

STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0021(149)	1	17

Plotting Date: 03/28/2014

PLANS FOR PROPOSED
PROJECT P 0021(149)
SD HIGHWAY 44
DOUGLAS COUNTY
CULVERT REPLACEMENT, REPAIR & SLIPLINING

INDEX OF SHEETS

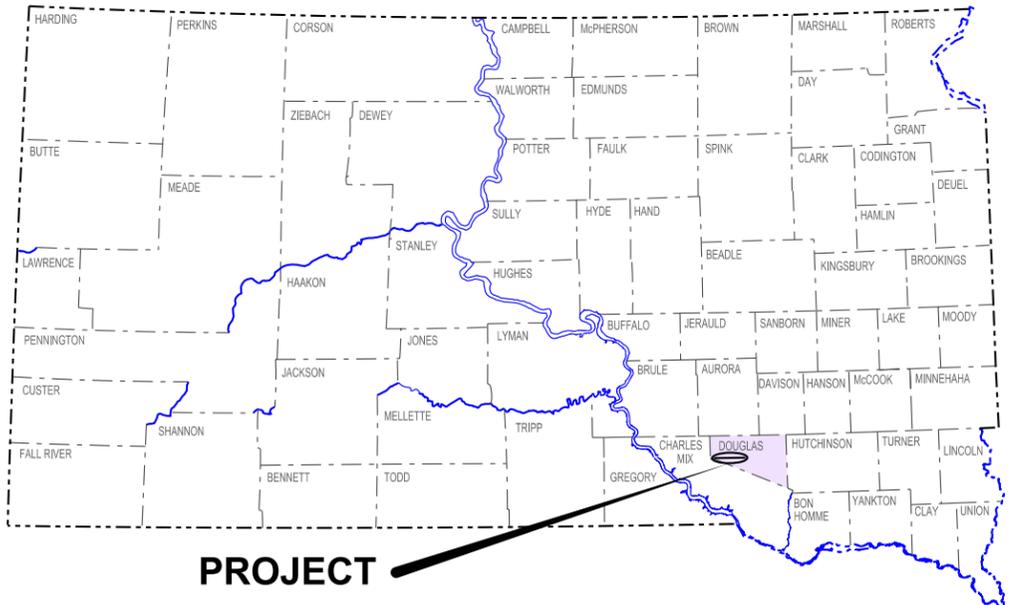
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PCN 041D

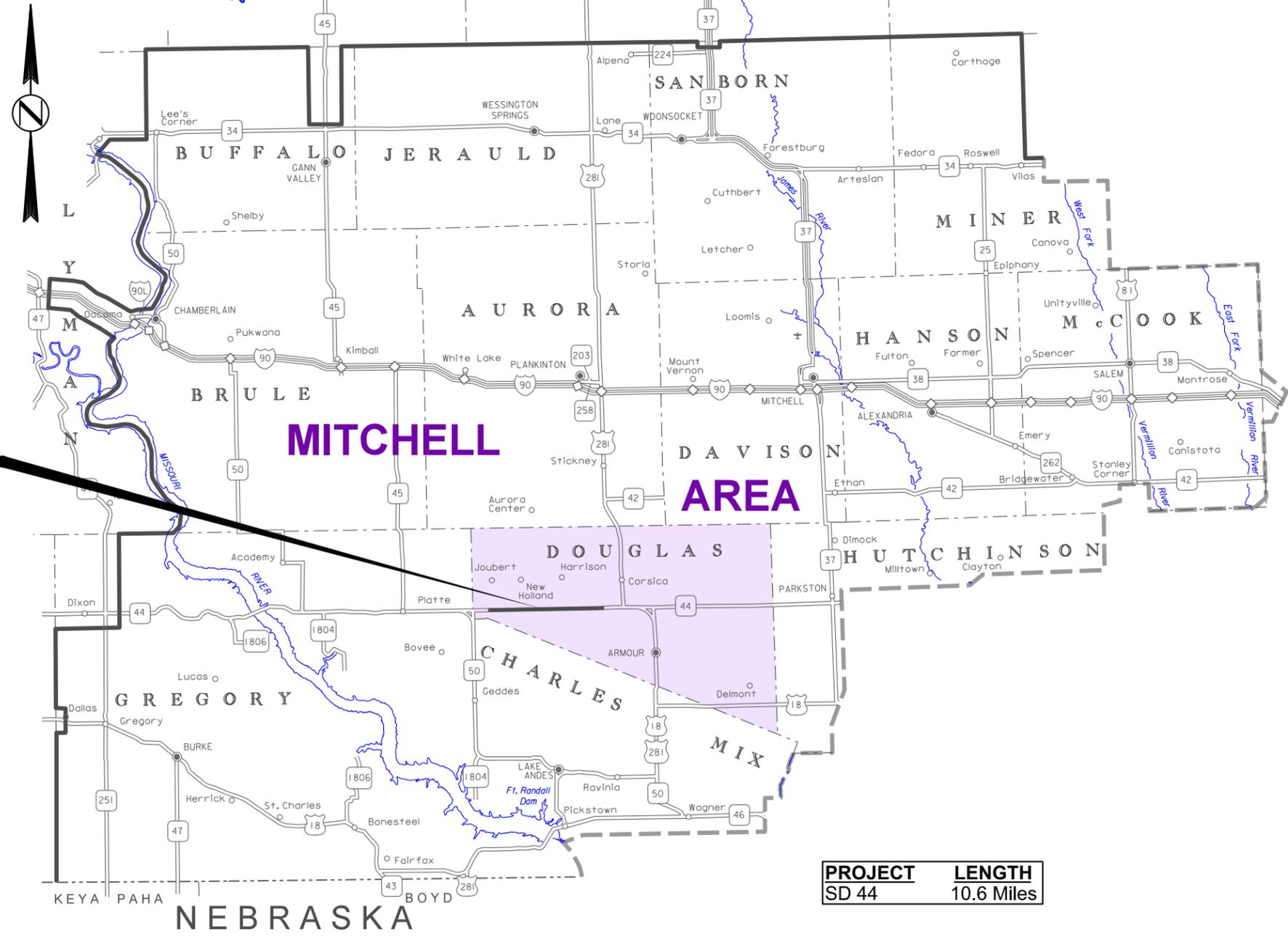
PLOT SCALE - 1"=7000'

PLOT NAME - 1

FILE - ... \CVL041D\TTL041D.DGN



PROJECT



PROJECT
SD44 MRM 314.44 to
SD44 MRM 324.99

STORM WATER PERMIT
(None required)

DESIGN DESIGNATION

ADT(2013)	1,428
ADT(2033)	1,945
DHV	268
D	50%
T DHV	12.9%
T ADT	28.4%
V	65 MPH

PROJECT LENGTH
SD 44 10.6 Miles

5

PLOTTED FROM - TERMIN15

ESTIMATE OF QUANTITIES

Bid Item Number	Item	Quantity	Unit
009E0010	Mobilization	Lump Sum	LS
110E0500	Remove Pipe Culvert	292	Ft
260E0050	Subbase, Modified	716.0	Ton
260E1010	Base Course	235.0	Ton
320E1200	Asphalt Concrete Composite	71.0	Ton
421E0100	Pipe Culvert Undercut	29	CuYd
450E3012	24" RCP Arch Class 2, Furnish	140	Ft
450E3020	24" RCP Arch, Install	140	Ft
450E4600	24" RCP Arch Sloped End, Furnish	4	Each
450E4601	24" RCP Arch Sloped End, Install	4	Each
450E4759	18" CMP 16 Gauge, Furnish	52	Ft
450E4760	18" CMP, Install	52	Ft
450E4769	24" CMP 16 Gauge, Furnish	64	Ft
450E4770	24" CMP, Install	64	Ft
450E4779	30" CMP 16 Gauge, Furnish	24	Ft
450E4780	30" CMP, Install	24	Ft
450E5211	18" CMP Flared End, Furnish	2	Each
450E5212	18" CMP Flared End, Install	2	Each
450E5215	24" CMP Flared End, Furnish	4	Each
450E5216	24" CMP Flared End, Install	4	Each
450E5219	30" CMP Flared End, Furnish	2	Each
450E5220	30" CMP Flared End, Install	2	Each
450E9218	Slipline 18" Pipe	58	Ft
450E9224	Slipline 24" Pipe	162	Ft
450E9226	Slipline 30" Pipe	64	Ft
462E0200	Controlled Density Fill	3.0	CuYd
462E0250	Cellular Grout	9.5	CuYd
634E0010	Flagging	10	Hour
634E0100	Traffic Control	826	Unit
634E0120	Traffic Control, Miscellaneous	Lump Sum	LS
634E0330	Raised Pavement Markers	2,120	Ft
634E0610	4" Temporary Pavement Marking Tape Type 2	144	Ft
734E0010	Erosion Control	Lump Sum	LS
734E0154	12" Diameter Erosion Control Wattle	150	Ft
831E1010	Geogrid Reinforcement	458	SqYd

SPECIFICATIONS

Standard Specifications for Roads & Bridges, 2004 Edition and Required Provisions, Supplemental Specifications and/or Special Provisions as included in the Proposal.

ENVIRONMENTAL COMMITMENTS

An Environmental Commitment is a measure that SDDOT commits to implement in order to avoid, minimize, and/or mitigate a real or potential environmental impact. Environmental commitments to various agencies and the public have been made to secure approval of this project. An agency mentioned below with permitting authority can influence a project if perceived environmental impacts have not been adequately addressed. Unless otherwise designated, the Contractor's primary contact regarding matters associated with these commitments will be the Project Engineer. These environmental commitments are not subject to change without prior written approval from the SDDOT Environmental Office. The environmental commitments associated with this project are as follows:

COMMITMENT B: FEDERALLY THREATENED, ENDANGERED, AND PROTECTED SPECIES

COMMITMENT B2: WHOOPING CRANE

The Whooping Crane is a spring and fall migratory bird in South Dakota that is about 5 feet tall and typically stops on wetlands, rivers, and agricultural lands along their migration route. An adult Whooping Crane is white with a red crown and a long, dark, pointed bill. Immature Whooping Cranes are cinnamon brown. While in flight, their long necks are kept straight and their long dark legs trail behind. Adult Whooping Cranes' black wing tips are visible during flight.

Action Taken/Required:

Harassment or other measures to cause the Whooping Crane to leave the site is a violation of the Endangered Species Act. If a Whooping Crane is sighted roosting in the vicinity of the project, borrow pit, or staging site associated with the project, cease construction activities in the affected area until the Whooping Crane departs and contact the Project Engineer. The Project Engineer will contact the Environmental Office so that the sighting can be reported to USFWS.

COMMITMENT B4: BALD EAGLE

Bald eagles are known to occur in this area.

Action Taken/Required:

If a nest is observed within one mile of the project site, notify the Project Engineer immediately so that he/she can consult with the Environmental Office for an appropriate course of action.

COMMITMENT C: WATER SOURCE

The Contractor shall not withdraw water with equipment previously used outside the State of South Dakota without prior approval from the SDDOT Environmental Office. Thoroughly wash all construction equipment before entering South Dakota to reduce the risk of invasive species introduction into the project vicinity.

The Contractor shall not withdraw water directly from streams of the James, Big Sioux, and Vermillion watersheds without prior approval from the SDDOT Environmental Office.

Action Taken/Required:

The Contractor shall obtain the necessary permits from the regulatory agencies such as the Department of Environment and Natural Resources (DENR) and the United States Army Corps of Engineers (COE) prior to executing water extraction activities.

COMMITMENT D: WATER QUALITY STANDARDS

COMMITMENT D2: SURFACE WATER DISCHARGE

Action Taken/Required:

If construction dewatering is required, the Contractor shall obtain a Temporary Discharge Permit from the DENR and provide a copy to the Project Engineer. Contact the DENR Surface Water Program at 605-773-3351 to apply for a permit.

COMMITMENT E: STORM WATER

Construction activities constitute less than 1 acre of disturbance.

Action Taken/Required:

At a minimum and regardless of project size, appropriate erosion and sediment control measures must be installed to control the discharge of pollutants from the construction site.

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COMMITMENT H: WASTE DISPOSAL SITE

The Contractor shall furnish a site(s) for the disposal of construction and/or demolition debris generated by this project.

Action Taken/Required:

Construction and/or demolition debris may not be disposed of within the State ROW.

The waste disposal site(s) shall be managed and reclaimed in accordance with the following from the General Permit for Highway, Road, and Railway Construction/Demolition Debris Disposal Under the South Dakota Waste Management Program issued by the Department of Environment and Natural Resources.

The waste disposal site(s) shall not be located in a wetland, within 200 feet of surface water, or in an area that adversely affects wildlife, recreation, aesthetic value of an area, or any threatened or endangered species, as approved by the Project Engineer.

If the waste disposal site(s) is located such that it is within view of any ROW, the following additional requirements shall apply:

1. Construction and/or demolition debris consisting of concrete, asphalt concrete, or other similar materials shall be buried in a trench completely separate from wood debris. The final cover over the construction and/or demolition debris shall consist of a minimum of 1 foot of soil capable of supporting vegetation. Waste disposal sites provided outside of the State ROW shall be seeded in accordance with Natural Resources Conservation Service recommendations. The seeding recommendations may be obtained through the appropriate County NRCS Office. The Contractor shall control the access to waste disposal sites not within the State ROW through the use of fences, gates, and placement of a sign or signs at the entrance to the site stating "No Dumping Allowed".

2. Concrete and asphalt concrete debris may be stockpiled within view of the ROW for a period of time not to exceed the duration of the project. Prior to project completion, the waste shall be removed from view of the ROW or buried and the waste disposal site reclaimed as noted above.

The above requirements will not apply to waste disposal sites that are covered by an individual solid waste permit as specified in SDCL 34A-6-58, SDCL 34A-6-1.13, and ARSD 74:27:10:06.

Failure to comply with the requirements stated above may result in civil penalties in accordance with South Dakota Solid Waste Law, SDCL 34A-6-1.31.

All costs associated with furnishing waste disposal site(s), disposing of waste, maintaining control of access (fence, gates, and signs), and reclamation of the waste disposal site(s) shall be incidental to the various contract items.

COMMITMENT I: HISTORICAL PRESERVATION OFFICE CLEARANCES

The SDDOT has obtained concurrence with the State Historical Preservation Office (SHPO or THPO) for all work included within the project limits and all designated option borrow sites provided within the plans.

Action Taken/Required:

All earth disturbing activities not designated within the plans require review of cultural resources impacts. This work includes, but is not limited to: staging areas, borrow sites, waste disposal sites, and all material processing sites.

The Contractor shall arrange and pay for a cultural resource survey and/or records search. The Contractor has the option to contact the state Archaeological Research Center (ARC) at 605-394-1936 or another qualified archaeologist, to obtain either a records search or a cultural resources survey. A record search might be sufficient for review; however, a cultural resources survey may need to be conducted by a qualified archaeologist.

The Contractor shall provide ARC with the following: a topographical map or aerial view on which the site is clearly outlined, site dimensions, project number, and PCN. If applicable, provide evidence that the site has been previously disturbed by farming, mining, or construction activities with a landowner statement that artifacts have not been found on the site.

The Contractor shall submit the records search or cultural resources survey report and if the location of the site is within the current geographical or historic boundaries of any South Dakota reservation to SDDOT Environmental Engineer, 700 East Broadway Avenue, Pierre, SD 57501-2586 (605-773-3180). SDDOT will submit the information to the appropriate SHPO/THPO. Allow **30 Days** from the date this information is submitted to the Environmental Engineer for SHPO/THPO review.

If evidence for cultural resources is uncovered during project construction activities, then such activities shall cease and the Project Engineer shall be immediately notified. The Project Engineer will contact the SDDOT Environmental Engineer in order to determine an appropriate course of action.

SHPO/THPO review does not relieve the Contractor of the responsibility for obtaining any additional permits and clearances for staging areas, borrow sites, waste disposal sites, or material processing sites that affect wetlands, threatened and endangered species, or waterways. The Contractor shall provide the required permits and clearances to the Project Engineer at the preconstruction meeting.

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SCOPE OF WORK

Work on this project entails replacing entire culverts or sections of corrugated metal pipe culverts where pipe culverts have rusted completely through and sliplining the section under the roadway.

SEQUENCE OF OPERATIONS

The following Sequence of Operations shall be adhered to. Any changes must be approved in writing by the Area Engineer prior to changes being made.

Pipe Replacement Location

1. Install signing prior to start of work to close one half of the roadway.
2. Place erosion control, as applicable.
3. Excavate and remove culverts ½ roadway width.
4. Place new culvert sections ½ roadway width.
5. Backfill and compact the Subbase, Base Course and temporary ramps.
6. Switch traffic and repeat steps 3 through 5.
7. Seed the disturbed inslopes.
8. Remove ramps and place Asphalt Concrete Composite on both lanes.

Slipline Pipe Locations

1. Install signing prior to start of work.
2. Place erosion control, as applicable.
3. Excavate to expose culvert sections.
4. Remove, clean and place culvert.
5. Slipline culvert.
6. Place remaining culvert and end sections.
7. Restore the roadway inslopes.
8. Seed the disturbed inslopes.

UTILITIES

Utilities are not planned to be affected on this project. If utilities are identified near the improvement area through the SD One Call Process as required by South Dakota Codified Law 49-7A and Administrative Rule Article 20:25, the Contractor shall contact the Engineer to determine modifications that will be necessary to avoid utility impacts.

REINFORCED CONCRETE PIPE

All reinforced concrete pipe used on this project is Class II unless otherwise noted in the plans.

CORRUGATED METAL PIPE

Corrugated metal pipes shall have 2 ⅜-inch X ½-inch corrugations for 42-inch and smaller round pipe and 48-inch and smaller arch pipe unless otherwise stated in the plans. Corrugated metal pipes shall have 3-inch X 1-inch or 5-inch X 1-inch corrugations for 48-inch and larger round pipe and 54-inch and larger arch pipe unless otherwise stated in the plans.

REMOVE PIPE CULVERT

The pipe culvert removed and not reused on this project shall become property of the Contractor. Any materials not reused on the project shall be disposed of per the waste disposal site notes.

TIE BOLTS FOR RCP/RCP ARCH CULVERTS

Tie Bolts shall be installed on all new pipe sections and all new end sections.

Cost for providing and installing tie bolts shall be incidental to the contract unit prices for installing or resetting RCP Culverts and End Sections.

CULVERT REPAIRS FOR MAINLINE CULVERTS

The Contractor is encouraged to thoroughly investigate the culvert repair sites prior to bidding. Culvert removal will require the cutting of the in place corrugated metal pipe and connecting the new pipe to the in place pipe.

Compaction of inslope embankments shall be to the satisfaction of the Engineer.

It is not anticipated that water for compaction will be required. However, if in the opinion of the Engineer the fill material is extremely dry, water may be ordered and placed to the satisfaction of the Engineer. All costs for any added water shall be incidental to the contract unit prices for the various culvert contract items.

Hauling of embankment material on established traveled roadways shall be limited to trucks or small scrapers hauling legal loads and which do not cause damage to the roadway, as approved by the Engineer. Hauling of material in the roadway ditches will not be allowed.

The Contractor shall be responsible for restoration of any areas disturbed outside the limits of the work area.

Joints between concrete pipe culvert sections shall be protected against infiltration as indicated in Section 450.3.A of the Standard Specifications. If an existing concrete pipe culvert section has a damaged joint or there is poor alignment of the joints, 2 layers of drainage fabric shall be placed over the joint.

CLEANOUT PIPE CULVERTS

At those culvert locations where slipliner pipes shall be placed, the portions of the culvert not removed shall be cleaned out to maintain the lowest possible flow line, as approved by the Engineer. The ditches at the inlet and outlet shall also be cleaned.

Payment for pipe cleanout will be incidental to the respective sliplining pipe culvert bid items.

Cleanout of pipe culverts shall be done in advance of slipliner placement operations. It is the responsibility of the Contractor to visit the sites to determine the extent of culvert cleaning work required.

The Contractor shall implement appropriate sediment control measures prior to water flushing in order to prevent discharges from project boundaries.

SALVAGING, STOCKPILING, AND PLACING TOPSOIL

Prior to starting construction operations, a sufficient volume of topsoil shall be removed from the construction limits to cover the disturbed areas to the required thickness as indicated in these plans.

Following completion of grading operations, topsoil shall be spread evenly over the disturbed areas. The thickness will be approximately 4 inches.

Removal and replacement of topsoil will not be measured for payment but shall be incidental to the contract unit prices for the various bid items.

DITCH CLEANOUT

Ditch cleanout is required at all locations on SD Highway 44 where pipe culvert work is being completed. There shall be no specific contract item for ditch cleanout. Ditch cleanout shall be incidental to the various contract items.

Ditch cleanout shall extend from the end of the culvert to within 1 foot of the Right-of-Way (ROW) Line. The bottom of the ditch cleanout shall be a minimum of 10 feet wide and the side slopes on the channel shall be 20:1 or flatter. For those locations where there is no channel from the inlet/outlet of the culvert to the ROW Line ditch cleanout shall be completed such that there is a flat area of 100 Square Feet created at the inlet/outlet and the sides slopes around the flat area shall be 20:1 or flatter.

Material from the ditch cleanout may be placed on the inslopes at the ditch cleanout locations or spread on the backslopes as directed by the engineer.

REMOVE AND RESET TYPE II OBJECT MARKERS

The Contractor will be required to remove prior to the work and reset after the work the Type II Object Markers delineating the pipe ends. Cost for this work shall be incidental to the contract unit prices for the various items.

GPS COORDINATES

The approximate GPS coordinates of the work locations have been included in the plans to help verify the work locations. The coordinates are not to be used for survey control or locates without verification by the Contractor. In the event that the GPS coordinates do not match the Mileage Reference Marker indicated the Contractor shall notify the Engineer for verification of the work location.

PIPE CULVERT REPLACEMENT AT MRM 314.44

The Contractor shall be responsible for the maintenance of drainage between phases of construction for the culvert replacement ½ roadway width at a time. After the existing pipe culverts have been removed, the area shall be undercut to a minimum depth of 1 foot and backfilled with Subbase. The undercut area shall extend 2 feet from the outermost diameter on both sides of the pipes with the back of the excavated area being sloped 6:1 upward to the top of the roadway surface, as indicated on the Culvert Replacement Detail. The culvert excavation area shall be backfilled with Subbase. The Subbase shall be tapered outward at a slope of 6:1 to eliminate a vertical trench of granular backfill material. Compaction of backfilled material shall be governed by Specified Density.

PIPE CULVERT REPLACEMENT AT MRM 314.44 Continued

All costs to saw cut asphalt, remove and dispose of Asphalt, excavate and dispose of the material to the bottom of the pipe and slope the excavation limits at a 6:1 backslope, as indicated on the Culvert Replacement Detail, shall be incidental to the contract unit price per ton for Subbase. Undercut shall be paid for at the contract unit price per cubic yard for Pipe Culvert Undercut. Refer to the Culvert Replacement Detail for additional details.

Subbase shall be used to backfill up to the bottom of the Base Course. A depth of 12 inches of Base Course shall be placed above the Subbase backfill. 4 inches of Asphalt Concrete Composite shall be placed in 2-2 inch lifts on top of the 12 inches of Base Course.

Subbase shall meet the requirements of Section 882 of the Standard Specifications with the following exception. The specification for material passing the #200 sieve will be changed to 5.0-15.0%.

Location	Subbase (Ton)	Base Course (12" Depth) (Ton)	Asphalt Concrete Composite (4" Depth) (Ton)
SD HWY 44 314.44	716	235	71
Total:	716	235	71

TABLE OF PIPE CULVERT UNDERCUT

The Table of Pipe Culvert Undercut is intended to be used to establish an estimated quantity of Pipe Culvert Undercut for bidding purposes only. The depth of undercut is an estimate and the actual depth necessary shall be determined during construction. The Engineer will determine the amount of undercut in accordance with Section 421 of the Standard Specifications.

Location	Undercut Depth (Ft)	Quantity (CuYd)
SD HWY 44 314.44	1	28.5
Total =		28.5

GEOGRID

Geogrid shall be placed between the Subbase and Base Course layers. 458 square yards of geogrid have been included in the Estimate of Quantities. This quantity is assumed to cover 436 square yards. The grid quantity has been increased by 5% to account for overlaps.

Station	Width of Geogrid Placement (Ft)	Length of Geogrid Placement (Ft)	*** Quantity of Geogrid (SqYd)
SD HWY 44 314.44	36	109	458
Total =			458

*** Quantity of Geogrid listed in above table has been increased by 5% to account for overlaps.

GEOGRID Continued

Geogrid Specification:

The geogrid will be a biaxial grid of single layer construction. Vibratory welded, integrally formed or woven and coated geogrids will be acceptable. Grids with laser welded grid junctions will not be allowed. The geogrid will be certified by the supplier to meet the following specification prior to installation:

Property	Test	MARV
Wide Width Strip Tensile Strength (Ultimate)	ASTM6637 Method B	850lb/ft MD and XD

Geogrid will be paid for at the contract unit price per square yard. Payment quantities will be based on area covered plus 5%. Overlaps are accounted for by the additional 5%. Payment will be full compensation for furnishing and installing the geogrid only.

Installation Procedure:

1. The geogrid should be kept as taut as possible prior to backfilling.
2. Granular material will be dumped at least 20 feet behind the leading edge of the fill and pushed into place with a loader or dozer. Maximum lift thickness of material being placed shall be 8" un-compacted.
3. No equipment is to be allowed on the geogrid until the first lift of granular material is in place.
4. All seams in the geogrid will be overlapped at least 1 foot and in manner that prevents granular material being pushed under the geogrid.
5. Geogrid will be unrolled parallel to centerline.

CONTROLLED DENSITY FILL FOR PIPE

Controlled density fill shall be a flowable mortar material. Materials shall be in accordance with the Standard Specifications, except as modified below. The mix design shall be one of the following:

Material	Rate per Cubic Yard
Portland Cement Type I, II, III, or V	100 Lb
Fine Aggregate	2600 Lb
Coarse Aggregate	None
Water	60 Gal
Fly Ash, Type C	300 Lb

CONTROLLED DENSITY FILL FOR PIPE Continued

Or alternative mix design with CLSM (Controlled Low Strength Material):

Material	Rate per Cubic Yard
Portland Cement Type I, II, III, or V	200 Lb
Fine Aggregate	2600 Lb
Coarse Aggregate	None
Water	35 Gal
"W.R. Grace – Darafill" or approved equal	1 (3 oz.) capsule or equivalent *

* Shall be one 3 ounce capsule or equivalent CLSM performance additive (foaming admixture).

The fine aggregate shall be natural sand consisting of mineral aggregate particles conforming to the following gradation requirements:

Passing 3/8 Inch Sieve	100%
Passing No. 200 Sieve	0-10%

Both of the mix designs shown above are designed to produce a minimum compressive strength of 100 psi. The Engineer may allow adjustments to the proportion of water at the site to provide the necessary consistency of the mix.

Controlled density fill shall be contained within the required limits with sandbags or other methods approved by the Engineer.

The Contractor shall prevent the flotation or movement of the culvert due to the buoyant force from the controlled density fill until the controlled density fill hardens. Overlying surfacing materials shall not be placed sooner than four hours after placement of the controlled density fill.

All costs for furnishing and installing the controlled density fill, including sandbags, labor, materials, equipment and incidentals necessary to complete the work shall be included in the contract unit price per cubic yard for "Controlled Density Fill."

Plans quantity will be the basis for payment unless otherwise ordered by the Engineer.

Location	Quantity (CuYd)	Fill Height (between pipes)
SD HWY 44 MRM 314.44	3	0.8 feet

ASPHALT CONCRETE COMPOSITE

Asphalt Concrete Composite shall be placed in two lifts. Each lift shall be two inches thick and the slope shall match the existing slopes.

Mineral aggregate for the Asphalt Concrete Composite shall conform to the requirements of the Standard Specifications for Class E, Type 1.

All other requirements in the Standard Specifications for Asphalt Concrete Composite shall apply.

The asphalt binder used in the mixture shall be PG 64-22, PG 64-28 or PG 64-34 Asphalt Binder.

SLIPLINE PIPE

The Contractor shall furnish and install slipliner pipe at locations specified in the Table of Slipline Pipe. This work consists of slipping high density polyethylene (HDPE) or polyvinyl chloride (PVC) pipe liner inside existing pipe and grouting the void between the liner and the existing pipe.

The Contractor shall submit a proposed procedure for sliplining pipes, including the grouting procedure, to the Engineer at least two weeks prior to beginning this work.

Slipliner pipe shall conform to one of the following types:

1. Closed Profile HDPE:

Closed profile HDPE pipe shall meet the requirements of ASTM F894 and shall have a cell classification of 345464C in accordance with ASTM D3350. The pipe shall have a minimum Ring Stiffness Constant (RSC) classification of 160 lb/ft as defined in ASTM F894. Pipe joints shall be in accordance with the pipe manufacturer's recommendations and as approved by the Engineer.

2. Solid Wall HDPE:

Solid wall HDPE pipe shall meet the requirements of ASTM F714 (SDR 32.5) and shall have a cell classification of 345464C in accordance with ASTM D3350. Pipe joints may be grooved press-on joints or heat fused as approved by the Engineer. Heat fused joints shall be fused in accordance with the pipe manufacturer's recommendations by an experienced operator of the heat fusion equipment.

3. PVC:

PVC pipe shall meet the requirements of ASTM F949 with a minimum pipe stiffness of 46 psi. PVC pipe shall have a cell classification of 12454 in accordance with ASTM D1784. Pipe joints shall be elastomeric seals (gaskets) in accordance with the requirements of ASTM F477.

4. Spirally Wound PVC:

Spirally wound PVC slipliner shall meet the requirements of ASTM F949 with minimum pipe stiffness of 46 psi. Pipe joints shall be in accordance with the pipe manufacturer's recommendations and as approved by the Engineer.

The diameter specified in the bid item description is the diameter of the existing pipe to be sliplined. The Contractor shall provide the largest diameter slipliner pipe that will fit into the existing pipe to maximize flow capacity.

Slipliner pipe shall have a smooth interior surface.

Slipliner pipe shall be joined into a continuous length with joints that are adequate for pushing, pulling, or winding the liner pipe through the existing pipe. The joints shall not allow seepage during pressure grouting. To allow for unrestricted insertion of the liner, the outside diameter of the liner pipe shall not be increased at the joints.

SLIPLINE PIPE Continued

Prior to sliplining, the Contractor shall clean the existing pipe of all debris, silt, and obstructions to ensure that the slipliner pipe can be inserted, the grout will flow to all voids, and the inserted slipliner pipe will not be set upon or irregularly supported by such material. Cleaning shall be accomplished by the use of jet rodding equipment or other approved methods.

The slipliner pipe shall be inserted into the existing pipe by pushing, pulling, or winding methods that do not damage the slipliner pipe. The slipliner pipe shall be clean and substantially dry before insertion.

To minimize the change in flowline, slipliner pipe shall be held down during the grouting operation. This may be accomplished by attaching fasteners or blocks at the top of the pipe, adding weight to the inside of the slipliner pipe, placing multiple grout lifts, or other means as approved by the Engineer.

Bulkheads shall be constructed at each end of the pipe. Each bulkhead shall be constructed to withstand the pressure of the grouting operation. The bulkhead shall extend from the end of the existing pipe inward a minimum depth of 18 inches. The bulkhead shall be free from leaks and the exterior surface shall be given a smooth trowel finish. The bulkhead at the inlet end shall be finished with a 45 degree mitered bevel transition between the existing pipe and the inside of the slipliner pipe with the slipliner pipe face pushed inside the existing pipe face.

Pressure grouting shall be done to ensure all the voids are filled between the slipliner pipe and the existing pipe including all breaks or holes in and around the existing pipe. Grouting pressures used shall ensure all voids are filled, but do not collapse or deform the slipliner pipe more than 5 percent of the diameter. Multiple grout lifts may be necessary to minimize pipe deflection for 60-inch diameter and larger pipe in accordance with the pipe manufacturer's recommendations.

The grout shall be a cellular grout (grout with pre-generated foam) with a minimum 28 day compressive strength of 100 pounds per square inch. If water is not present within the sliplined pipe a low density grout with a minimum of 30 pounds per cubic foot wet density may be used. When it is not possible to dewater the existing pipe or keep water out of the annular space during grouting, a high density grout with a minimum of 70 pounds per cubic foot shall be used which may include approved sand. The foaming agent used shall meet the requirements of ASTM C869 when tested in accordance with ASTM C796.

The cellular grout mix design shall be submitted to the SDDOT Concrete Engineer for approval prior to use. The mix design submittal shall include the base cement slurry mix per cubic foot of cellular grout, expansion factor of the foaming agent, and the cellular grout wet density (pounds per cubic foot).

The Contractor shall install a bypass valve adjacent to the location where the pressure grouting hose is attached for obtaining samples to be checked for wet density. The wet density of the cellular grout shall be checked by the Contractor to verify the proper minimum wet density before the cellular grout filling operations begin and at a minimum once every two hours during production. The SDDOT shall document the results of the density checks.

Cellular grout shall be wasted until the cellular grout meets the minimum wet density required; however, if 0.5 cubic yards or more of base cement slurry is wasted trying to meet density requirements, then that quantity will not be included for payment.

SLIPLINE PIPE Continued

If grout holes are utilized, cylindrical wooden plugs or other approved plugs shall be inserted to plug holes until the grout has set. After the plugs are removed the holes shall be filled with concrete.

The quantity of cellular grout was estimated based on void quantity between the slipliner pipe and the existing pipe, and an additional quantity if necessary was estimated for the void volume outside the existing pipe. The quantity of cellular grout in the plans is based on the outside diameter of the slipliner with the indicated minimum inside diameter, plus 80 percent for filling of voids due to the condition of the in place corrugated metal pipe. If a smaller inside diameter slipliner is approved and used the grout quantity will not be increased. If grout quantities are increased due to additional voids or a smaller outside diameter with at least the minimum inside diameter shown in the plans the additional grout quantity will be eligible for payment.

The quantity of base cement slurry ordered shall be approved by the Engineer.

The quantity of base cement slurry needed shall be calculated to the nearest tenth of a cubic yard using the approved mix design, expansion factor of the foaming agent, and estimated amount of cellular grout. The quantity for payment to the nearest tenth of a cubic yard of Cellular Grout is a calculated quantity based on the amount of base cement slurry used on the project to the nearest tenth of a cubic yard, expansion factor of the foaming agent, and approved mix design.

All costs for furnishing and installing the slipliner pipe, including work area excavation, backfilling, pipe cleaning, and incidentals necessary to satisfactorily complete the work shall be included in the contract unit price per foot for the correct size of Slipline Pipe.

All costs for furnishing and installing the cellular grout including bulkhead construction, inlet bevel construction, and incidentals necessary to satisfactorily complete the work shall be included in the contract unit price per cubic yard for Cellular Grout.

TABLE OF SLIPLINE PIPE

Location MRM	*Slipliner Design Inside Dia. (In)	Slipline 18" Pipe (Ft)	Slipline 24" Pipe (Ft)	Slipline 30" Pipe (Ft)	Cellular Grout (CuYd)
324.50	26			64	2.7
324.71	20		64		2.2
324.76	15	58			1.4
324.98	20		98		3.2
Totals =		58	162	64	9.5

* The hydraulic design of the pipe was based on the slipliner inside diameter as noted in the TABLE OF SLIPLINE PIPE. If a smaller diameter liner is needed, contact the Design Engineer for approval.

PERMANENT SEEDING AND EROSION CONTROL BLANKET

The areas to be seeded comprise of all newly graded areas and disturbed areas within the project limits. All disturbed areas shall be covered by Type 2 Erosion Control Blanket.

All permanent seed shall be planted in the topsoil at a depth of ¼" to ½".

All seed broadcast must be raked or dragged in (incorporated) within the top ¼" to ½" of topsoil when possible. This requirement may be waived by the Engineer during construction when raking or dragging is deemed not feasible by conventional methods.

South Dakota native grown seed is an acceptable alternative to any of the seed varieties listed below. South Dakota native grown seeds used as an alternative shall conform to the same specification and requirements for that individual seed type.

Type G Permanent Seed Mixture shall consist of the following:

Grass Species	Variety	Pure Live Seed (PLS) (Pounds/Acre)
Western Wheatgrass	Flintlock, Rodan, Rosana	7
Switchgrass	Dacotah, Forestburg, Nebraska 28, Pathfinder, Summer, Sunburst, Trailblazer	3
Indiangrass	Holt, Tomahawk	3
Big Bluestem	Bison, Bonilla, Champ, Pawnee, Sunnyview	3
Oats or Spring Wheat: April through July; Winter Wheat: August through November		10
Total:		26

There shall be no Seasonal Limitations per 730.3B for the seeding on this project due to the sensitivity of the disturbed areas. Seed and Erosion Control Blanket shall be applied to each site not more than 14 calendar days after the completion of the work at the site.

The area to be seeded is estimated at 0.2 acre. The area to be covered with erosion control blanket is estimated at 0.2 acre (1000 square yards).

Cost for seeding and furnishing and placing erosion control blanket shall be included in the contract lump sum price for Erosion Control.

DRILLS

In addition to the drills specified in Section 730 of the Standard Specifications, other types of drills including no-till drills will be allowed as long as they have baffles, partitions, agitators, or augers which keep the seed distributed throughout the seed box and the seed is planted at a depth of ¼" to ½".

EROSION CONTROL WATTLE

Erosion control wattles for restraining the flow of runoff and sediment shall be installed at locations determined by the Engineer during construction. Refer to Standard Plate 734.06 for details.

The Contractor shall provide certification that the erosion control wattles do not contain noxious weed seeds.

Erosion control wattles shall remain on the project to decompose.

The erosion control wattle provided shall be from the approved product list. The approved product list for erosion control wattle may be viewed at the following internet site:

<http://sddot.com/business/certification/products/Default.aspx>

Cost for furnishing and placing the wattles shall be included in the contract unit price per foot for 12" Diameter Erosion Control Wattle.

EROSION CONTROL BLANKET

The erosion control blanket provided shall be from the approved product list. The approved product list for erosion control blanket may be viewed at the following internet site:

<http://sddot.com/business/certification/products/Default.aspx>

The Contractor shall install erosion control blanket according to the manufacturer's installation instructions.

TEMPORARY PAVEMENT MARKING

Temporary pavement marking (except stop bars) shall consist of Raised Pavement Markers. (One workspace with 2-500' double yellow lines = 2000' and temporary pavement marking after top lift of asphalt placement = 120'; Total = 2120') Cost shall be included in the contract unit price per foot for Raised Pavement Markers.

Temporary pavement marking for 24" white stop bars shall consist of 4" Temporary Pavement Marking Tape Type 2 and shall be included in the contract unit price per foot for 4" Temporary Pavement Marking Tape Type 2. (One workspace at 144')

GENERAL MAINTENANCE OF TRAFFIC

Removing, relocating, covering, salvaging and resetting of permanent traffic control devices, including delineation, and culvert end markers, shall be the responsibility of the Contractor. Cost for this work shall be incidental to the contract unit prices for the various items unless otherwise specified in the plans. Any delineators and signs damaged or lost shall be replaced by the Contractor at no cost to the State.

Storage of vehicles and equipment shall be outside the clear zone and as near as possible to the right-of-way line. Contractor's employees should mobilize at a location off the right-of-way and arrive at the work sites in a minimum number of vehicles necessary to perform the work.

Indiscriminate driving and parking of vehicles within the right-of-way will not be permitted. Any damage to the vegetation, surfacing, embankment, delineators and existing signs resulting from such indiscriminate use shall be repaired and/or restored by the Contractor, at no expense to the State, and to the satisfaction of the Engineer.

The Contractor shall provide documentation that all breakaway sign supports comply with FHWA NCHRP 350 or MASH crash-worthy requirements. The Contractor shall provide installation details at the preconstruction meeting for all breakaway sign support assemblies.

The shoulders shall be closed per standard plate 634.03 if excavations are within 30 feet of the traveled lane.

Sufficient traffic control devices have been included in these plans to sign one workspace for a shoulder closure and one workspace for a lane closure using stop signs. If the Contractor elects to work on additional sites simultaneously, the cost for additional traffic control devices shall be incidental to the contract unit price per unit for Traffic Control.

TABLE OF PIPE REPAIR

HIGHWAY	MRM	EXISTING SIZE AND TYPE	REMOVE PIPE CULVERT (FT)	PRIOR TO SLIPLINING			SLIPLINE 18 INCH PIPE (FT)	SLIPLINE 24 INCH PIPE (FT)	SLIPLINE 30 INCH PIPE (FT)	FURNISH AND INSTALL 24 INCH RCP ARCH SLOPED END (EACH)	FURNISH AND INSTALL 24 INCH RCP ARCH (FT)	AFTER PLACEMENT OF SLIPLINER					APPROXIMATE GPS COORDINATES NORTHING EASTING		SIDE OF ROAD, RAMP, OR BERM
				FURNISH AND INSTALL 18 INCH CMP (FT)	FURNISH AND INSTALL 24 INCH CMP (FT)	FURNISH AND INSTALL 30 INCH CMP (FT)						FURNISH AND INSTALL 18 INCH CMP FLARED END (EACH)	FURNISH AND INSTALL 24 INCH CMP FLARED END (EACH)	FURNISH AND INSTALL 24 INCH CMP (FT)	FURNISH AND INSTALL 30 INCH CMP FLARED END (EACH)				
44	314.44	TWIN 24" CMP ELLIPTICAL	2 @ 70							4	2 @ 70						N 43.38448	W 098.67367	BOTH
44	324.50	30" CMP	2 @ 12			2 @ 12			64							2	N 43.38416	W 098.47386	BOTH
44	324.71	24" CMP	2 @ 24		2 @ 10			64						2	2 @ 12		N 43.38429	W 098.47079	BOTH
44	324.76	18" CMP	2 @ 28	2 @ 10			58					2	2 @ 16				N 43.38429	W 098.46847	BOTH
44	324.98	24" CMP	2 @ 12		2 @ 10			98						2			N 43.38435	W 098.46424	BOTH
PROJECT TOTALS			292	20	40	24	58	162	64	4	140	2	32	4	24	2			
18 INCH & 24 INCH CMP TOTALS												52		64					

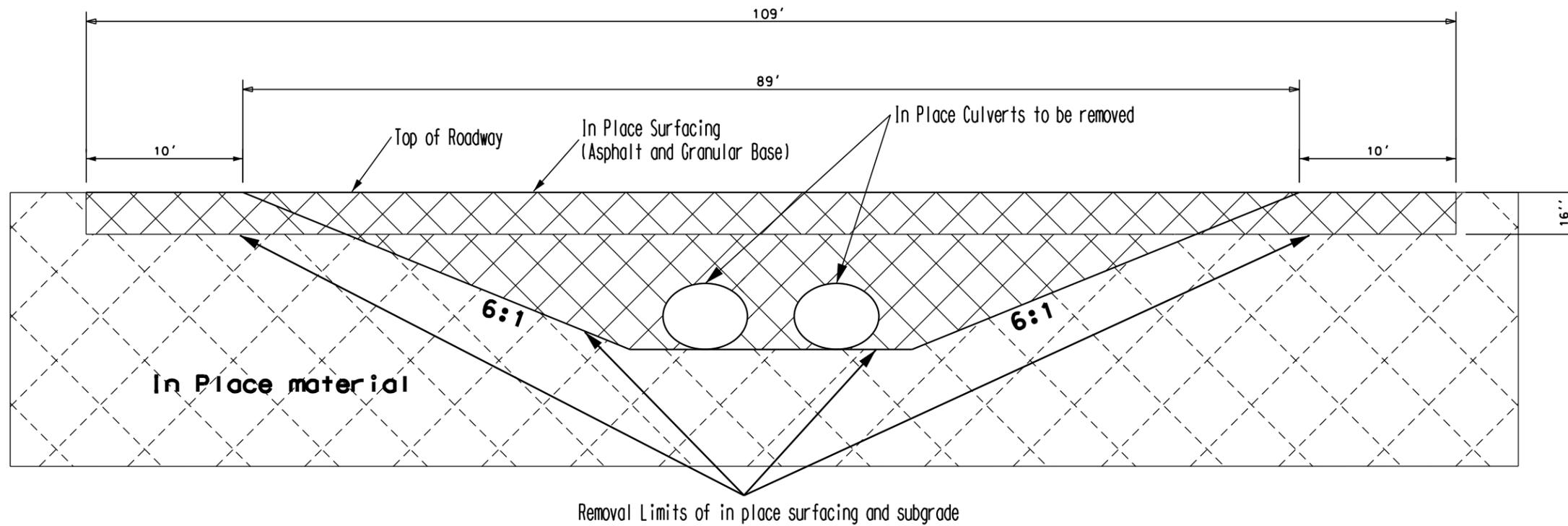
ITEMIZED LIST FOR TRAFFIC CONTROL

SIGN CODE	SIGN SIZE	DESCRIPTION	NUMBER REQUIRED	UNITS PER SIGN	UNITS
E5-1	36" x 32"	EXIT GORE SIGN		24	
G20-2	36" x 18"	END ROAD WORK	4	17	68
R1-1	48" x 48"	STOP	2	34	68
R1-2	48" x 48"	YIELD		34	
R2-1	30" x 36"	SPEED LIMIT __		23	
R2-1	36" x 48"	SPEED LIMIT __		29	
R2-1	48" x 60"	SPEED LIMIT __		38	
R2-6aP	36" x 24"	FINES DOUBLE		20	
R4-7	24" x 30"	KEEP RIGHT (SYMBOL)		18	
R5-1	48" x 48"	DO NOT ENTER		34	
R5-1a	42" x 30"	WRONG WAY		25	
R10-6	24" x 36"	STOP HERE ON RED		20	
R11-2	48" x 30"	ROAD CLOSED		27	
R11-3a	60" x 30"	ROAD CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY		30	
R11-4	60" x 30"	ROAD CLOSED TO THRU TRAFFIC		30	
SW12-1b	120" x 60"	HIGHWAY WORKERS GIVE'EM A BRAKE		80	
W1-1	48" x 48"	LEFT OR RIGHT TURN ARROW		34	
W1-2	48" x 48"	LEFT OR RIGHT CURVE ARROW		34	
W1-3	48" x 48"	REVERSE TURN SIGN (LEFT OR RIGHT)	1	34	34
W1-4	48" x 48"	REVERSE CURVE SIGN (LEFT OR RIGHT)		34	
W3-1	48" x 48"	STOP AHEAD (SYMBOL)	2	34	68
W3-2	48" x 48"	YIELD AHEAD (SYMBOL)		34	
W3-3	48" x 48"	SIGNAL AHEAD (SYMBOL)		34	
W3-4	48" x 48"	BE PREPARED TO STOP		34	
W3-5	48" x 48"	SPEED REDUCTION (__ MPH)		34	
W4-1	48" x 48"	MERGE (SYMBOL)		34	
W4-2	48" x 48"	LEFT OR RIGHT LANE ENDS (SYMBOL)		34	
W5-2	48" x 48"	NARROW BRIDGE		34	
W5-3	48" x 48"	ONE LANE BRIDGE		34	
W7-3aP	36" x 30"	NEXT __ MILES		23	
W8-1	36" x 36"	BUMP		27	
W8-6	48" x 48"	TRUCK CROSSING		34	
W8-7	36" x 36"	LOOSE GRAVEL		27	
W8-11	48" x 48"	UNEVEN LANES		34	
W12-1	36" x 36"	DOUBLE ARROW		27	
W13-1P	24" x 24"	ADVISORY SPEED PLATE		16	
W16-2P	30" x 24"	SUPPLEMENTAL DISTANCE PLAQUE		18	
W20-1	48" x 48"	ROAD WORK AHEAD	4	34	136
W20-2	48" x 48"	DETOUR AHEAD		34	
W20-3	48" x 48"	ROAD CLOSED AHEAD		34	
W20-4	48" x 48"	ONE LANE ROAD AHEAD	2	34	68
W20-5	48" x 48"	LT. OR RT. LANE CLOSED AHEAD		34	
W20-7	48" x 48"	FLAGGER	2	34	68
W21-1	48" x 48"	WORKERS (SYMBOL)		34	
W21-2	36" x 36"	FRESH OIL		27	
W21-3	48" x 48"	ROAD MACHINERY AHEAD		34	
W21-5	48" x 48"	SHOULDER WORK	2	34	68
W21-5a	48" x 48"	RIGHT SHOULDER CLOSED	2	34	68
W21-5b	48" x 48"	RIGHT SHOULDER CLOSED AHEAD	2	34	68
*****	12" x 36"	TYPE III OBJECT MARKER		15	
*****	*****	TYPE III BARRICADE - 8 FT. SINGLE SIDED		40	
*****	*****	TYPE III BARRICADE - 8 FT. DOUBLE SIDED	2	56	112
TOTAL UNITS					826

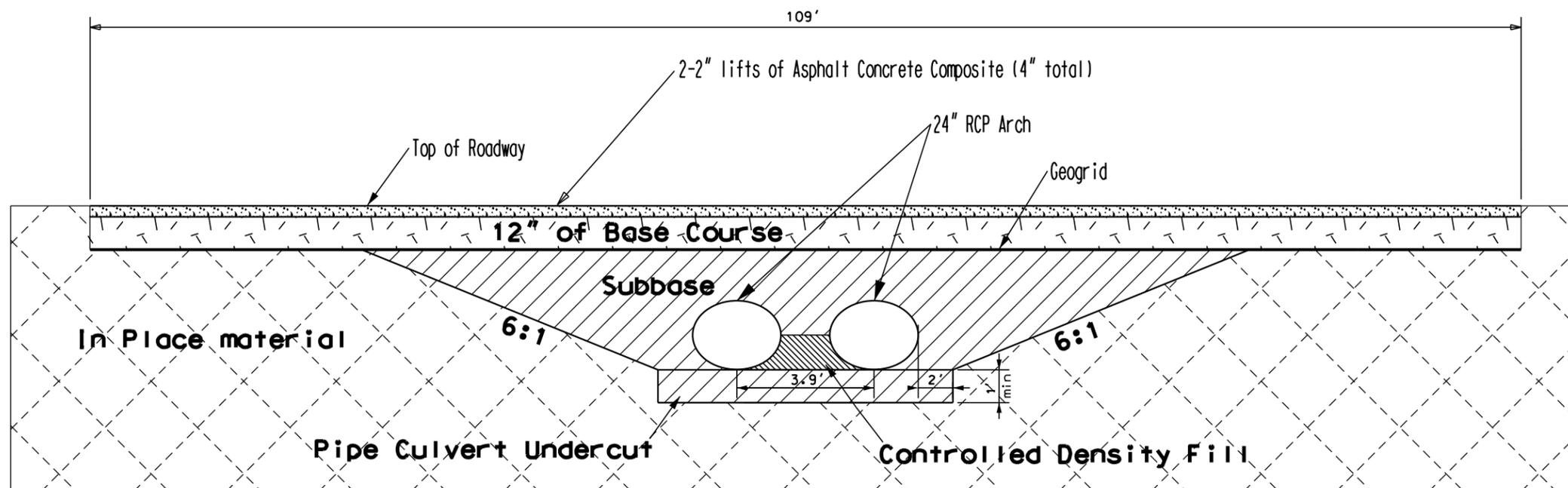
CULVERT REPLACEMENT DETAIL - MRM 314.44

Plotting Date: 03/27/2014

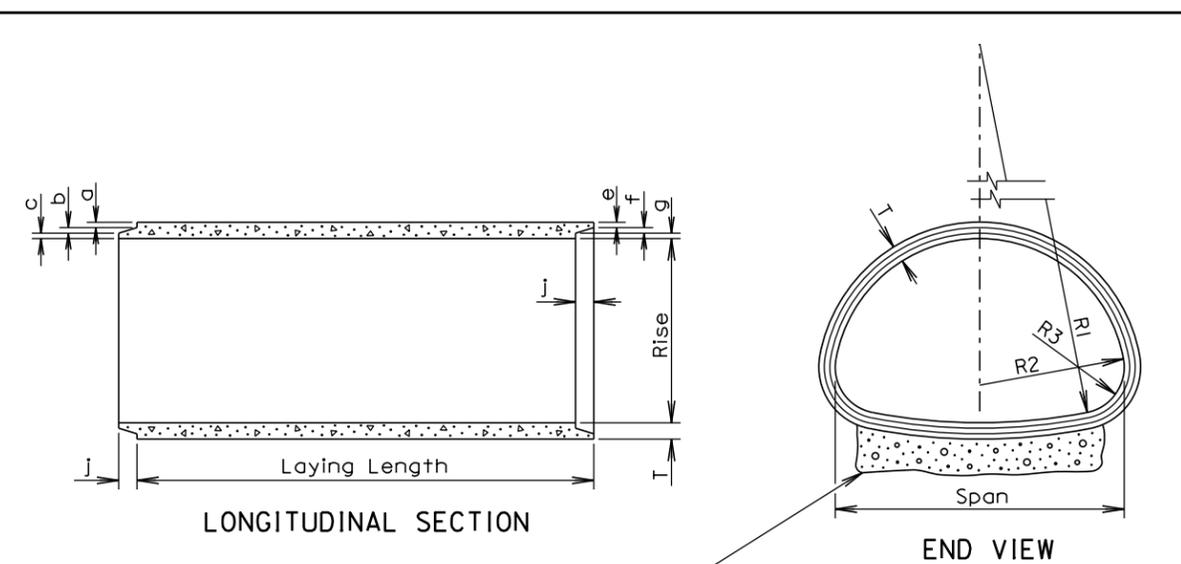
Removal Detail



Installation Detail



PLOTTED FROM - TRYA1NT46



TOLERANCES IN DIMENSIONS
 Radial dimensions at joints: $\pm 1/8$ " for 65" span or less and $\pm 1/4$ " for longer spans.
 Rise and Span: $\pm 2\%$ of tabular values.
 Length of Joint (J): $\pm 1/4$ ".
 Wall thickness (T): not less than design T by more than 5% or $3/16$ ", whichever is greater.
 Laying length: shall not underrun by more than $1/2$ ".

Gravel Bedding Material shall be supplied for 102" to 169" spans. It shall be placed to a thickness of 6" (min.) x 85% of the Span x Length of culvert and shall conform to the gradation requirements for gravel surfacing except material may be screened or may be plan provided material.

* Size (in.)	Approx. Wt./Ft. (lb.)	Rise (in.)	Span (in.)	T (in.)	a (in.)	b (in.)	c (in.)	j (in.)	e (in.)	f (in.)	g (in.)	R1 (in.)	R2 (in.)	R3 (in.)
18	170	13 1/2	22	2 1/2	1 3/8	3/8	3/4	2	1 1/8	3/8	1	27 1/2	13 3/4	5 1/4
24	320	18	28 1/2	3 1/2	1 5/8	1/2	1 3/8	3	1 3/8	1/2	1 5/8	40 11/16	14 3/4	4 5/8
30	450	22 1/2	36 1/4	4	1 13/16	5/8	1 9/16	3 1/2	1 9/16	5/8	1 13/16	51	18 3/4	6 1/8
36	600	26 5/8	43 3/4	4 1/2	2	3/4	1 3/4	4	1 3/4	3/4	2	62	22 1/2	6 1/2
42	740	31 5/16	51 1/8	4 1/2	2	3/4	1 3/4	4	1 3/4	3/4	2	73	26 1/4	7 3/4
48	890	36	58 1/2	5	2 1/4	3/4	2	5	2	3/4	2 1/4	84	30	8 7/8
54	1100	40	65	5 1/2	2 1/2	3/4	2 1/4	5	2 1/4	3/4	2 1/2	92 1/2	33 3/8	10
60	1400	45	73 1/2	6	3 5/16	3/4	1 15/16	5	2 3/4	3/4	2 1/2	105	37 1/2	11
72	1900	54	88	7	3 13/16	1	2 3/16	6	3 1/4	1	2 3/4	126	45	13 5/16
84	2500	62	102	8	4 1/8	1	2 7/8	6	3 1/2	1	3 1/2	162 1/2	52	14 1/2
96	3300	78	122 3/8	9	4 1/2	1	3 1/2	7	4	1	4	218	62	20
108	4200	88	138 1/2	10	5	1	4	7	4 1/2	1	4 1/2	269	70	22
120	5100	96 7/8	154	11	5 1/2	1	4 1/2	7	5	1	5	301 3/8	78	24
132	5100	106 1/2	168 3/4	10		1	4	7	4 1/2	1	4 1/2	329	85 5/8	26 7/8

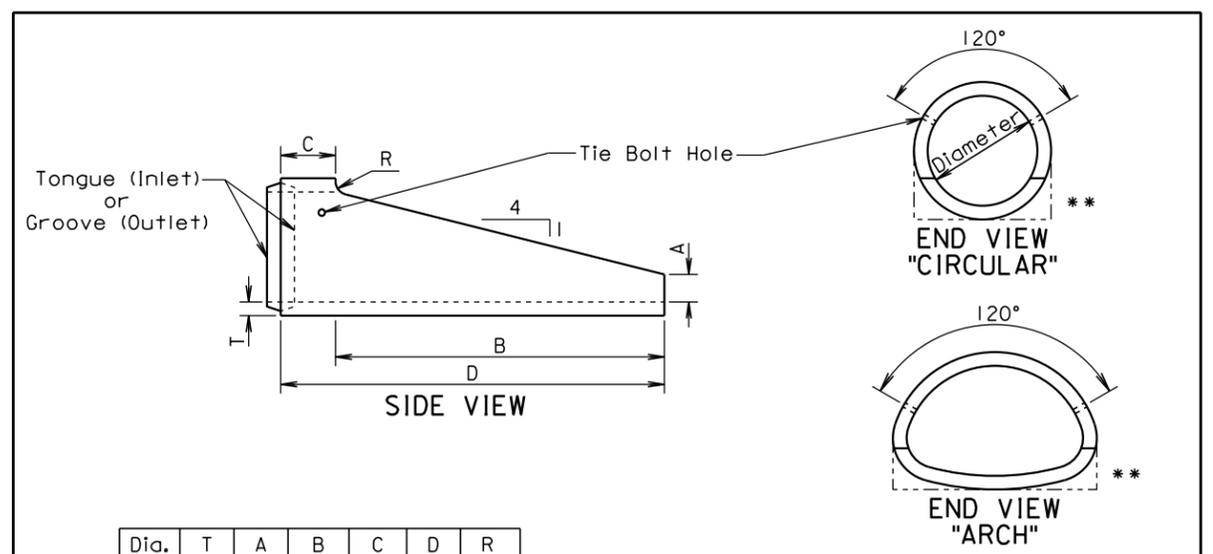
* Equivalent Diameter of Circular R. C. P.

GENERAL NOTES:

Construction of R.C.P. Arch shall conform to the requirements of Section 990 of the Standard Specifications for Roads and Bridges. Not more than 2 four foot sections shall be permitted near the ends of any culvert. Four foot lengths shall be used only to secure the required length of culvert.

March 31, 2000

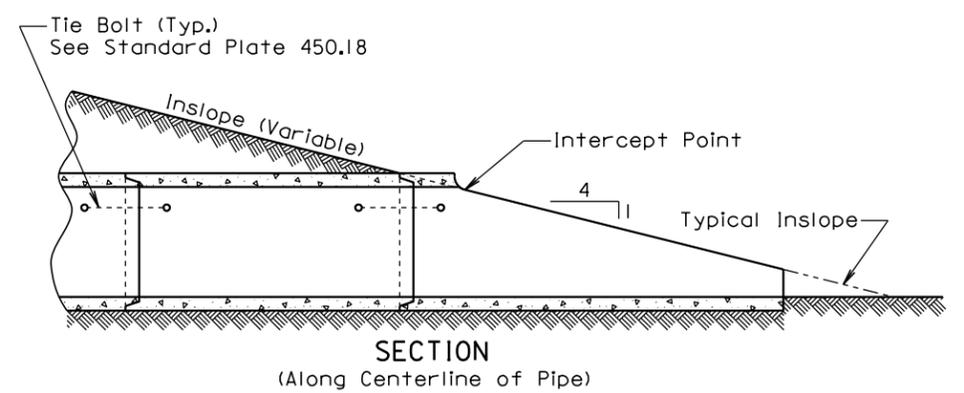
Published Date: 1st Qtr. 2014	S D D O T	REINFORCED CONCRETE PIPE ARCH	PLATE NUMBER 450.02
			Sheet 1 of 1



Dia. (in.)	T (in.)	A (in.)	B (in.)	C (in.)	D (in.)	R (in.)
FOR CIRCULAR PIPE						
24	3	6	72	12	84	3
30	3 1/2	7 1/2	90	12	102	3 1/2
FOR ARCH PIPE						
* 24	3	6	48	12	60	3
* 30	3 1/2	7 1/2	60	12	72	3 1/2
* 36	4 1/2	8 5/8	66	30	96	0
* 42	4 1/2	10	77 1/4	18 3/4	96	0

Dia. (in.)	T (in.)	A (in.)	B (in.)	C (in.)	D (in.)	R (in.)
ALTERNATE						
FOR CIRCULAR PIPE						
24	3	9	72	12	84	0
30	3 1/2	11	90	12	102	0
FOR ARCH PIPE						
* 24	3	9	48	12	60	0
* 30	3 1/2	11	60	12	72	0

* Equivalent Diameter of Circular R.C.P.
 ** Acceptable Flat Bottom Alternate.



GENERAL NOTE:

The length of concrete pipe shown in the construction plans is between sloped ends.

September 22, 2006

Published Date: 1st Qtr. 2014	S D D O T	R. C. P. SLOPED ENDS	PLATE NUMBER 450.13
			Sheet 1 of 1

Wall "t" (in.)	Rod Dia. (in.)	Pipe Sleeve Dia. (nominal)
< 3/4	5/8	3/4
3/2-6/2	3/4	1
≥ 7	1	1 1/4

GENERAL NOTES:
 Tie bolts shall conform to ASTM F1554 Grade 36 or ASTM A36. Nuts shall be heavy hex conforming to ASTM A563. Washers shall conform to ASTM F436.
 Pipe Sleeve shall conform to ASTM A500 or A53, Grade B.
 Galvanize adjustable eye bolt tie assembly in accordance with ASTM A153.

ASTM F1554 Grade 36 or ASTM A36 Tie Bolt with 2 Heavy Hex Nuts and 2 Washers

ASTM F1554 Grade 36 or ASTM A36 Rod with Heavy Hex Nut and Washer

ADJUSTABLE EYE BOLT TIE

Pipe Dia. (in.)	"L" (in.)	Bolt Dia. (in.)
< 48	4	3/4
> 48	6	1

GENERAL NOTES:
 Angles shall conform to ASTM A36.
 Bolts shall conform to ASTM A307. Nuts shall be heavy hex conforming to ASTM A563. Washers shall conform to ASTM F436.
 Galvanize angles, bolts, nuts, and washers in accordance with ASTM A153.

ASTM A307 Bolt with Heavy Hex Nut and 2 Washers

ANGLE AND BOLT TIE

GENERAL NOTES:
 In lieu of the tie bolts detailed above other types of tie bolt connections may be installed as approved by the Office of Bridge Design.

All pipe sections of R.C.P. and R.C.P. Arch shall be tied with tie bolts except for pipe located between drop inlets, manholes, and junction boxes. All pipe sections of pipes that only enter or exit drop inlets, manhole, and junction boxes shall be tied with tie bolts.

There will be no separate measurement or payment for the tie bolts. The cost for furnishing and installing the tie bolts shall be incidental to the contract unit price per foot for the corresponding bid item for R.C.P. or R.C.P. Arch.

END VIEW "CIRCULAR" **END VIEW "ARCH"**

February 28, 2013

Alternate Type Connector Sections may be used with approval of the Engineer.

Dia. D (in.)	Ga.	DIMENSIONS (in.)					Approx. Slope	Body
		A	B	H	L	W		
12	16	6	6	6	21	24	2 1/2:1	1 Pc.
15	16	7	8	6	26	30	2 1/2:1	1 Pc.
18	16	8	10	6	31	36	2 1/2:1	1 Pc.
21	16	9	12	6	36	42	2 1/2:1	1 Pc.
24	16	10	13	6	41	48	2 1/2:1	1 Pc.
30	14	12	16	8	46	60	2 1/2:1	1 Pc.
36	14	14	19	9	51	72	2 1/2:1	2 Pc.
42	12	16	22	11	60	84	2 1/2:1	2 Pc.
48	12	18	27	12	69	90	2 1/4:1	2 Pc.
54	12	18	30	12	78	102	2:1	3 Pc.
60	12	18	33	12	84	114	1 3/4:1	3 Pc.
66	12	18	36	12	87	120	1 1/2:1	3 Pc.
72	12	18	39	12	87	126	1 1/3:1	3 Pc.
78	12	18	42	12	87	132	1 1/4:1	3 Pc.
84	12	18	45	12	87	138	1 1/6:1	3 Pc.

STANDARD CONNECTIONS

Threaded 5/8" Dia. Rod over Top of culvert Pipe Bolted on Side Lug

Dimple Band Collar bolted to end section with 3/8" bolts

For 30" through 84"

Alternate for all sizes

NOTE: Tubing is slipped over the sheet and rivets or lugs prior to forming operations

1" O.D. 14 Ga. Galv. Tubing

Sheet

3/8" x 1/2" Gal. Buttonhead Rivets spaced 6" C. to C. Overall length of rivets=0.78"

TUBING ATTACHMENT DETAILS SECTION A-A

Flat Strap Connector

Pipe Strap Bolt

For 12" through 24" only

Finish Earth Slope as Required

Approx. 2 1/2:1 Slope

Flow Line

Standard Coupling Band

SECTION A-A (alternate)

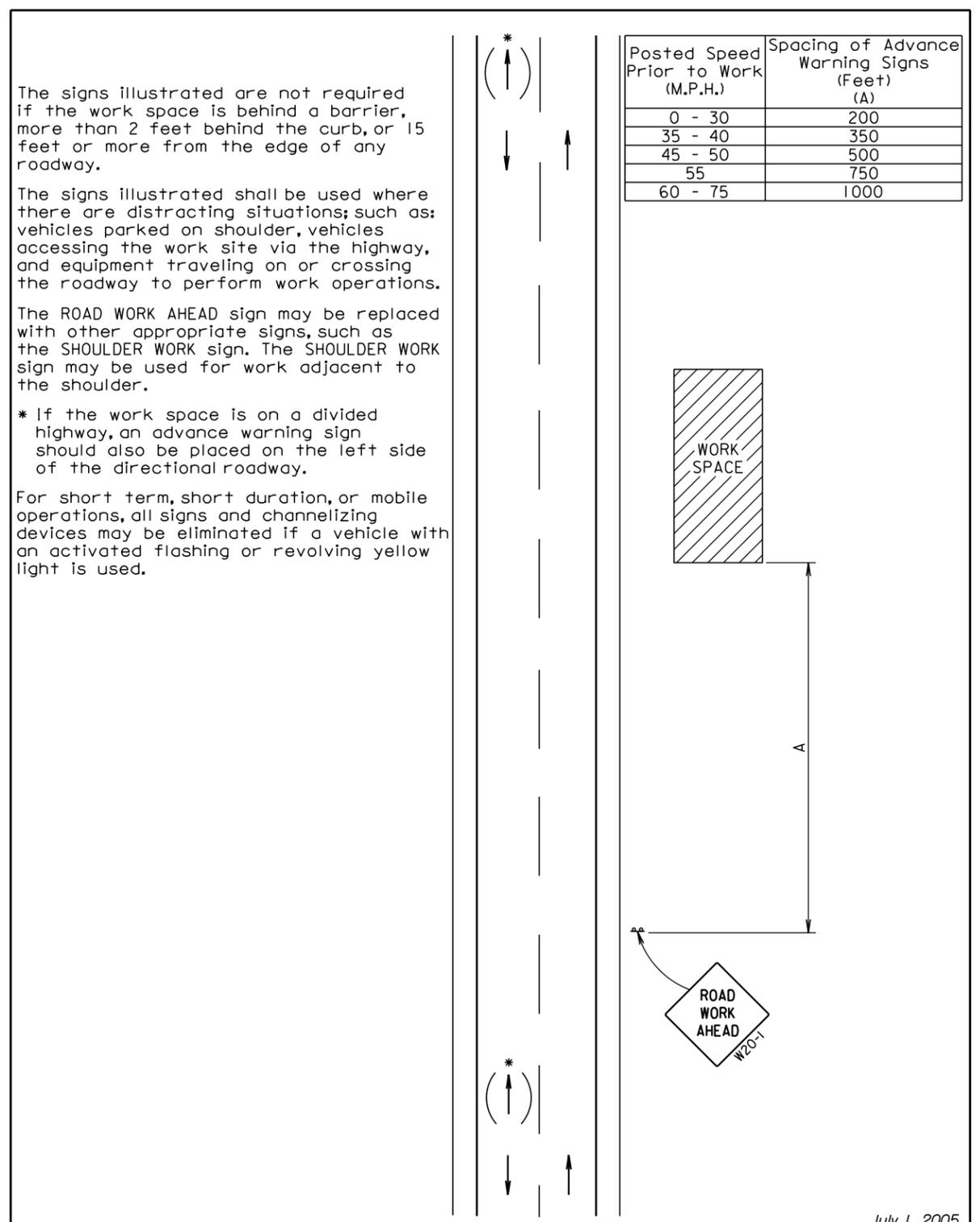
Half Punches (Lugs)

SECTION A-A (alternate)

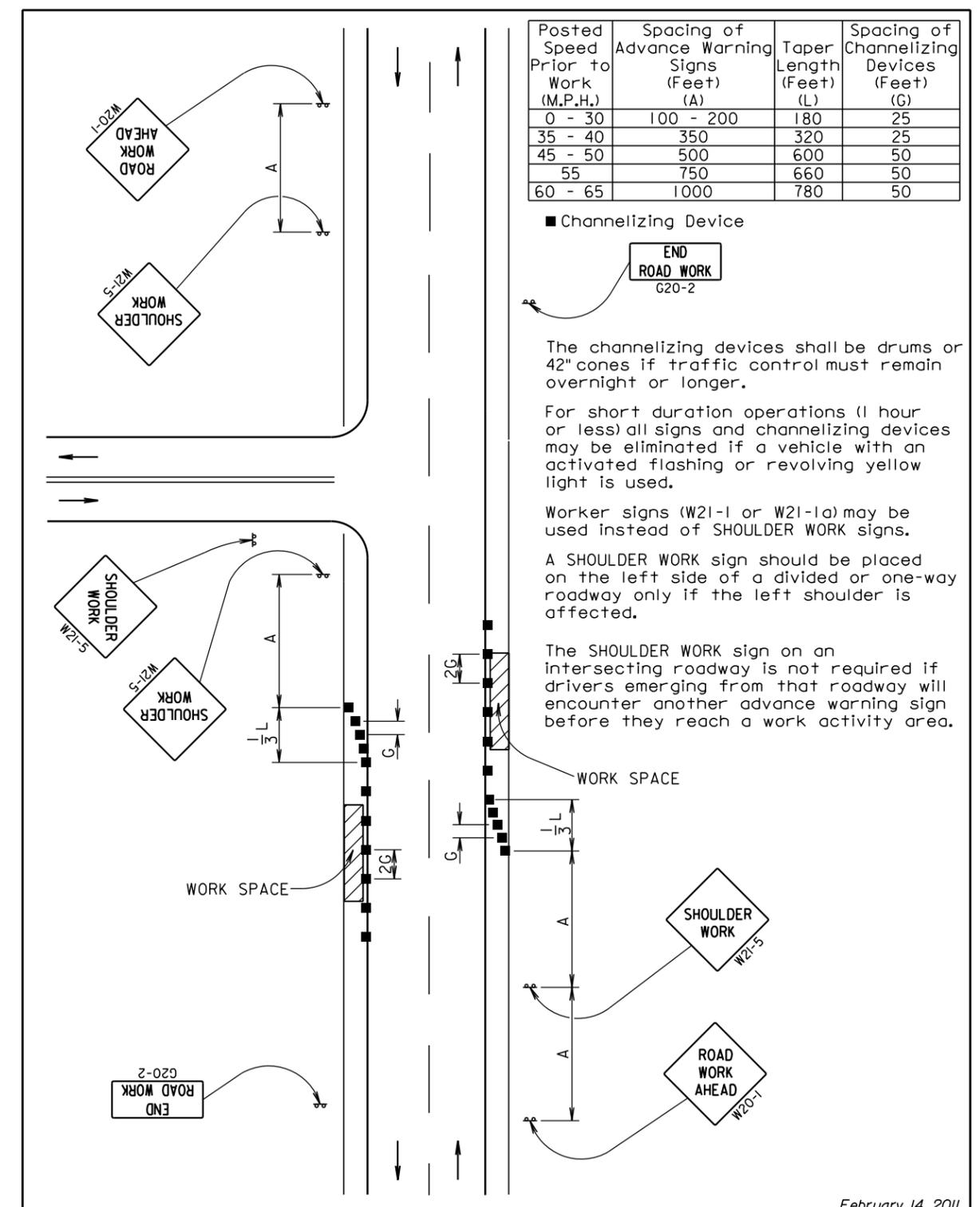
1/2" I.D. (Metal Edge)

GENERAL NOTES:
 All 3 pc. bodies shall have 12 Ga. sides and 10 Ga. center panels. Width of center panels shall be greater than 20% of the pipe periphery. Multiple panel bodies to have lap seams tightly joined by 3/8" Dia. galvanized rivets or bolts.
 For 60" through 84" sizes, reinforced edges shall be supplemented with galvanized stiffener angles. The angles will be 2" x 2" x 1/4" for 60" through 72" diameters and 2 1/2" x 2 1/2" x 1/4" for 78" and 84" diameters. The angles shall be attached by 3/8" diameter galvanized nuts and bolts.
 Rivets and Bolts shall be 3/8" Dia. Min. for 10 Ga. and 12 Ga. sheet, and 5/16" Dia. Min. for 14 Ga. and 16 Ga. sheets. Tighten nuts with torque wrench to 25 lbs. torque.

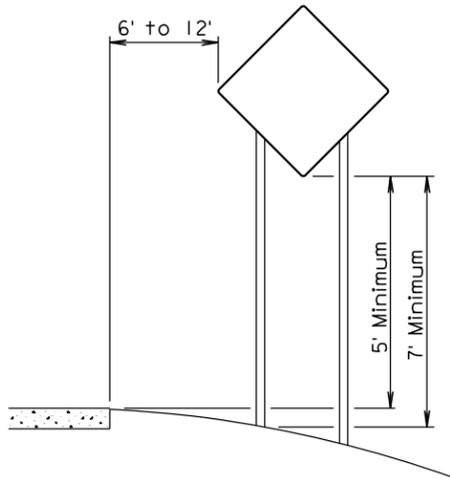
March 31, 2000



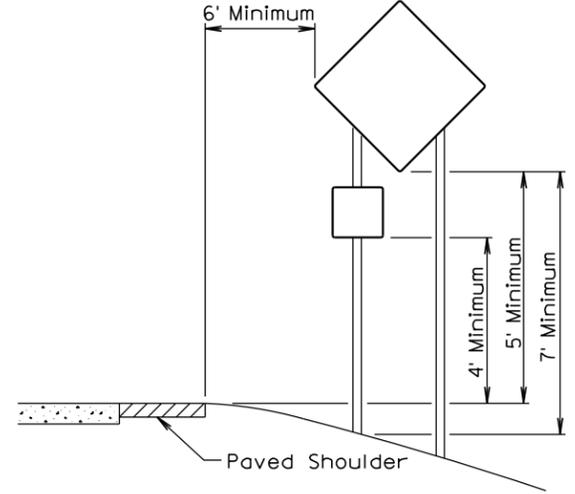
July 1, 2005



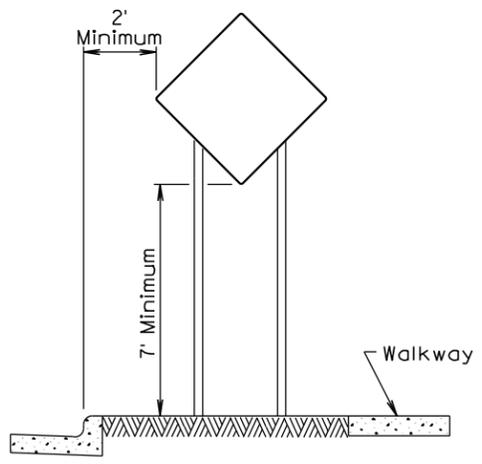
February 14, 2011



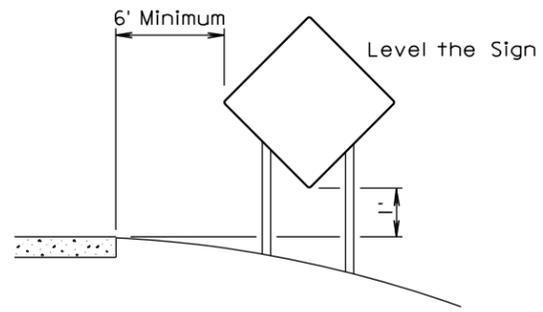
RURAL DISTRICT



RURAL DISTRICT WITH SUPPLEMENTAL PLATE



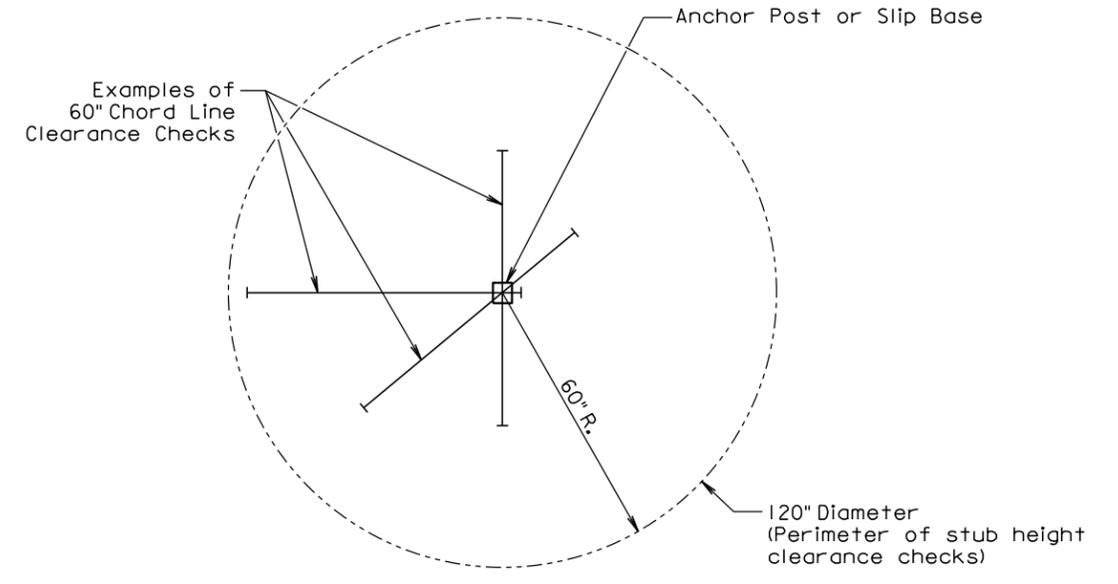
URBAN DISTRICT



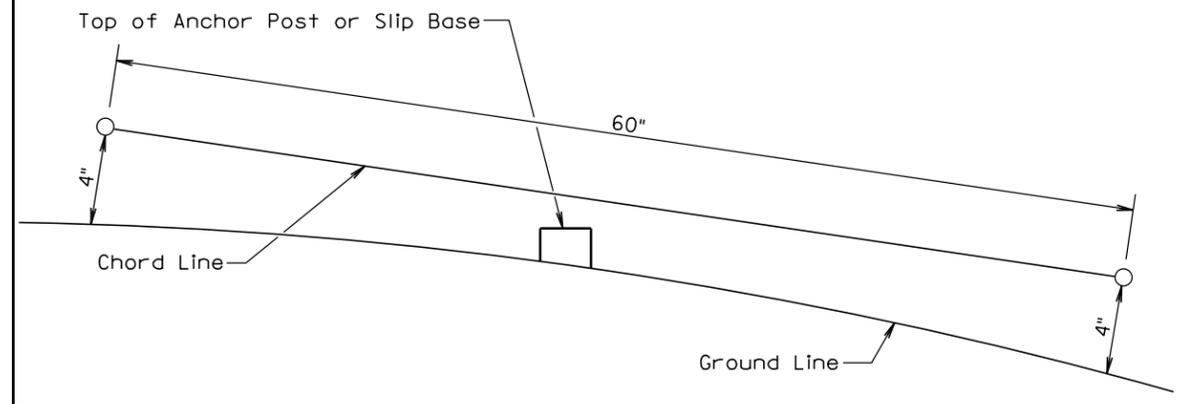
RURAL DISTRICT 3 DAY MAXIMUM

February 14, 2011

Published Date: 1st Qtr. 2014	S D D O T	CRASHWORTHY SIGN SUPPORTS (Typical Construction Signing)	PLATE NUMBER 634.85
			Sheet 1 of 1



PLAN VIEW
(Examples of stub height clearance checks)



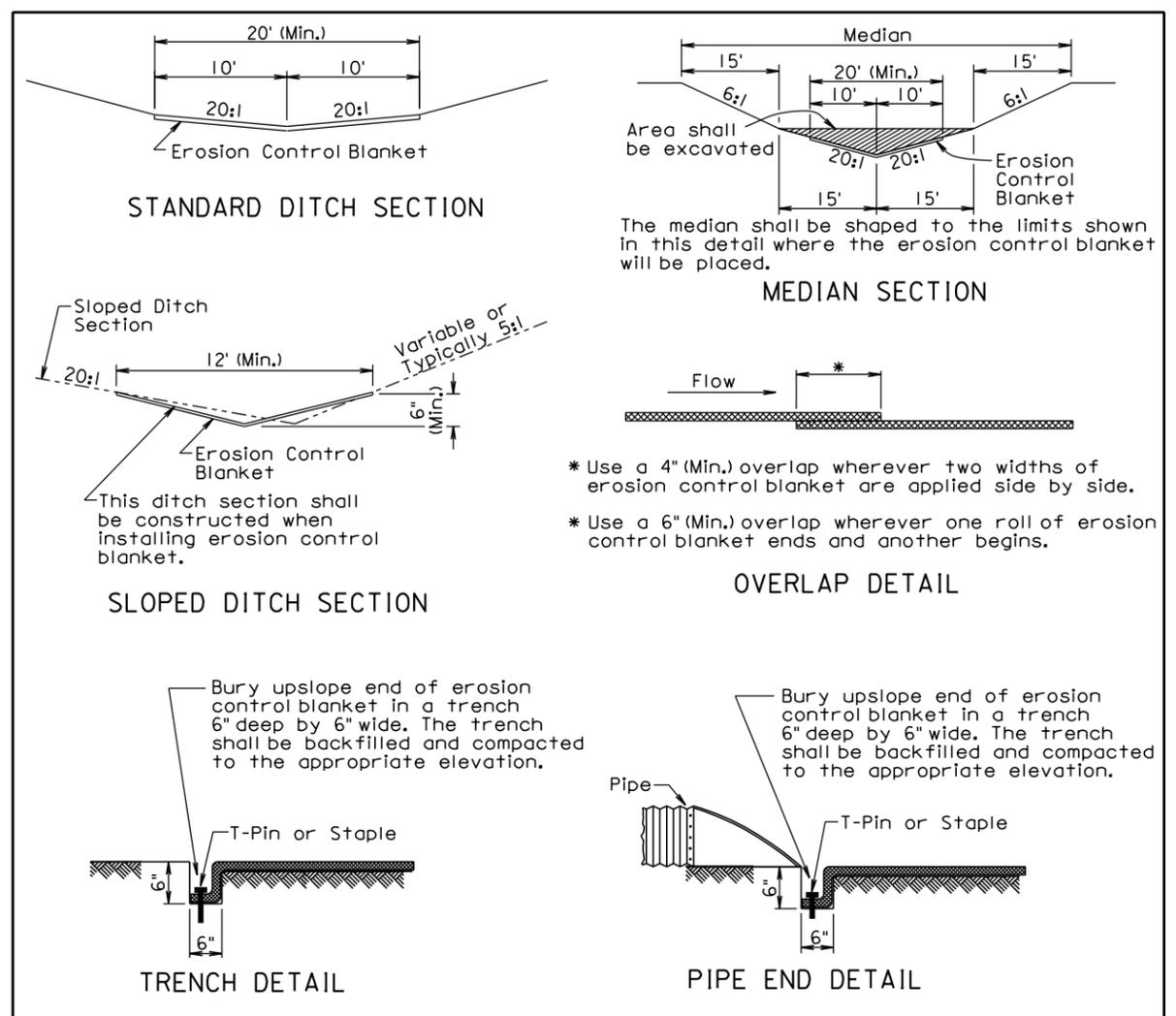
ELEVATION VIEW

GENERAL NOTES:

The top of anchor posts and slip bases SHALL NOT extend above a 60" chord line within a 120" diameter circle around the post with ends 4" above the ground.
 At locations where there is curb and gutter adjacent to the breakaway sign support, the stub height shall be a maximum of 4" above the ground line at the localized area adjacent to the breakaway support stub.
 The 4" stub height clearance is not necessary for U-channel lap splices where the support is designed to yield (bend) at the base.

July 1, 2005

Published Date: 1st Qtr. 2014	S D D O T	BREAKAWAY SUPPORT STUB CLEARANCE	PLATE NUMBER 634.99
			Sheet 1 of 1



GENERAL NOTES:

Prior to placement of the erosion control blanket, the areas shall be properly prepared, shaped, seeded, and fertilized.

Erosion control blanket shall be unrolled in the direction of the flow of water when placed in ditches and on slopes. The upslope end of the erosion control blanket shall be buried in a trench 6" wide by 6" deep. There shall be at least a 6" overlap wherever one roll of erosion control blanket ends and another begins, with the upslope erosion control blanket placed on top of the downslope erosion control blanket.

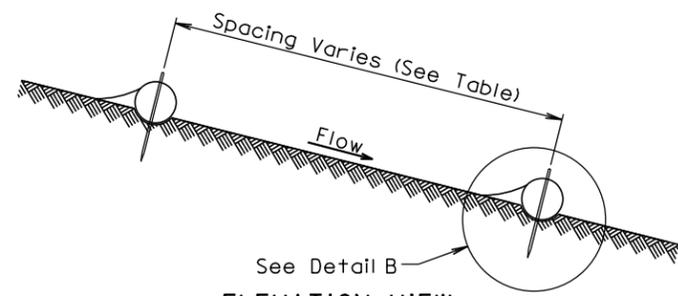
The erosion control blanket shall be pinned to the ground according to the manufacturer's installation recommendations.

After the placement of the erosion control blanket, the Contractor shall fine grade along all edges of the blanket to maintain a uniform slope adjacent to the blanket and level any low spots which might prevent uniform and unrestricted flow of side drainage directly onto the erosion control blanket.

All ditch sections shall be shaped when installing the erosion control blanket. All costs for shaping the ditches shall be incidental to the contract unit price per foot for "Shaping for Erosion Control Blanket".

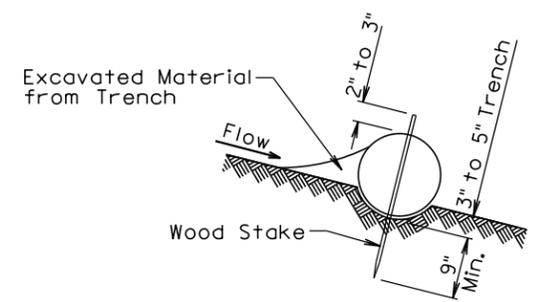
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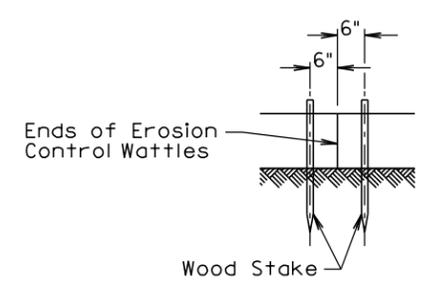


CUT OR FILL SLOPE INSTALLATION	
Slope	Spacing (Ft)
1:1	10
2:1	20
3:1	30
4:1	40

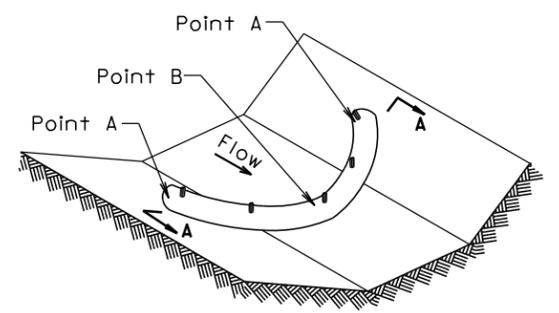
ELEVATION VIEW
CUT OR FILL SLOPE INSTALLATION



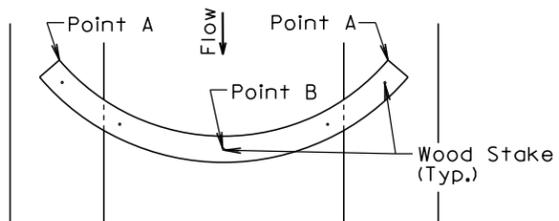
DETAIL B
(TYPICAL OF ALL INSTALLATIONS)



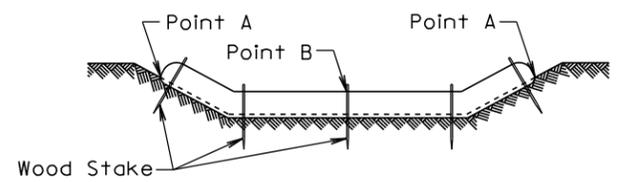
DETAIL C



ISOMETRIC VIEW
DITCH INSTALLATION



PLAN VIEW
DITCH INSTALLATION



SECTION A-A

DITCH INSTALLATION	
Grade	Spacing (Ft)
2%	150
3%	100
4%	75
5%	50

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GENERAL NOTES:

At cut or fill slope installations, wattles shall be installed along the contour and perpendicular to the water flow.

At ditch installations, point A must be higher than point B to ensure that water flows over the wattle and not around the ends.

The Contractor shall dig a 3" to 5" trench, install the wattle tightly in the trench so that daylight can not be seen under the wattle, and then compact the soil excavated from the trench against the wattle on the uphill side. See Detail B.

The stakes shall be 1"x2" or 2"x2" wood stakes, however, other types of stakes such as rebar may be used only if approved by the Engineer. The stakes shall be placed 6" from the ends of the wattles and the spacing of the stakes along the wattles shall be 3' to 4'.

Where installing running lengths of wattles, the Contractor shall butt the second wattle tightly against the first and shall not overlap the ends. See Detail C.

The Contractor and Engineer shall inspect the erosion control wattles once every week and within 24 hours after every rainfall event greater than 1/2". The Contractor shall remove, dispose, or reshape the accumulated sediment when necessary as determined by the Engineer.

Sediment removal, disposal, or necessary shaping shall be as directed by the Engineer. All costs for removing accumulated sediment, disposal of sediment, and necessary shaping shall be incidental to the contract unit price per cubic yard for "Remove Sediment".

All costs for furnishing and installing the erosion control wattles including labor, equipment, and materials shall be incidental to the contract unit price per foot for the corresponding erosion control wattle bid item.

All costs for removing the erosion control wattle from the project including labor, equipment, and materials shall be incidental to the contract unit price per foot for "Remove Erosion Control Wattle".

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