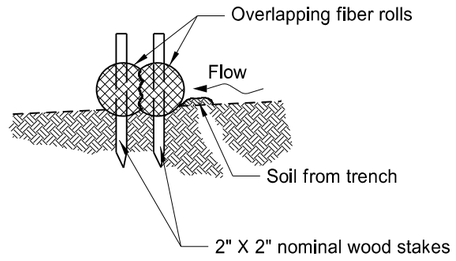
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



PLAN VIEW FOR SLOPE APPLICATION

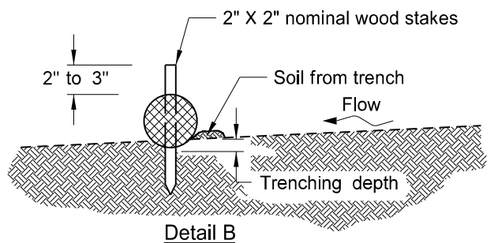


PLAN VIEW FOR DITCH APPLICATION



Detail A

Fiber Roll Overlapping Staking Detail



Detail B

Fiber Roll Staking Detail

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

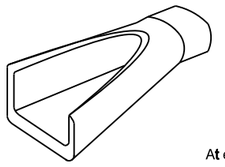
NOTE: Runoff must not be allowed to run under or around roll.

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

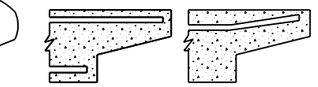
This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 06/10/13 and the original document is stored at the North Dakota Department of Transportation

REINFORCED CONCRETE PIPE CULVERT AND END SECTIONS

D-714-01

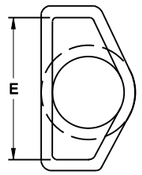


PERSPECTIVE

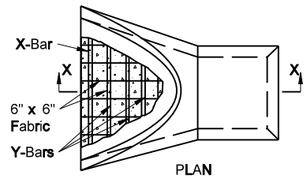


ARRANGEMENT FOR REINFORCEMENT

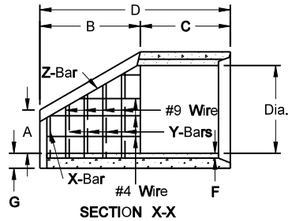
At end of 36" to 106" pipe. At end of 12" to 33" pipe.



END VIEW



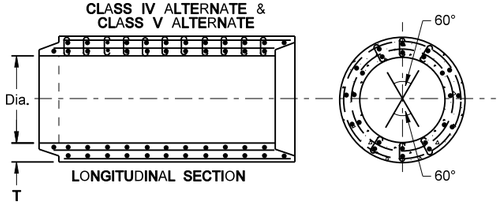
PLAN



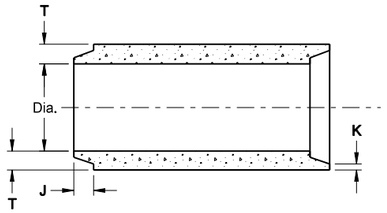
SECTION X-X
END SECTION

Equivalent to Class III Pipe

CLASS IV ALTERNATE &
CLASS V ALTERNATE



LONGITUDINAL SECTION



END SECTION

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

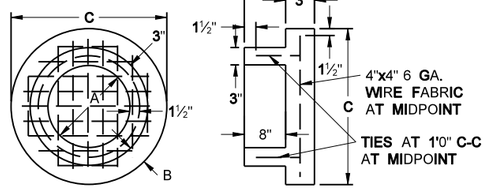
		All Classifications of Round Concrete Pipe				CLASS IV ALTERNATE								CLASS V ALTERNATE							
						D-LOAD TO PRODUCE A 0.01 INCH CRACK															
						2000								3000							
						3000								D-LOAD TO PRODUCE ULTIMATE LOAD							
							5000 P.S.I.								3750 5000 P.S.I.						
Internal Dia.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

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

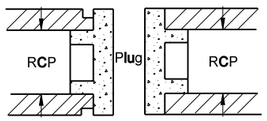
SEE STANDARD D-714-22 FOR DETAILS OF CONCRETE PIPE TIES (TIE BOLTS).

REINFORCED CONCRETE PIPE PLUG

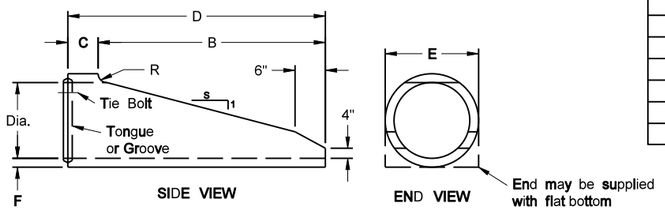
CONCRETE PIPE PLUG			
DIMENSIONS (in inches)			
PIPE DIAMETER	A	B	C
15	8	2.25	19.5
18	11	3.0	23.0
21	14	3.25	26.5
24	17	3.50	30.0
27	20	3.75	33.5
30	23	4.0	37.0
33	26	4.25	40.5
36	29	4.50	44.0
42	35	5.0	51.0
48	41	5.50	58.0



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



TRAVERSABLE END SECTION



SIDE VIEW

END VIEW

TRAVERSABLE END SECTION							
DIA	B	C	D	E	F	R	S
15"	4'	9"	4'-9"	1'-7½"	2¼"	3"	6
18"	5'-9"	9"	6'-6"	1'-11"	2½"	3"	6
24"	6'	1'	7'	2'-6"	3"	3"	4
30"	7'-6"	1'	8'-6"	3'-1"	3½"	3½"	4
36"	7'-6"	15"	7'-3"	3'-8"	4"	3"	4

NOTES (Traversable End Section):

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

NOTES:

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

10-1-86

REVISIONS

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

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

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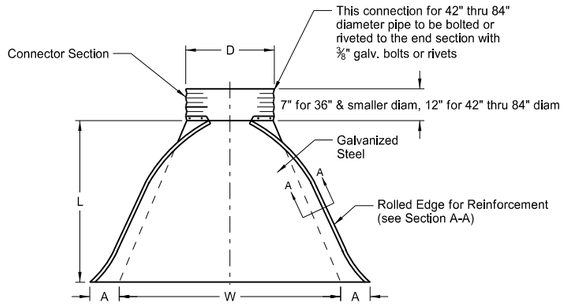
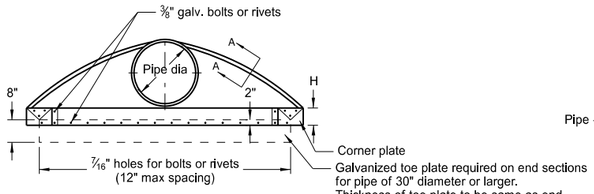
ROUND CORRUGATED STEEL PIPE CULVERTS AND END SECTIONS

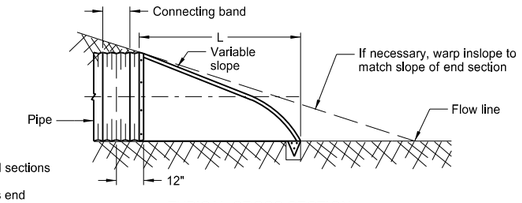
D-714-4



PLAN VIEW



ELEVATION VIEW



TYPICAL CROSS SECTION
(showing connector section)

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

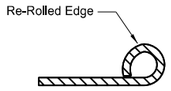
* These sizes have 0.109" sides and 0.138" center panels.

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

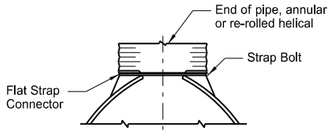
Manufacturers tolerances of above dimensions will be allowed.

Splices to be the lap riveted type.

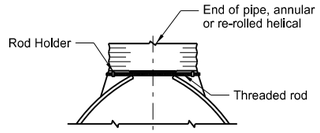
Multiple panel bodies shall have lap seams which are to be tightly joined with ⅜" dia. galv. bolts or rivets. Nuts to be torqued to 25 foot-lbs ±.



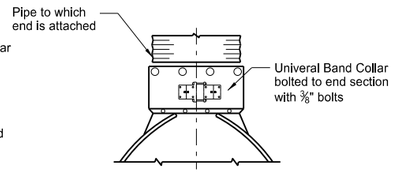
SECTION A-A



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



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

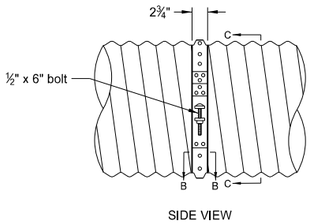


TYPE #3
For all pipe sizes

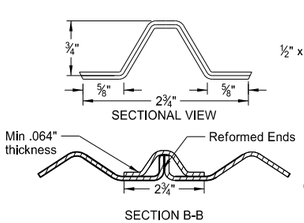
COUPLING BAND DIMENSIONS				
COUPLING TYPE	CORRUGATION PITCH x DEPTH	PIPE SIZE	COUPLING BAND LENGTH	MIN. BAND THICKNESS
Hat Band	2⅔" x ½"	12" - 48"	2¾"	.064"
Annular Band	2⅔" x ½"	12" - 72"	12"	.052"
		78" - 84"	12"	.079"
	3" x 1"	48" - 120"	14"	.052"
Hugger Band	2⅔" x ½" Rerolled End	12" - 72"	10½"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

NOTES:

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



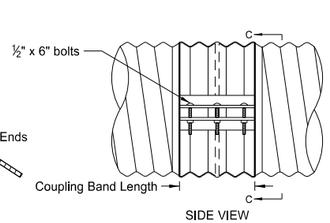
SIDE VIEW



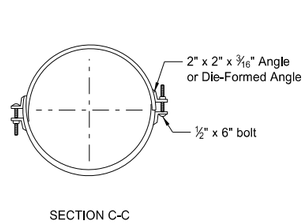
SECTIONAL VIEW

SECTION B-B

HAT BAND FOR FLANGED END PIPE

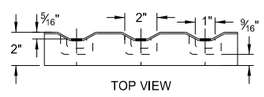


SIDE VIEW

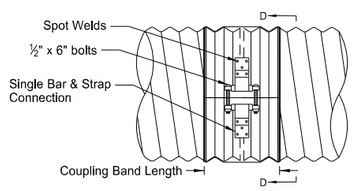


SECTION C-C
Angle Connection

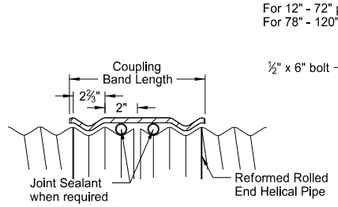
ANNULAR BAND



TOP VIEW
Die-Formed Angle Connector

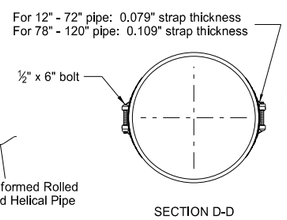


SIDE VIEW

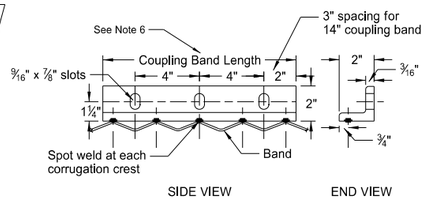


SECTIONAL VIEW

HUGGER COUPLING BAND



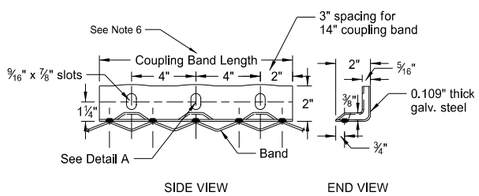
SECTION D-D
Bar & Strap Connection



SIDE VIEW

END VIEW

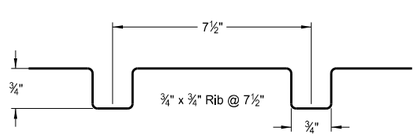
2" x 2" x 3/16" Angle Connector

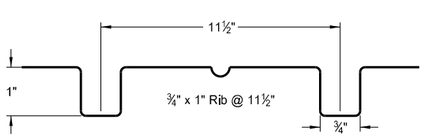


SIDE VIEW

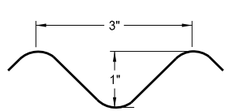
END VIEW

Die-Formed Angle Connector

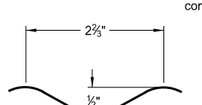




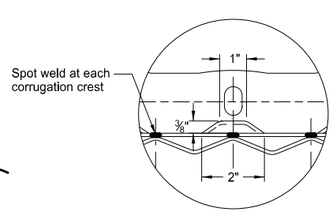
SPIRAL RIB CORRUGATIONS



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



2⅔" x ½" CORRUGATIONS

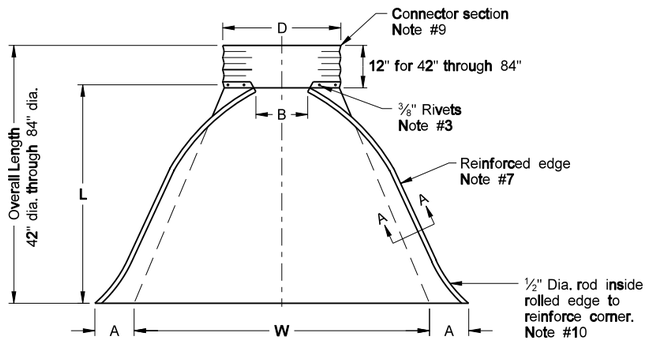


Detail A

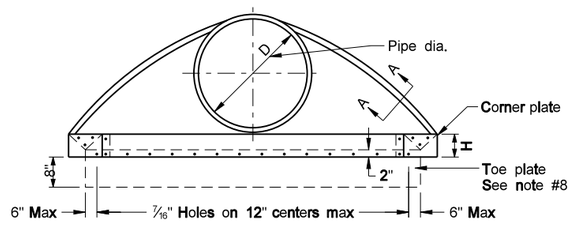
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
08-06-13	
REVISIONS	
DATE	CHANGE

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

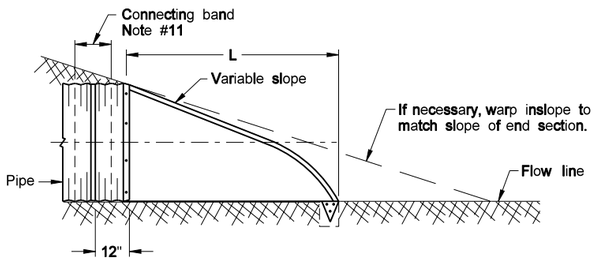
CORRUGATED ALUMINUM PIPE CULVERT AND END SECTIONS (ROUND PIPE)



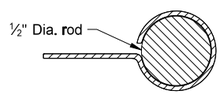
PLAN



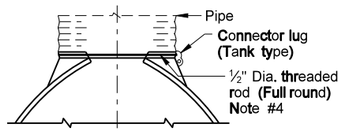
ELEVATION



TYPICAL CROSS SECTION
(Showing connector section)



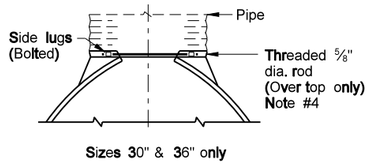
SECTION A-A



Sizes 18" & 24" only

½" Dia. threaded rod	
Pipe size	Length
18"	65"
24"	83"

2½" Threaded length both ends. ½"-13 UNC thread.

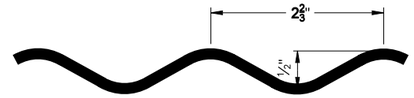


Sizes 30" & 36" only

⅝" Dia. threaded rod	
Pipe size	Length
30"	22¼"
36"	25⅝"

1¾" Thread length both ends. ⅝"-11 UNC thread

ROD CONNECTION DETAIL



2⅔" x ½" CORRUGATIONS

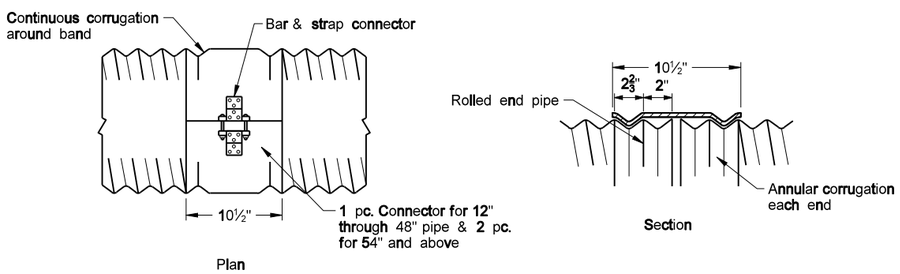
END SECTION										
* * PIPE DIA.	WATERWAY AREA	GALV. THICK.	DIMENSIONS					APPROX. SLOPE	BODY
			A	B	H	L	W		
IN	SQ FT		IN	IN	IN	IN	IN	RATE	PIECE
18	1.8	0.060	8	10	6	31	36	2½:1	1
24	3.1	0.060	10	13	6	41	48	2½:1	1
30	4.9	0.075	12	16	8	51	60	2½:1	1 or 2
36	7.1	0.075	14	19	9	60	72	2½:1	2
42	9.6	0.105	16	22	11	69	84	2½:1	2
48	12.6	0.105	18	27	12	78	90	2¼:1	2
54	16.0	0.105	18	30	12	84	102	2 :1	2
* 60	19.6	0.105	18	33	12	87	114	1¾:1	3
* 66	23.8	0.105	18	36	12	87	120	1½:1	3
* 72	28.3	0.105	18	39	12	87	126	1 1/3:1	3
* 78	33.2	0.105	18	42	12	87	132	1¼:1	3
* 84	38.5	0.105	18	45	12	87	138	1 1/6:1	3

* These sizes have 0.135" thick center panels.

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

Manufacturers tolerances of above dimensions will be allowed.

78" and 84" diameter pipe shall be 5% vertically elongated.



CONNECTING BAND DETAILS FOR HELICAL, WELDED-SEAM CULVERT

NOTES:

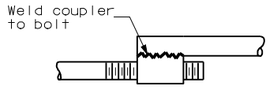
1. End sections shall be made from aluminum alloy 3004-0, clad 5% each side with alloy 7072.
2. Corner plate shall be the same material and thickness as end section.
3. Rivets shall be aluminum alloy 6053-T4.
4. Threaded rods shall be aluminum alloy 6061-T6.
5. Connector & side lugs, bolts, and nuts shall be hot-dipped galvanized steel.
6. Multiple panel bodies shall have 2" lap seams which are to be tightly joined with ⅜" diameter rivets spaced 6" c. to c.
7. Top edge of all end sections to have rolled edge reinforcement (See section A-A). The rolled edge is to be supplemented with 2"x2"x¼" aluminum alloy angle for 60" through 72" diameter and 2½"x2½"x¼ angle for 78" and 84" diameter. Angles to be attached by ⅜" dia. bolts and nuts. Angles are to extend from pipe to the corner wing bend.
8. Aluminum alloy toe plate required on end sections for pipe of 30" diameter or larger. Thickness of toe plate to be same as end section. Where toe plate is needed, the toe plate, nuts, and bolts are to be included in price bid for end sections.
9. Connector section, when specified, shall be corrugated aluminum alloy pipe culvert.
10. Reinforcement for edge of end section shall be alloy 6063-F.
11. Pipe and connection bands shall conform to applicable sections of NDDOT Standard specifications and to AASHTO M-196 and M-211.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
04-28-89	Toe plate note
06-25-03	Revised layout
12-01-04	PE Stamp added
12-08-08	Removed min/max fill info

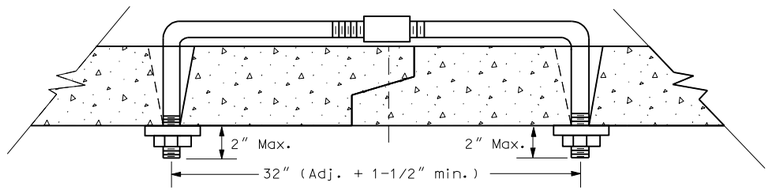
This document was originally issued and sealed by Terrence R. Udland, Registration Number PE- 2674 , on 12/08/2008 and the original document is stored at the North Dakota Department of Transportation

D-714-22

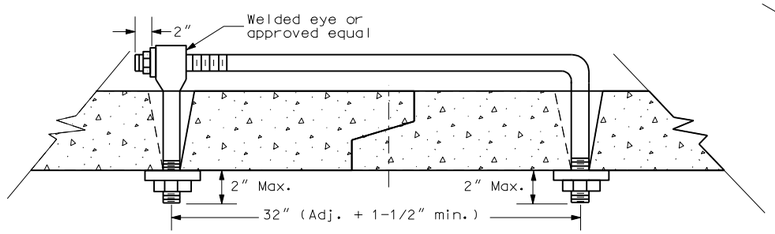
CONCRETE PIPE TIES



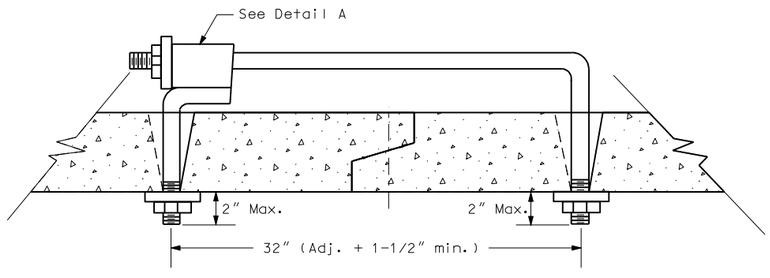
TOP VIEW



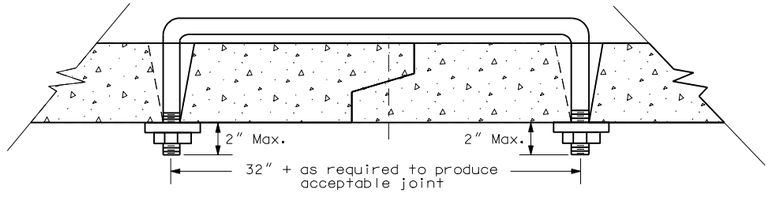
ADJUSTABLE TIE



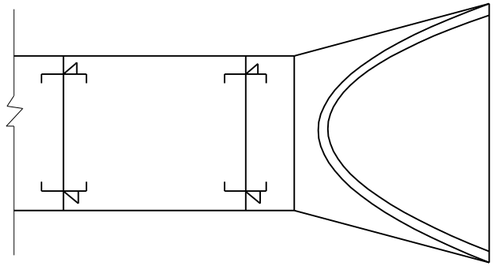
EYE BOLT TIE

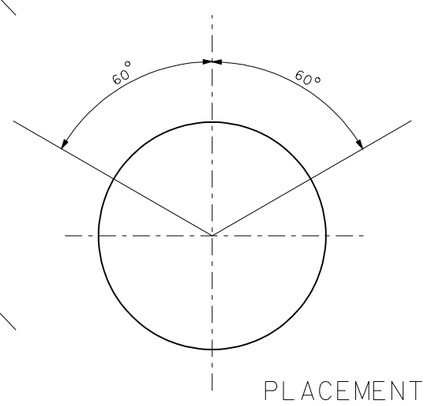


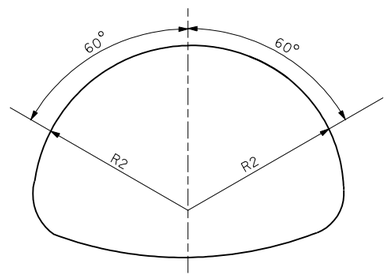
WELDED PIPE TIE



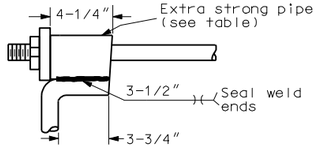
U BOLT TIE





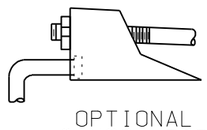


PLACEMENT OF HOLES



DETAIL A

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



OPTIONAL CANOPY TIE

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

NOTES:

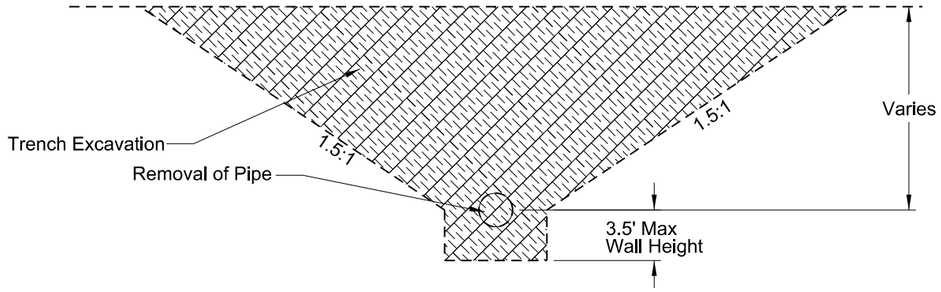
1. Pipe size listed is inside diameter of round pipe or equivalent diameter of pipe arch.
2. Nuts and washers are not required on inside of 21" diameter pipe or less.
3. Ties to be used only to hold pipe sections together, not for pulling sections tight.
4. Tie bolts shall be painted after fabrication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

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

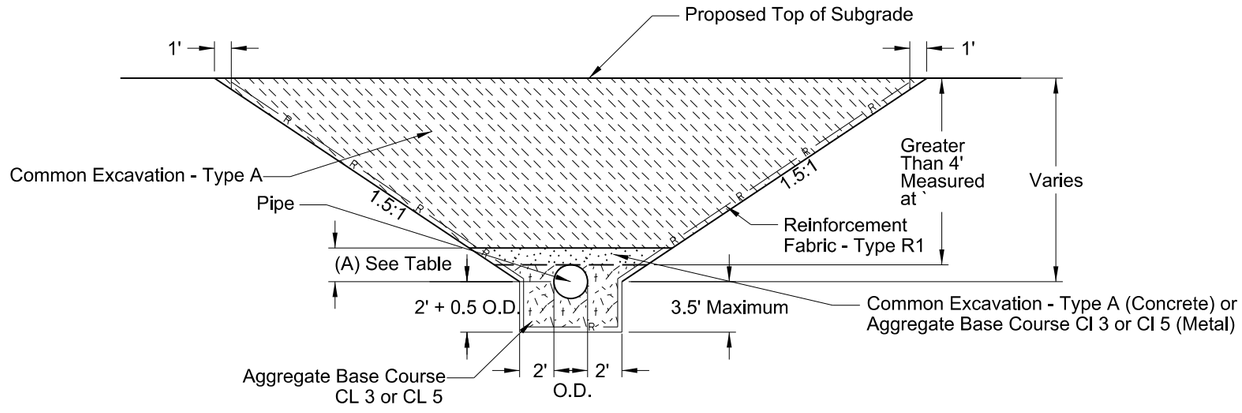
This document was originally issued and sealed by MARK S GAYDOS, Registration Number PE-4518, on 12/01/04 and the original document is stored at the North Dakota Department of Transportation

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

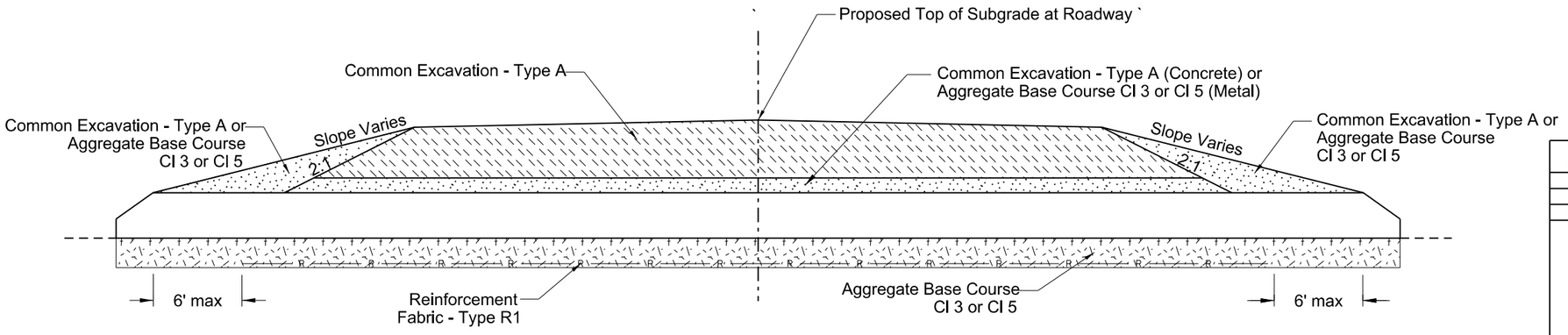
D-714-25



EXCAVATION DETAIL



INSTALLATION DETAIL



CROSS SECTION

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

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

NOTES:

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

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

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

This document was originally issued and sealed by Ron Horner, Registration Number PE-2087, on 7/26/13 and the original document is stored at the North Dakota Department of Transportation

NOTES:

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

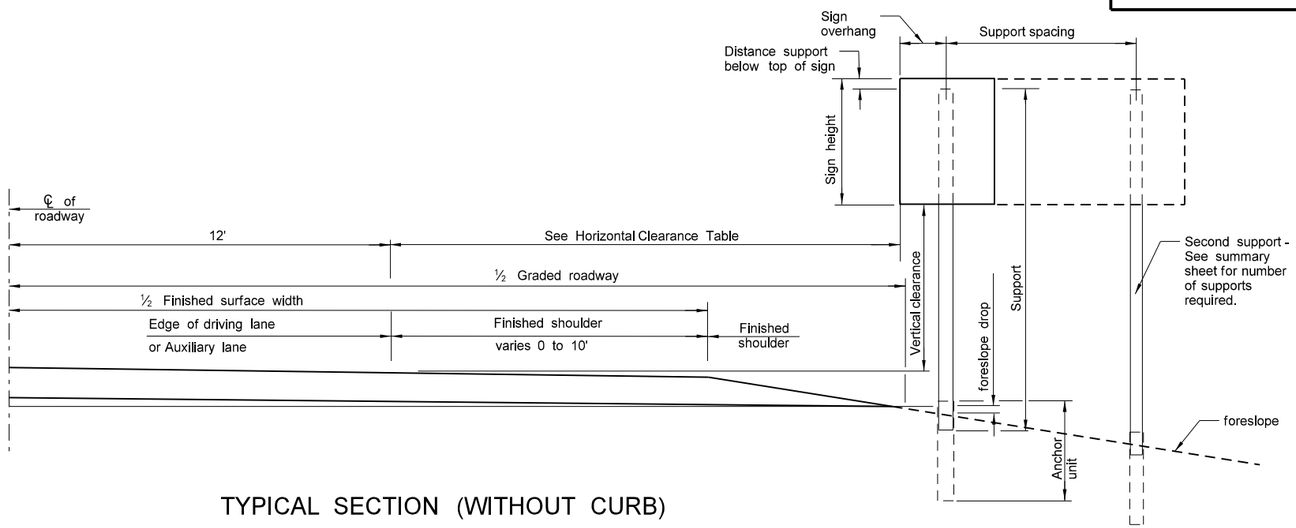
2. Minimum Vertical clearance: Signs installed at the side of the road in rural districts shall be at least 5' measured from the bottom of the sign to the edge of the driving lane or auxillary lane. Where parking or pedestrian movements occur, the clearance to the bottom of the sign shall be at least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

Directional signs on expressways and freeways shall be installed with a minimum height of 7'. If the secondary sign is mounted below another sign, the major sign shall be installed at least 8' and the secondary sign shall be installed at least 5' above the edge of the driving lane. All route signs, warning signs, and regulatory signs on expressways and freeways shall be at least 7' above the edge of the driving lane. Where signs are placed at least 30 feet or more from the edge of the traveled way, the height to the bottom of such sign shall be 5' above the edge of the driving lane.

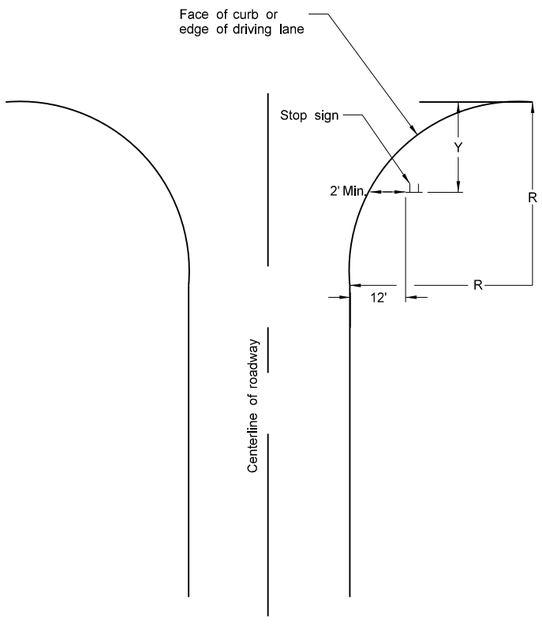
The vertical clearance shall have a maximum height of 6" above the vertical clearance specified above.

HORIZONTAL CLEARANCE TABLE	
SHOULDER WIDTH ft	OFFSET ft
0 to 2	16
>2 to 4	18
>4 to 6	20
>6 to 8	22
>8 to 10	24

ASSEMBLY DETAILS



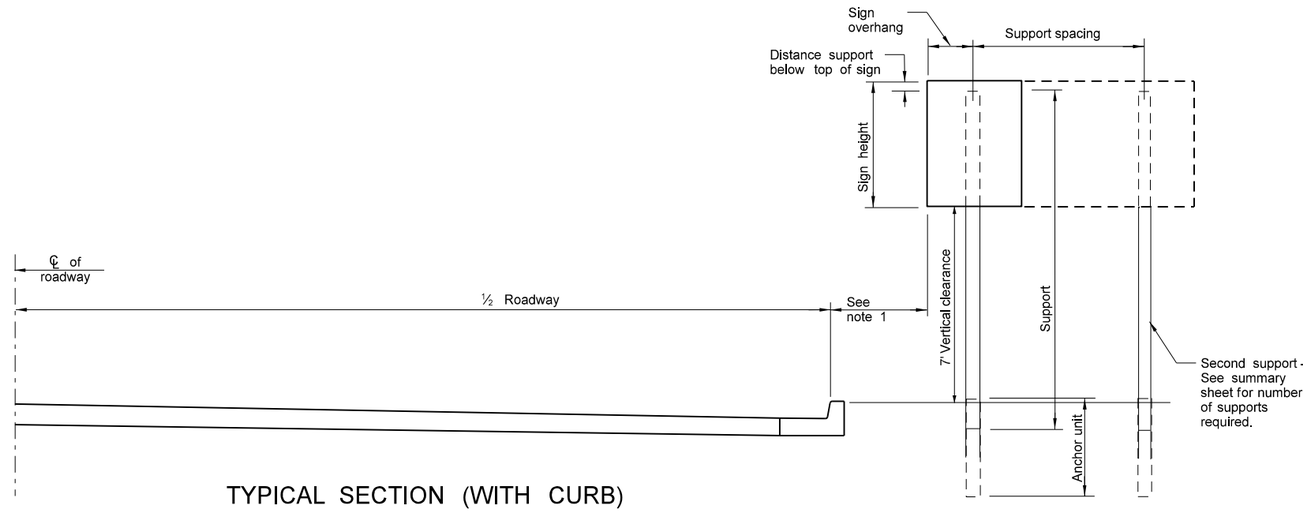
TYPICAL SECTION (WITHOUT CURB)



R=Radius	Y-Max	Y-Min
40'	50'	15'
45'	50'	18'
50'	50'	21'
55'	50'	25'
60'	50'	28'
65'	50'	32'
70'	50'	35'
75'	50'	39'
80'	50'	43'

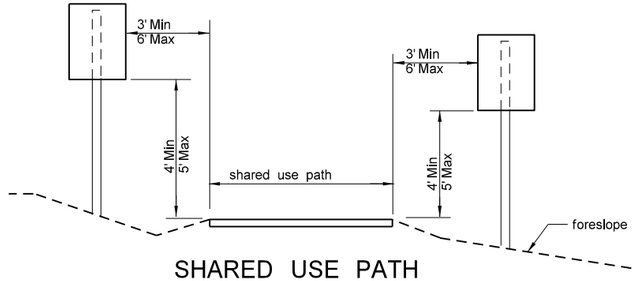
STOP SIGN LOCATION WIDE THROAT INTERSECTION

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



TYPICAL SECTION (WITH CURB)

Residential or Business District



SHARED USE PATH

Bicycle - Pedestrian Path

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

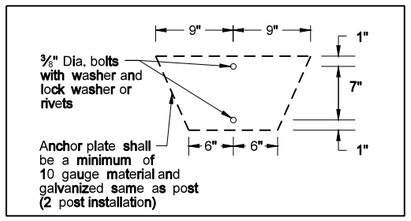
This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 12-1-10 and the original document is stored at the North Dakota Department of Transportation

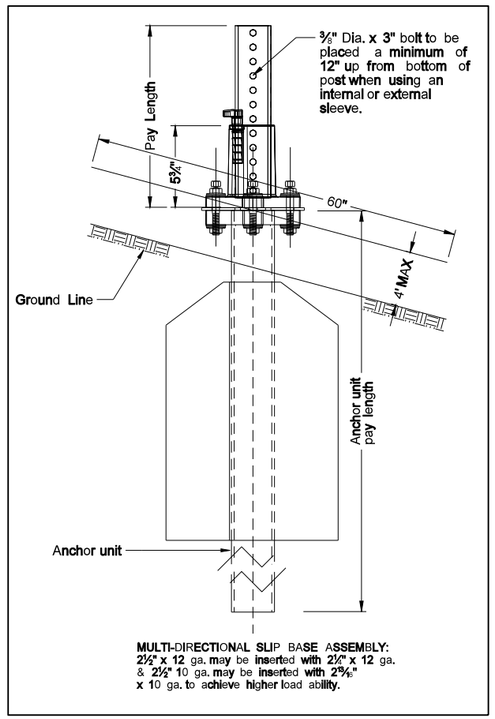
Mounting Details Perforated Tube

D-754-24

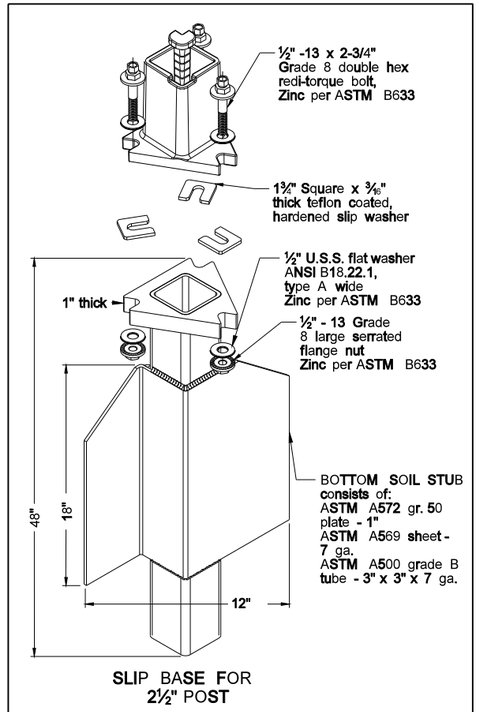
Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Gauge
1	2	12			No	2½	12
1	2½	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2½	12	2⅛(D)	12	Yes		7
1	2½	12	2½	12	Yes		7
2	2½	10			Yes		7
2	2½	12	2⅛(D)	12	Yes		7
2	2½	12	2½	12	Yes		7
3 & 4	2½	12			Yes		7
3 & 4	2½	10			Yes		7
3 & 4	2½	12	2½	12	Yes		7
3 & 4	2½	12	2⅛(D)	12	Yes		7
3 & 4	2½	10	2⅜	10	Yes		7

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

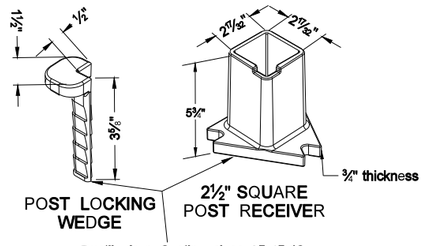




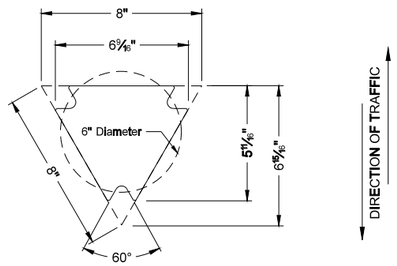
MULTI-DIRECTIONAL SLIP BASE ASSEMBLY: 2½" x 12 ga. may be inserted with 2½" x 12 ga. & 2½" 10 ga. may be inserted with 2⅜" x 10 ga. to achieve higher load ability.



SLIP BASE FOR 2½" POST



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



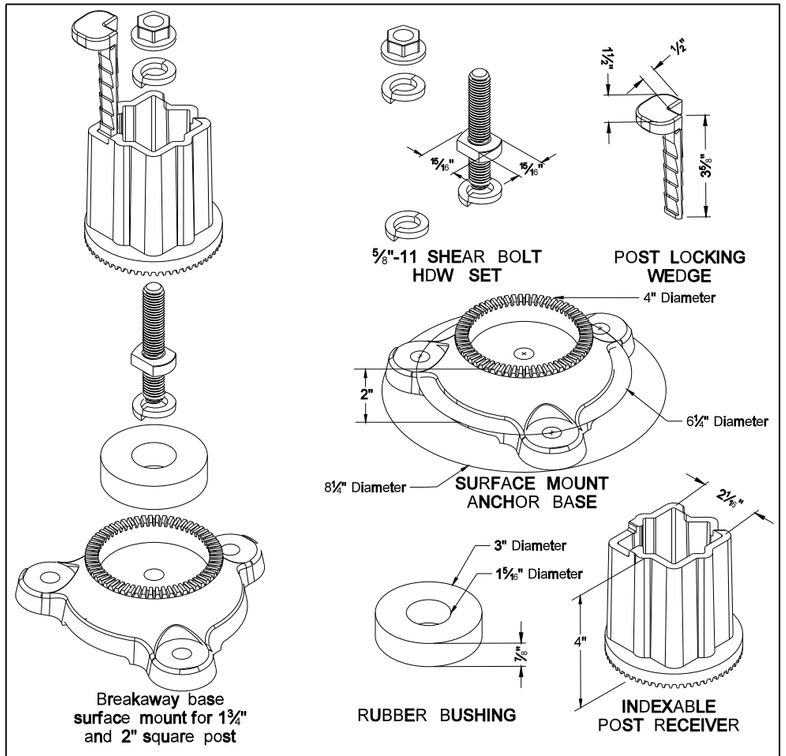
SLIP BASE DETAIL

Properties of Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness in.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia in.⁴	Cross Sect. Area in.²	Section Modulus in.³
1½ x 1½	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2¼ x 2¼	0.105	12	2.773	0.561	0.695	0.499
2⅜ x 2⅜	0.135	10	3.432	0.605	0.841	0.590
2½ x 2½	0.105	12	3.141	0.804	0.803	0.643
2½ x 2½	0.135	10	4.006	0.979	1.010	0.783

The 2 ⅜" size 10 gauge is shown as 2.19" size on the plans; The 2½" size is shown as 2.51" size on the plans.

NOTE:

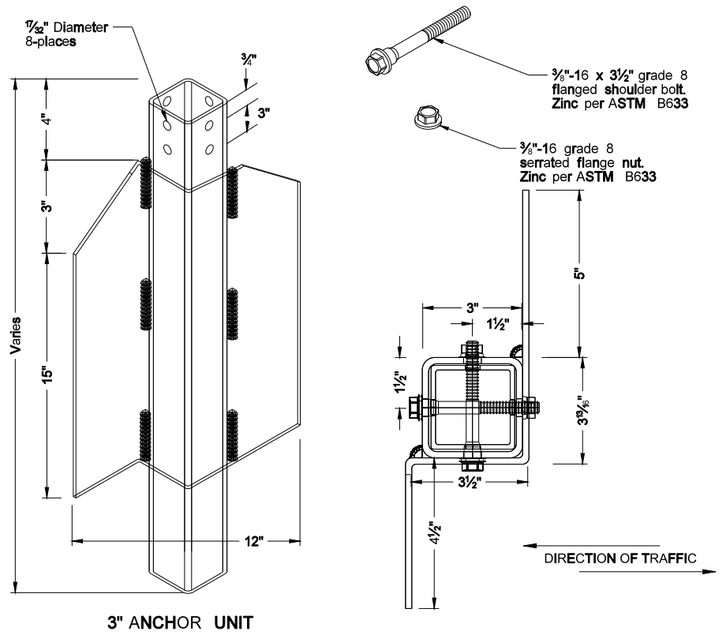
1. 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.
2. Anchor material shall be 7 guage H.R.P.O. Commmercial quality ASTM A569 and 3" x 3" x 7" guage ASTM A500 grade B. Anchor shall have a yield strength 43.9 KSI and tensile strength of 59.3 KSI. Anchor shall be hot dipped galvanized per ASTM A123/153. All tolerances on anchor unit and slip base bottom assembly are +/- 0.005" unless otherwise noted.
3. When used in concrete sidewalk, anchor shall be the same concept without the wings
4. Four post signs shall have over 8' between the first and fourth posts.
5. Installation procedures as per manufacturers recommendation.
6. Concrete fasteners for surface mount breakaway base shall be a minimum ½" diameter x 4" grade 8.



SURFACE MOUNT ANCHOR BASE

SHOULDER BOLT

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



3" ANCHOR UNIT

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

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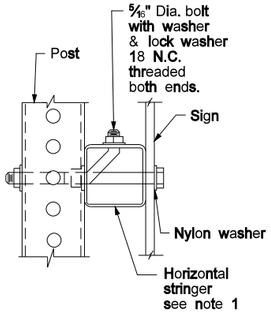
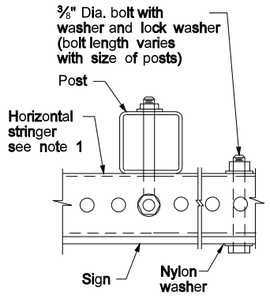
Mounting Details Perforated Tube

D-754-25

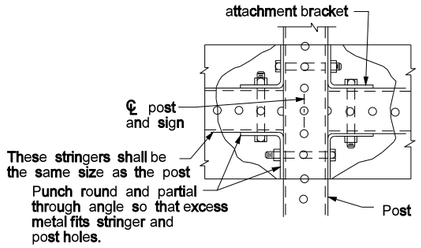


Side View

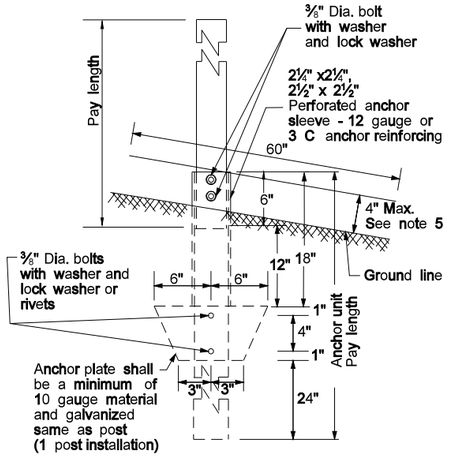


Top View

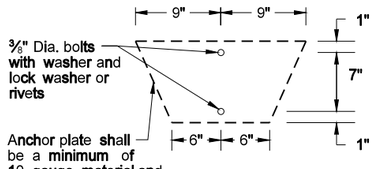
STRINGER MOUNTING (WITH STRINGER IN FRONT OF POST)



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



ANCHOR UNIT AND POST ASSEMBLY

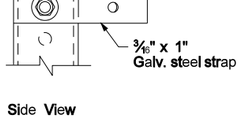


Note:

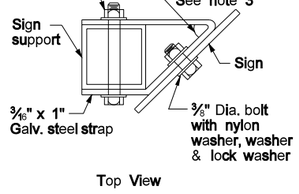
1. Horizontal stringers - In lieu of perforated tubes, the contractor may substitute z bar stringers. The z bar stringers shall be 1¾" x ⅜" thick, 1.08 lbs./ft aluminum or 3.16 lbs./ft steel.
2. Metal washers used on sign face shall have a minimum outside diameter of 15/16" ± 1/16" and 10 gauge thickness.
3. No Parking Signs: All no parking signs with directional arrows shall be placed at a 30 to 45 degree angle with the line of traffic flow. No parking signs required at the above angles may have the support turned to the correct angle. If the no parking sign is placed with another sign that has to be placed at a 90 degree angle with the line of traffic flow, the detailed angle strap should be used to mount the no parking sign. Flat washers and lock washers shall be used with all nylon washers. Material used for the attachment strap shall be included in the price bid for "Flat sheet for signs."
4. In lieu of using the bent bolt to attach the post to the stringer, the contractor may choose to punch the sign backing and place the bolt through the sign, the stringer and the post.
5. 4" vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.

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

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

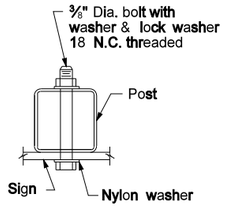


Side View

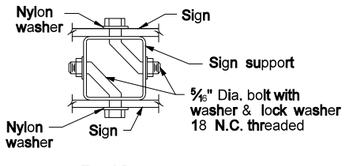


Top View

STRAP DETAIL



BOLT MOUNTING



Top View

BACK TO BACK MOUNTING

Properties of Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In.⁴	Cross Sect. area In.²	Section Modulus In.³
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2 x 2	0.105	12	2.416	0.372	0.590	0.372
2¼ x 2¼	0.105	12	2.773	0.561	0.695	0.499
2 3/16 x 2 3/16	0.135	10	3.432	0.605	0.841	0.590
2½ x 2½	0.105	12	3.141	0.804	0.803	0.643
2½ x 2½	0.135	10	4.006	0.979	1.010	0.783

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The 2½" size is shown as 2.51" size on the plans.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
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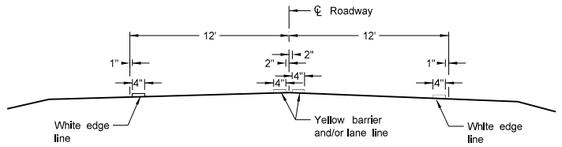
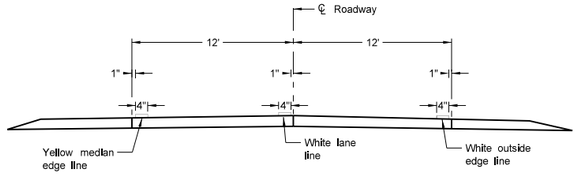
PAVEMENT MARKING

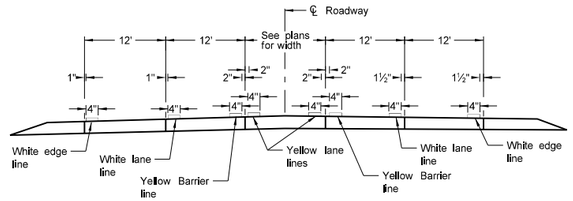
D-762-4



Two Lane Two Way
RURAL ROADWAY



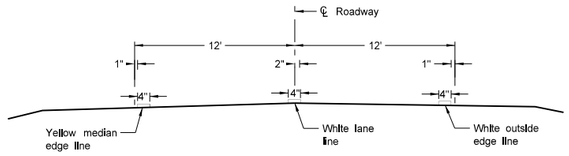
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



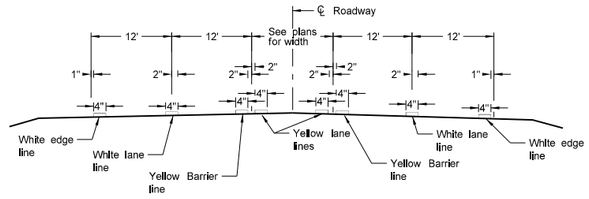
RURAL FIVE LANE ROADWAY
Concrete Section

NOTES:

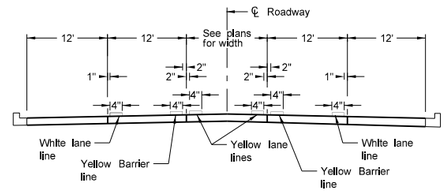
1. Edge lines shall be continued through private drives and field drives and broken for intersections.



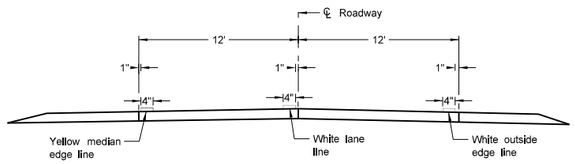
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



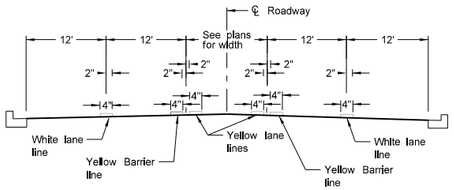
RURAL FIVE LANE ROADWAY
Asphalt Section



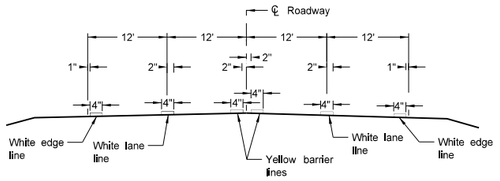
URBAN FIVE LANE SECTION
Concrete Section



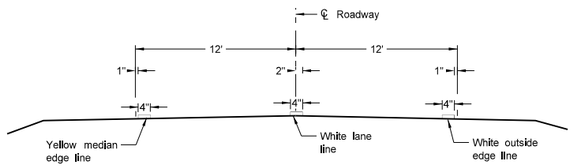
Two Lane Roadway
PRIMARY HIGHWAY
Concrete Section



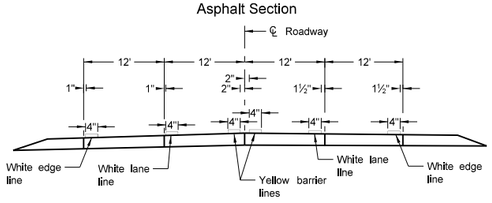
URBAN FIVE LANE SECTION
Asphalt Section



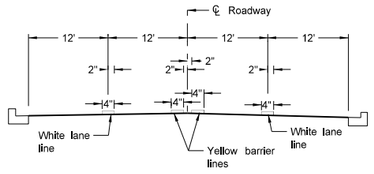
RURAL FOUR LANE ROADWAY
Asphalt Section



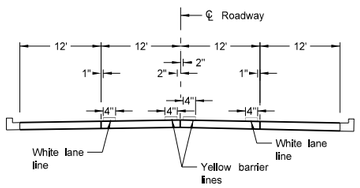
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



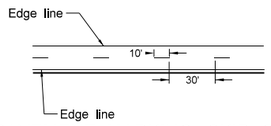
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
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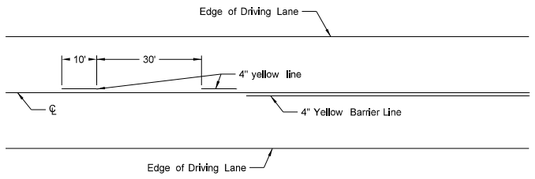
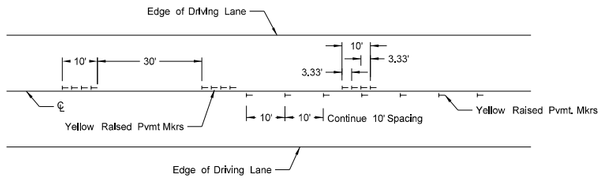
SHORT-TERM PAVEMENT MARKING

D-762-6

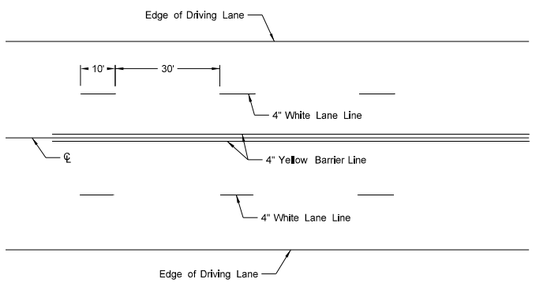


Painted or Tape Lines

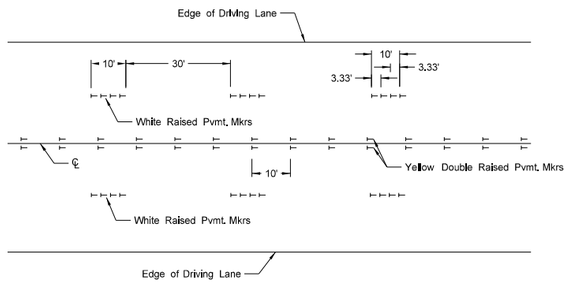


Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

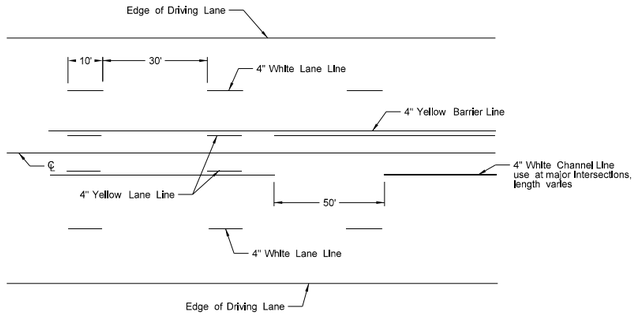


Painted or Tape Lines



Raised Pavement Markers

FOUR LANE ROADWAY



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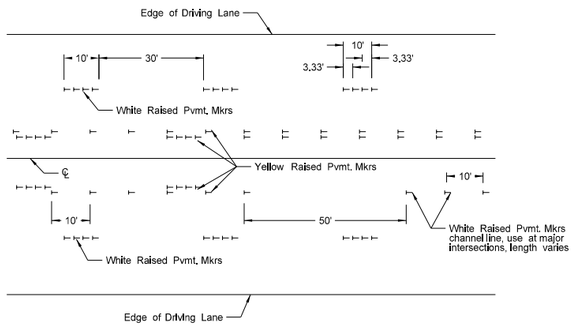
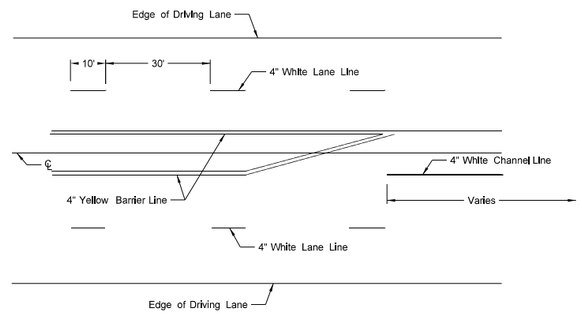
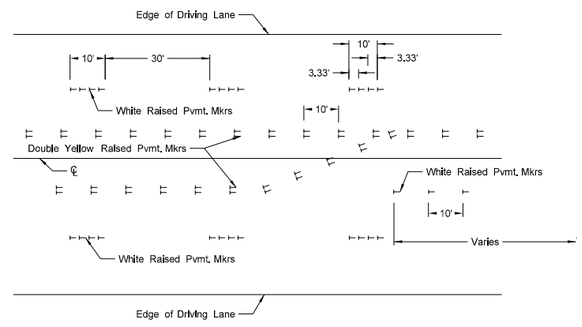


Raised Pavement Markers

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	
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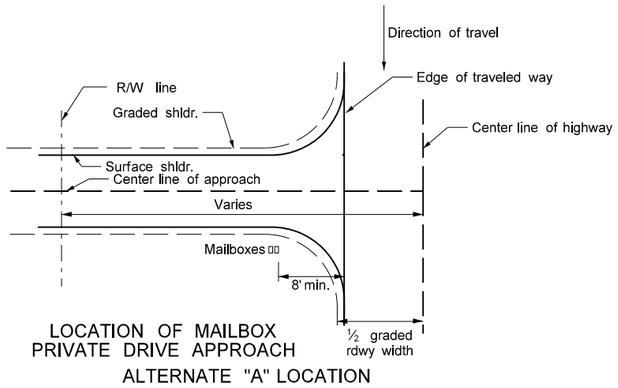
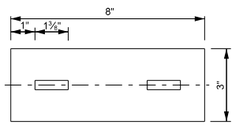
MAILBOX LOCATION DETAILS

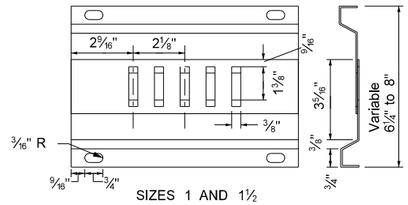
D-766-1



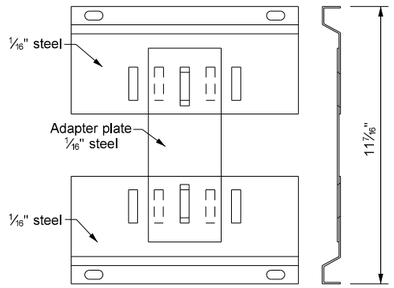
LOCATION OF MAILBOX
PRIVATE DRIVE APPROACH
ALTERNATE "A" LOCATION



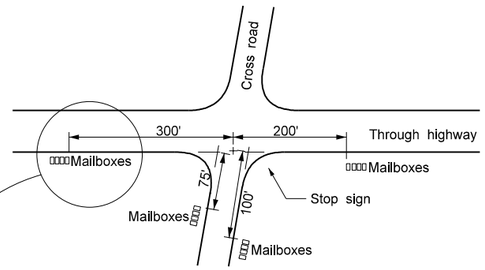
ADAPTOR PLATE



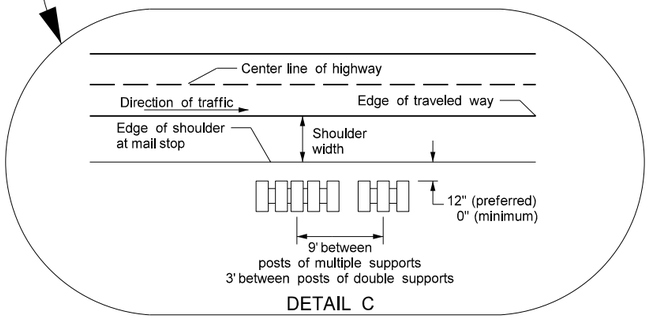
SIZES 1 AND 1½
MOUNTING BRACKET



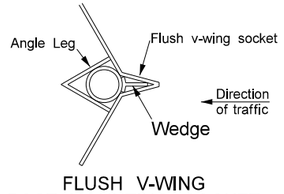
SIZE 2 WITH ADAPTOR PLATE
MOUNTING BRACKET



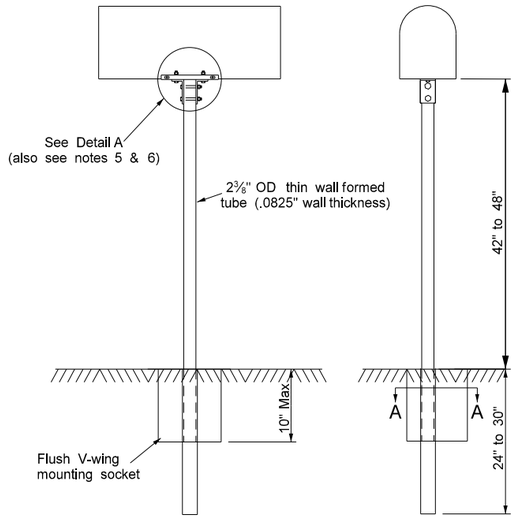
MINIMUM CLEARANCE DISTANCE TO NEAREST
MAILBOX ALONG ROADWAY AT INTERSECTIONS
ALTERNATE "B" LOCATION



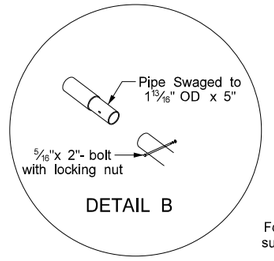
DETAIL C



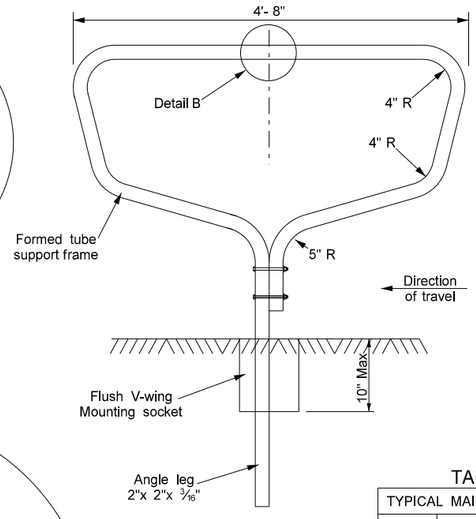
FLUSH V-WING
POST MOUNTING SOCKET
SECTION A-A



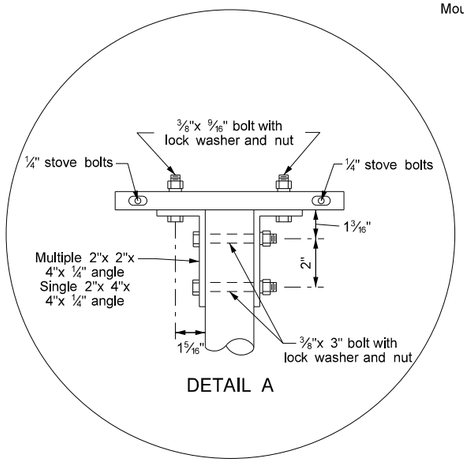
SIDE FRONT
SINGLE SUPPORT



DETAIL B



FRONT



DETAIL A

Notes:

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

   Tapco
   Traffic & Parking Control Co. Inc.

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

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

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

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

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

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

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

TABLE A

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

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

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