

STATE OF SOUTH DAKOTA  
DEPARTMENT OF TRANSPORTATION

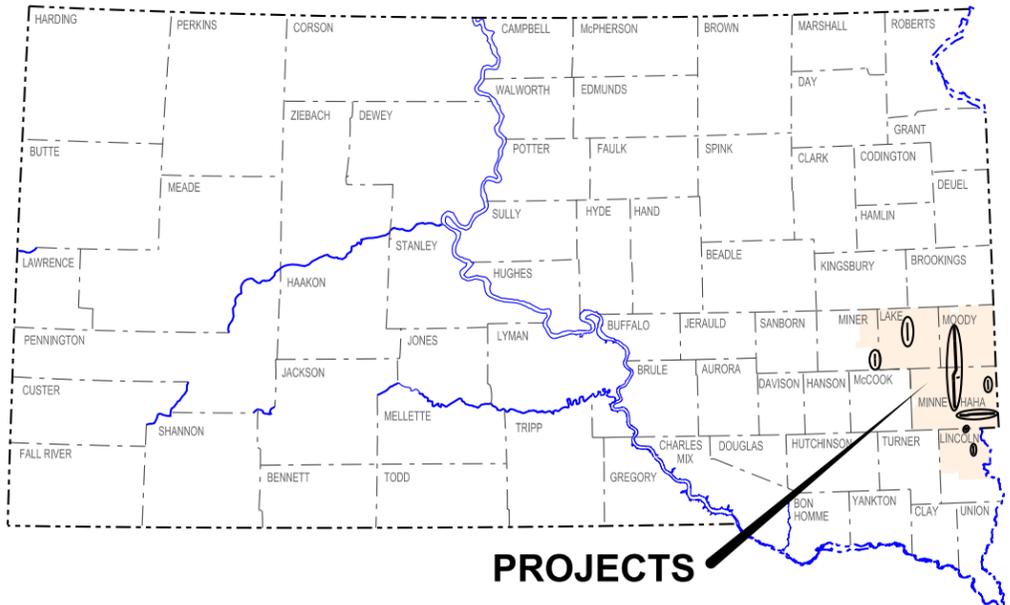
|                       |            |       |              |
|-----------------------|------------|-------|--------------|
| STATE OF SOUTH DAKOTA | PROJECT    | SHEET | TOTAL SHEETS |
|                       | P 0022(42) | 1     | 20           |

Plotting Date: 04/07/2014

PLANS FOR PROPOSED  
**PROJECT P 0022(42)**  
**SD HIGHWAYS 11 & 115**  
**US HIGHWAY 81**  
**INTERSTATES 29, 229 & 90**  
**LAKE, LINCOLN, MINER**  
**MINNEHAHA &**  
**MOODY COUNTIES**

INDEX OF SHEETS

|                |  |
|----------------|--|
| Sheet 1        | Title Sheet & Layout Map                           |
| Sheets 2 & 3   | Estimate of Quantities & Environmental Commitments |
| Sheets 4 - 6   | Plan Notes   |
| Sheet 7        | Table of Mainline Culvert Work                     |
| Sheet 8        | Itemized List for Traffic Control                  |
| Sheet 9        | Bank & Channel Protection Gabion Detail            |
| Sheet 10       | Turf Reinforcement Mat Detail                      |
| Sheets 11 - 20 | Standard Plates                                    |



PROJECTS

CULVERT REPAIR

| PROJECT       | LENGTH            |
|---------------|-------------------|
| SD 11 (south) | 4.2 Miles         |
| SD 11 (north) | 2.2 Miles         |
| SD 115        | 0.0 Miles         |
| US 81 (south) | 5.2 Miles         |
| US 81 (north) | 4.7 Miles         |
| I 29          | 28.9 Miles        |
| I 229         | 0.9 Miles         |
| I 90          | 13.5 Miles        |
| <b>TOTAL</b>  | <b>59.6 Miles</b> |



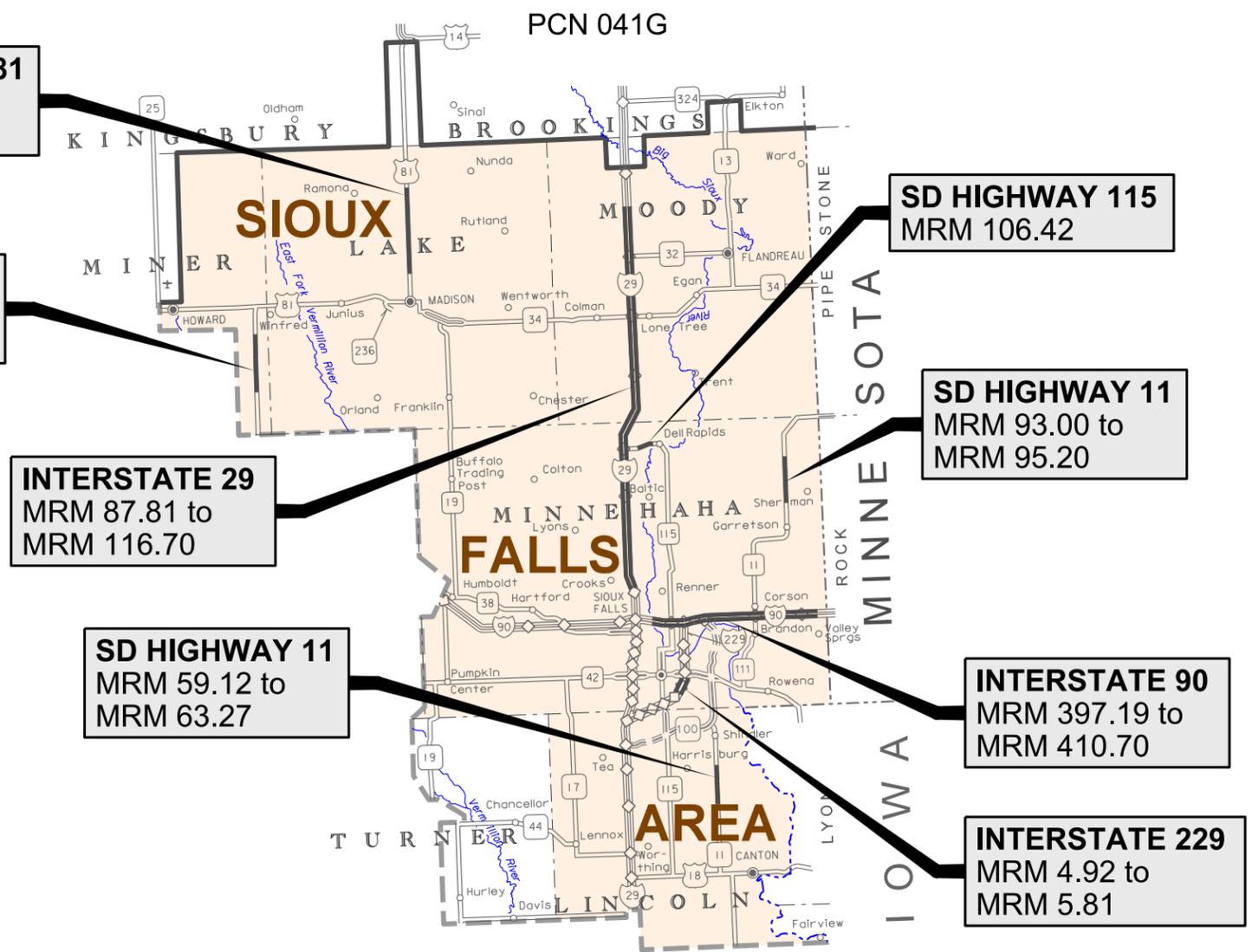
**US HIGHWAY 81**  
MRM 96.32 to  
MRM 101.00

**US HIGHWAY 81**  
MRM 74.47 to  
MRM 79.68

**STORM WATER PERMIT**  
(None required)

| PROJECT   | DESIGN DESIGNATION |         |        |         |
|-----------|--------------------|---------|--------|---------|
|           | SD 11 S            | SD 11 N | SD 115 | US 81 S |
| ADT(2013) | 2,347              | 2,223   | 3,158  | 1,215   |
| ADT(2033) | 4,539              | 3,392   | 4,820  | 1,409   |
| DHV       | 590                | 438     | 622    | 175     |
| D         | 50%                | 50%     | 50%    | 50%     |
| T DHV     | 3.4%               | 6.9%    | 2.1%   | 11.4%   |
| T ADT     | 7.5%               | 15.1%   | 4.7%   | 25.2%   |
| V         | 65 MPH             | 65 MPH  | 65 MPH | 65 MPH  |

| PROJECT   | DESIGN DESIGNATION |        |        |        |
|-----------|--------------------|--------|--------|--------|
|           | US 81 N            | I 29   | I 229  | I 90   |
| ADT(2013) | 1,709              | 7,537  | 18,200 | 7,937  |
| ADT(2033) | 2,127              | 9,928  | 28,065 | 12,059 |
| DHV       | 347                | 1,162  | 3,340  | 1,411  |
| D         | 50%                | 50%    | 50%    | 50%    |
| T DHV     | 8.6%               | 10.0%  | 3.3%   | 7.4%   |
| T ADT     | 19.0%              | 21.9%  | 7.2%   | 16.2%  |
| V         | 65 MPH             | 75 MPH | 65 MPH | 75 MPH |



PLOT SCALE - 1"=7000'

PLOTTED FROM - TRM11115

PLOT NAME - 1

FILE - ... \CULV041G\TTL041G.DGN

### ESTIMATE OF QUANTITIES

| Bid Item Number | Item  | Quantity | Unit |
|-----------------|---|----------|------|
| 009E0010        | Mobilization                                  | Lump Sum | LS   |
| 110E0500        | Remove Pipe Culvert                           | 18       | Ft   |
| 110E0510        | Remove Pipe End Section                       | 4        | Each |
| 110E7500        | Remove Pipe for Reset                         | 202      | Ft   |
| 110E7510        | Remove Pipe End Section for Reset             | 33       | Each |
| 120E0600        | Contractor Furnished Borrow                   | 26       | CuYd |
| 250E0020        | Incidental Work, Grading                      | Lump Sum | LS   |
| 450E0182        | 36" RCP Class 2, Furnish                      | 12       | Ft   |
| 450E0190        | 36" RCP, Install                              | 12       | Ft   |
| 450E2008        | 18" RCP Flared End, Furnish                   | 1        | Each |
| 450E2009        | 18" RCP Flared End, Install                   | 1        | Each |
| 450E2028        | 36" RCP Flared End, Furnish                   | 3        | Each |
| 450E2029        | 36" RCP Flared End, Install                   | 3        | Each |
| 450E3062        | 54" RCP Arch Class 2, Furnish                 | 6        | Ft   |
| 450E3070        | 54" RCP Arch, Install                         | 6        | Ft   |
| 450E9000        | Reset Pipe                                    | 202      | Ft   |
| 450E9001        | Reset Pipe End Section                        | 33       | Each |
| 634E0010        | Flagging                                      | 25       | Hour |
| 634E0100        | Traffic Control                               | 1,186    | Unit |
| 634E0120        | Traffic Control, Miscellaneous                | Lump Sum | LS   |
| 634E0330        | Raised Pavement Markers                       | 5,820    | Ft   |
| 634E0420        | Type C Advance Warning Arrow Panel            | 1        | Each |
| 720E1010        | PVC Coated Bank and Channel Protection Gabion | 23.0     | CuYd |
| 734E0010        | Erosion Control                               | Lump Sum | LS   |
| 734E0132        | Type 2 Turf Reinforcement Mat                 | 667.0    | SqYd |
| 734E0154        | 12" Diameter Erosion Control Wattle           | 400      | Ft   |
| 831E0110        | Type B Drainage Fabric                        | 72       | SqYd |

### SPECIFICATIONS

Standard Specifications for Roads & Bridges, 2004 Edition and Required Provisions, Supplemental Specifications and 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.

|                                |            |       |                 |
|--------------------------------|------------|-------|-----------------|
| STATE<br>OF<br>SOUTH<br>DAKOTA | PROJECT    | SHEET | TOTAL<br>SHEETS |
|                                | P 0022(42) | 3     | 20              |

**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.

|                                |            |       |                 |
|--------------------------------|------------|-------|-----------------|
| STATE<br>OF<br>SOUTH<br>DAKOTA | PROJECT    | SHEET | TOTAL<br>SHEETS |
|                                | P 0022(42) | 4     | 20              |

### SCOPE OF WORK

The scope of work on these projects shall include, but is not limited to the following:

1. Remove and reset separated pipe culvert and end sections.
2. Remove and replace pipe culvert and end sections.
3. Install tie bolts on all new or removed and reset sections.
4. Clean silt from ditches adjacent to pipe culverts.
5. Grade and shape ditch cleanout sections and place gabions.
6. Seed and apply turf reinforcement mat or erosion control blanket to disturbed areas.

### COORDINATION BETWEEN CONTRACTORS

A separate contract for Project PH 2292(96)5, Minnehaha County – PCN 04U2 will be awarded to another Contractor for High Friction Surface Treatment on I229 from approximately MRM 5.6 to MRM 6.0. Also, a separate contract for Project 029N-272 and etc., Minnehaha, Lincoln and Moody Counties – PCN I38X and etc. will be awarded to another Contractor for PCC & CRC Pavement Repair on I29, I229 and I90.

The Contractor shall schedule his work so as not to interfere with or hinder the progress of the work performed by other contractors on these projects.

### 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.

### TIE BOLTS FOR RCP/RCP ARCH CULVERTS

Tie Bolts shall be installed at the inlet and outlet on all sections of new/reset culvert and on new/reset culvert ends (requires connection from existing culvert to new end section). Connection shall be made from the first section left in place to the first new/reset section and to all new/reset sections.

For informational purposes:

Field drilling will be required to install the tie bolts on reset culvert, on reset culvert ends and on existing culvert when installing a new/reset end section.

Cost for removing tie bolts for reuse, drilling tie bolt holes and providing, installing and reinstalling tie bolts shall be incidental to the contract unit prices for installing or resetting RCP Culverts and End Sections.

### 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.

### CULVERT REPAIRS FOR MAINLINE CULVERTS

The Contractor is encouraged to thoroughly investigate the culvert repair sites prior to bidding.

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.

### 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 as directed by the Engineer. 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 at some locations 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.

### INCIDENTAL WORK, GRADING

The following work will be required at MRM 5.79 on I229 N:

Perform ditch cleanout in the outside ditch from the 42" RCP end approximately 125' north to the 24" RCP end. Ditch cleanout dimensions are approximately 125' long by 20' wide by 1' average depth. An estimated 93 cubic yards of waste material to be disposed of outside the ROW will be generated with this cleanout.

The ditch bottom shall then be shaped as detailed in the TURF REINFORCEMENT MAT DETAIL shown elsewhere in these plans. Approximately 125' of ditch shaping will be required. A 10' long ditch transition will be required from the typical TURF REINFORCEMENT MAT DETAIL cross section to the typical BANK & CHANNEL PROTECTION GABION DETAIL at the 42" RCP end location.

The following work will be required at MRM 5.81 on I229 S:

Perform ditch cleanout in the outside ditch from the 24" RCP end approximately 100' south. Ditch cleanout dimensions are approximately 100' long by 20' wide by 1' average depth. An estimated 74 cubic yards of waste material to be disposed of outside the ROW will be generated with this cleanout.

Also, the Contractor will be required to remove and dispose of approximately 10 tons of in-place riprap and concrete/asphalt debris from this cleanout area.

The ditch bottom shall then be shaped as detailed in the TURF REINFORCEMENT MAT DETAIL shown elsewhere in these plans. Approximately 175' of ditch shaping will be required from the 24" RCP end to the 42" RCP end.

Exact cleanout limits and ditch bottom alignments for both the above areas will be staked by the Engineer.

All costs to remove and dispose of the waste material, including all dirt, sod, riprap and concrete/asphalt debris and also for the shaping of the ditch to the dimensions as detailed shall be included in the lump sum price for Incidental Work, Grading.

**DRAINAGE FABRIC**

Type B Drainage Fabric shall be placed on all surfaces to be covered with Bank & Channel Protection Gabions.

Cost for placing Type B Drainage Fabric shall be included in the contract unit price per square yard for Type B Drainage Fabric. Plans quantity shall be the basis of payment unless changes are ordered by the Engineer.

**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 except those covered by Turf Reinforcement Mat.

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;<br>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 0.3 acre. The area to be covered with type 2 erosion control blanket is estimated at 0.2 acre (929 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".

**MYCORRHIZAL INOCULUM**

Mycorrhizal inoculum shall consist of mycorrhizal fungi spores and mycorrhizal fungi-infected root fragments in a solid carrier. The carrier may include organic materials, calcinated clay, or other materials consistent with application and good plant growth. The supplier shall provide certification of the fungal species claimed and the live propagule count. The inoculum shall include the following fungal species:

- Glomus intraradices* 25%
- Glomus aggregatu* 25%
- Glomus mosseae* 25%
- Glomus etunicatum*25%

All seed shall be inoculated by the seed supplier with a minimum of 100,000 live propagules of mycorrhizal fungi per acre. All costs of inoculating the seed shall be incidental to the contract unit price per pound for the corresponding permanent seed mixture.

The mycorrhizal inoculum shall be from the list below or an approved equal:

| <u>Product</u> | <u>Manufacturer</u>   |
|----------------|---|
| MycApply       | Mycorrhizal Applications, Inc.<br>Grants Pass, OR<br>Phone: 1-866-476-7800<br><a href="http://www.mycorrhizae.com/">http://www.mycorrhizae.com/</a> |

**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.

**TURF REINFORCEMENT MAT**

Turf Reinforcement Mat shall be installed at locations shown in the table at the widths specified, and at locations determined by the Engineer during construction. The Contractor shall use a turf reinforcement mat from the approved products list. The approved product list for turf reinforcement mat may be viewed at the following internet site:

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

Installation of the Turf Reinforcement Mat shall be according to the manufacturer's installation instructions.

**TABLE OF TURF REINFORCEMENT MAT**

| Route                                | MRM  | Location      | Width (Ft) | Length (Ft) | Type | Quantity (SqYd) |
|--------------------------------------|------|---------------|------------|-------------|------|-----------------|
| I229 N                               | 5.79 | Outside ditch | 20         | 125         | 2    | 278             |
| I229 S                               | 5.81 | Outside ditch | 20         | 175         | 2    | 389             |
| Total Type 2 Turf Reinforcement Mat: |      |               |            |             |      | 667             |

**CONTRACTOR FURNISHED BORROW**

The Contractor shall provide a suitable site for Contractor Furnished Borrow material. The Contractor Furnished Borrow may be obtained from ditch cleanout at the pipe end in some locations.

The borrow material shall be approved by the Engineer.

Compaction of the fill material 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. Cost for water shall be incidental to the contract unit price per cubic yard for Contractor Furnished Borrow.

The basis for payment for Contractor Furnished Borrow will be plans quantity. Additional quantities will be included for payment only in the event that work sites other than those shown on the plans are added to the contract.

Restoration of the Contractor furnished borrow site shall be the responsibility of the Contractor.

The Contractor is responsible for obtaining all required permits and clearances for the borrow site.

|                                |            |       |                 |
|--------------------------------|------------|-------|-----------------|
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|                                | P 0022(42) | 6     | 20              |

**TEMPORARY PAVEMENT MARKING**

Temporary pavement marking for lane closure tapers shall consist of Raised Pavement Markers. Cost shall be included in the contract unit price per foot for Raised Pavement Markers.

**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.

On two-lane highways, the shoulders shall be closed per standard plate 634.03 if excavations are within 30 feet of the traveled lane.

On the interstate highways, a lane closure will be required if any construction equipment or materials will be parked or unloaded on the shoulder. Otherwise, the work can be completed with a shoulder closure as shown in standard plate 634.61.

Sufficient traffic control devices have been included in these plans to sign one workspace for a shoulder closure, one workspace for a lane closure using flaggers and one workspace for a lane closure on a four lane divided.

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    | SIZE AND TYPE   | REMOVE PIPE CULVERT (FT) | REMOVE PIPE END SECTION (EACH) | REMOVE AND RESET PIPE CULVERT (FT) | REMOVE AND RESET PIPE END SECTION (EACH) | 1.5 ft DEEP BANK AND CHANNEL PROTECTION GABIONS (CUYD) | TYPE B DRAINAGE FABRIC (SQYD) | CONTR. FURN. BORROW (CUYD) | FURNISH AND INSTALL 18 INCH RCP FLARED END (EACH) | FURNISH AND INSTALL 36 INCH RCP (FT) | FURNISH AND INSTALL 36 INCH RCP FLARED END (EACH) | FURNISH AND INSTALL 54 INCH RCP ARCH (FT) | APPROXIMATE GPS COORDINATES |            | SIDE OF ROAD, RAMP, OR BERM |
|---------------------------------|--------|---|--------------------------|--------------------------------|------------------------------------|--|--|-------------------------------|----------------------------|---|--------------------------------------|---|---|-----------------------------|------------|-----------------------------|
|                                 |        |   |                          |                                |                                    |  |  |                               |                            |   |                                      |   |   | NORTHING                    | EASTING    |                             |
| 11                              | 59.12  | 36" RCP   |                          |                                | 12                                 | 2  |  |                               |                            |   |                                      |   |   | N 43.35469                  | W 96.64857 | Both                        |
| 11                              | 60.15  | 30" RCP   |                          |                                | 12                                 | 2  |  |                               |                            |   |                                      |   |   | N 43.36948                  | W 96.64843 | Both                        |
| 11                              | 61.68  | 30" RCP   |                          |                                | 12                                 | 2  |  |                               |                            |   |                                      |   |   | N 43.39151                  | W 96.64855 | Both                        |
| 11                              | 63.27  | 36" RCP   |                          | 1                              |                                    | 1  | 6  | 20                            |                            |   |                                      | 1   |   | N 43.41484                  | W 96.64855 | Both                        |
| 11                              | 93.00  | 36" RCP   |                          |                                | 18                                 | 2  |  |                               |                            |   |                                      |   |   | N 43.74198                  | W 96.51098 | Both                        |
| 11                              | 93.90  | 30" RCP   |                          |                                | 12                                 | 2  |  |                               | 5                          |   |                                      |   |   | N 43.75512                  | W 96.51153 | Both                        |
| 11                              | 95.20  | 54" RCP   |                          |                                | 24                                 | 2  |  |                               |                            |   |                                      |   |   | N 43.77387                  | W 96.51188 | Both                        |
| <b>SD HIGHWAY 11 SUBTOTALS</b>  |        |   | <b>0</b>                 | <b>1</b>                       | <b>90</b>                          | <b>13</b>                                | <b>6</b>   | <b>20</b>                     | <b>5</b>                   | <b>0</b>  | <b>0</b>                             | <b>1</b>  | <b>0</b>                                  |                             |            |                             |
| 115                             | 106.42 | 30" RCP   |                          |                                |                                    | 1  |  |                               | 5                          |   |                                      |   |   | N 43.81975                  | W 96.75771 | South                       |
| <b>SD HIGHWAY 115 SUBTOTALS</b> |        |   | <b>0</b>                 | <b>0</b>                       | <b>0</b>                           | <b>1</b>                                 | <b>0</b>   | <b>0</b>                      | <b>5</b>                   | <b>0</b>  | <b>0</b>                             | <b>0</b>  | <b>0</b>                                  |                             |            |                             |
| 81                              | 74.47  | 36" RCP   |                          |                                | 6                                  | 1  |  |                               |                            |   |                                      |   |   | N 43.90422                  | W 97.38966 | East                        |
| 81                              | 75.14  | 36" RCP   |                          |                                | 6                                  | 1  |  |                               |                            |   |                                      |   |   | N 43.91371                  | W 97.38931 | East                        |
| 81                              | 79.68  | 36" RCP   |                          | 1                              | 12                                 | 1  |  |                               |                            |   |                                      | 1   |   | N 43.97967                  | W 97.38978 | Both                        |
| 81                              | 96.32  | 36" RCP   | 12                       |                                | 12                                 | 2  |  |                               |                            |   | 12                                   |   |   | N 44.03065                  | W 97.12940 | Both                        |
| 81                              | 101.00 | 36" RCP   |                          |                                | 6                                  | 2  |  |                               |                            |   |                                      |   |   | N 44.09864                  | W 97.12973 | Both                        |
| <b>US HIGHWAY 81 SUBTOTALS</b>  |        |   | <b>12</b>                | <b>1</b>                       | <b>42</b>                          | <b>7</b>                                 | <b>0</b>   | <b>0</b>                      | <b>0</b>                   | <b>0</b>  | <b>12</b>                            | <b>1</b>  | <b>0</b>                                  |                             |            |                             |
| I29                             | 87.81  | 54" RCP Arch  | 6                        |                                | 18                                 | 2  |  |                               |                            |   |                                      |   | 6   | N 43.66514                  | W 96.78072 | Both                        |
| I29 S                           | 92.43  | 18" RCP   |                          |                                |                                    | 1  | 4.5  | 16                            |                            |   |                                      |   |   | N 43.73175                  | W 96.78168 | West                        |
| I29 N                           | 92.74  | 18" RCP   |                          | 1                              |                                    |  |  |                               |                            | 1   |                                      |   |   | N 43.73634                  | W 96.78095 | West                        |
| I29 S                           | 98.18  | TWIN 54" RCP  |                          |                                | 2 @ 12                             | 2  |  |                               | 10                         |   |                                      |   |   | N 43.81474                  | W 96.78095 | West                        |
| I29 S                           | 116.70 | 36" RCP   |                          |                                |                                    | 1  |  |                               |                            |   |                                      |   |   | N 44.07803                  | W 96.75957 | West                        |
| <b>INTERSTATE 29 SUBTOTALS</b>  |        |   | <b>6</b>                 | <b>1</b>                       | <b>42</b>                          | <b>6</b>                                 | <b>4.5</b>   | <b>16</b>                     | <b>10</b>                  | <b>1</b>  | <b>0</b>                             | <b>0</b>  | <b>6</b>                                  |                             |            |                             |
| I229                            | 4.92   | 36" RCP   |                          | 1                              | 6                                  | 1  |  |                               | 3                          |   |                                      | 1   |   | N 43.52502                  | W 96.70348 | Both                        |
| I229 N                          | 5.79*  | 42" RCP   |                          |                                |                                    |  | 12.5   | 36                            |                            |   |                                      |   |   | N 43.53521                  | W 96.69482 | East                        |
| I229 S                          | 5.81*  | 24" RCP   |                          |                                |                                    |  |  |                               |                            |   |                                      |   |   | N 43.53509                  | W 96.69399 | West                        |
| <b>INTERSTATE 229 SUBTOTALS</b> |        |   | <b>0</b>                 | <b>1</b>                       | <b>6</b>                           | <b>1</b>                                 | <b>12.5</b>  | <b>36</b>                     | <b>3</b>                   | <b>0</b>  | <b>0</b>                             | <b>1</b>  | <b>0</b>                                  |                             |            |                             |
| I 90                            | 397.19 | 36" RCP   |                          |                                |                                    | 1  |  |                               |                            |   |                                      |   |   | N 43.61282                  | W 96.75636 | South                       |
| I90 EB On Ramp                  | 410.70 | 36" RCP   |                          |                                | 12                                 | 1  |  |                               | 3                          |   |                                      |   |   | N 43.60839                  | W 96.49003 | South                       |
| I90 E                           | 410.70 | 36" RCP with 36" RCP to CMP Transition Safety end with bars |                          |                                | 6                                  | 1  |  |                               |                            |   |                                      |   |   | N 43.60841                  | W 96.49003 | South                       |
| I90 WB Off Ramp                 | 410.70 | 36" RCP   |                          |                                | 4                                  | 2  |  |                               |                            |   |                                      |   |   | N 43.60894                  | W 96.49013 | Both                        |
| <b>INTERSTATE 90 SUBTOTALS</b>  |        |   | <b>0</b>                 | <b>0</b>                       | <b>22</b>                          | <b>5</b>                                 | <b>0</b>   | <b>0</b>                      | <b>3</b>                   | <b>0</b>  | <b>0</b>                             | <b>0</b>  | <b>0</b>                                  |                             |            |                             |
| <b>PROJECT TOTALS</b>           |        |   | <b>18</b>                | <b>4</b>                       | <b>202</b>                         | <b>33</b>                                | <b>23</b>  | <b>72</b>                     | <b>26</b>                  | <b>1</b>  | <b>12</b>                            | <b>3</b>  | <b>6</b>                                  |                             |            |                             |

\* SEE NOTES FOR INCIDENTAL WORK, GRADING AND TURF REINFORCEMENT MAT

**ITEMIZED LIST FOR TRAFFIC CONTROL**

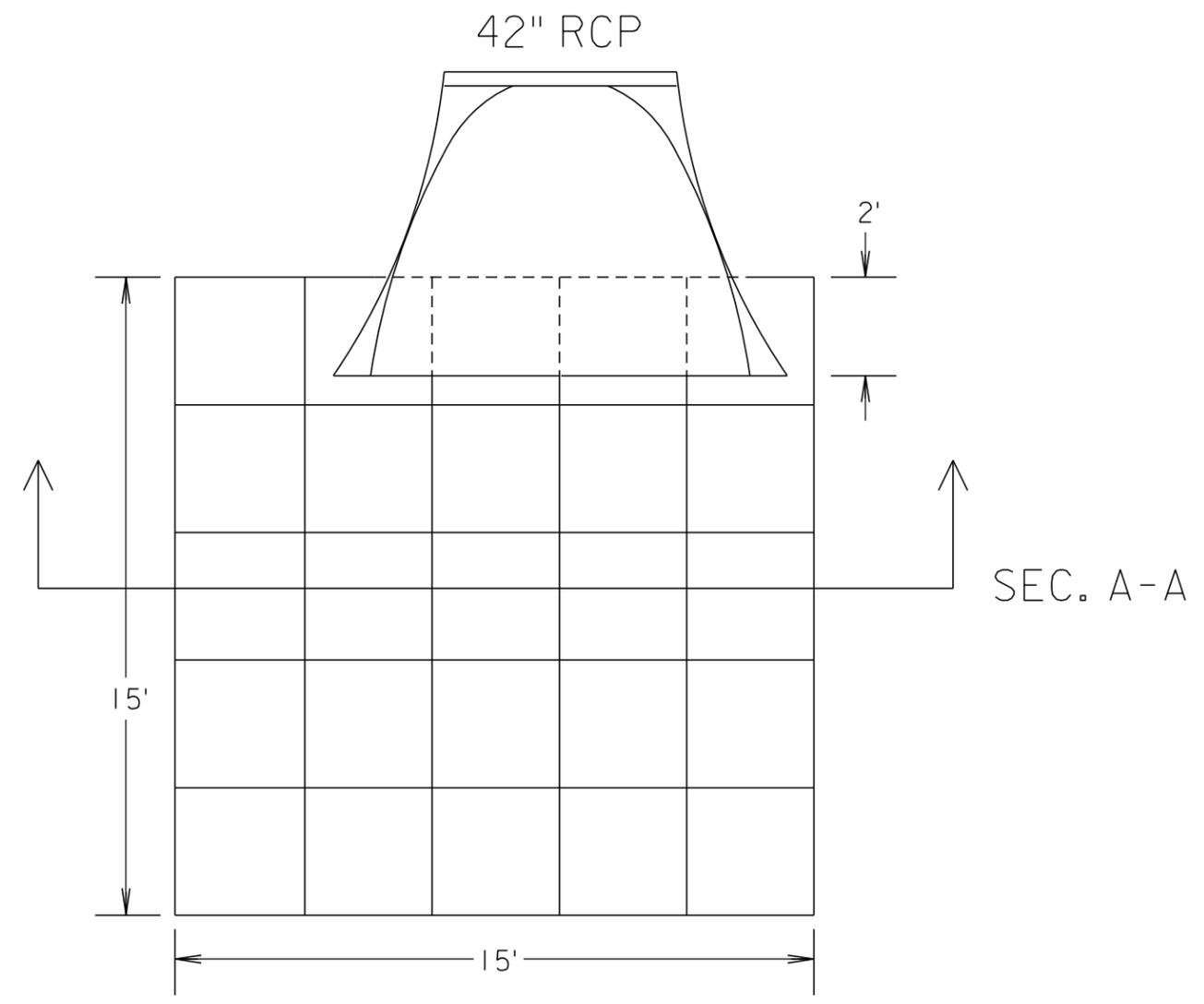
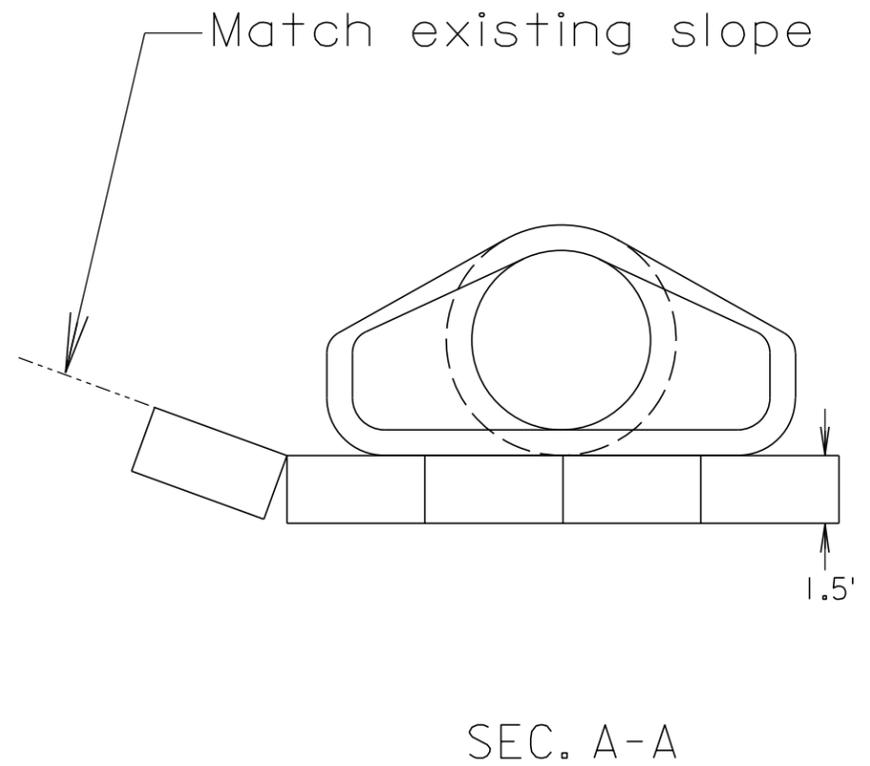
| SIGN CODE | SIGN SIZE  | DESCRIPTION                                    | NUMBER REQUIRED | UNITS PER SIGN | UNITS |
|-----------|------------|--|-----------------|----------------|-------|
| E5-1      | 36" x 32"  | EXIT GORE SIGN                                 |                 | 24             |       |
| G20-2     | 36" x 18"  | END ROAD WORK                                  | 6               | 17             | 102   |
| R1-1      | 48" x 48"  | STOP   |                 | 34             |       |
| R1-2      | 48" x 48"  | YIELD  |                 | 34             |       |
| R2-1      | 30" x 36"  | SPEED LIMIT ___                                |                 | 23             |       |
| R2-1      | 36" x 48"  | SPEED LIMIT 2-45, 1-65 & 1-75                  | 4               | 29             | 116   |
| R2-1      | 48" x 60"  | SPEED LIMIT ___                                |                 | 38             |       |
| R2-6aP    | 36" x 24"  | FINES DOUBLE                                   | 2               | 20             | 40    |
| 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)              |                 | 34             |       |
| W1-4      | 48" x 48"  | REVERSE CURVE SIGN (LEFT OR RIGHT)             |                 | 34             |       |
| W3-1      | 48" x 48"  | STOP AHEAD (SYMBOL)                            |                 | 34             |       |
| 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)                      | 2               | 34             | 68    |
| W4-1      | 48" x 48"  | MERGE (SYMBOL)                                 |                 | 34             |       |
| W4-2      | 48" x 48"  | LEFT OR RIGHT LANE ENDS (SYMBOL)               | 2               | 34             | 68    |
| 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                           | 1               | 16             | 16    |
| W16-2P    | 30" x 24"  | SUPPLEMENTAL DISTANCE PLAQUE                   |                 | 18             |       |
| W20-1     | 48" x 48"  | ROAD WORK AHEAD                                | 6               | 34             | 204   |
| 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                   | 2               | 34             | 68    |
| 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    |
| W4-3      | 48" x 48"  | LANE USE                                       | 1               | 34             | 34    |
| W5-4      | 48" x 48"  | RAMP NARROWS                                   | 1               | 34             | 34    |
| W13-4     | 24" x 24"  | ON RAMP  | 1               | 16             | 16    |
| *****     | 12" x 36"  | TYPE III OBJECT MARKER                         |                 | 15             |       |
| *****     | *****      | TYPE III BARRICADE - 8 FT. SINGLE SIDED        | 2               | 40             | 80    |
| *****     | *****      | TYPE III BARRICADE - 8 FT. DOUBLE SIDED        |                 | 56             |       |

**TOTAL UNITS 1186**

|                       |            |       |              |
|-----------------------|------------|-------|--------------|
| STATE OF SOUTH DAKOTA | PROJECT    | SHEET | TOTAL SHEETS |
|                       | P 0022(42) | 9     | 20           |

Plotting Date: 04/04/2014

# BANK & CHANNEL PROTECTION GABION DETAIL for MRM 5.79 on I229 N

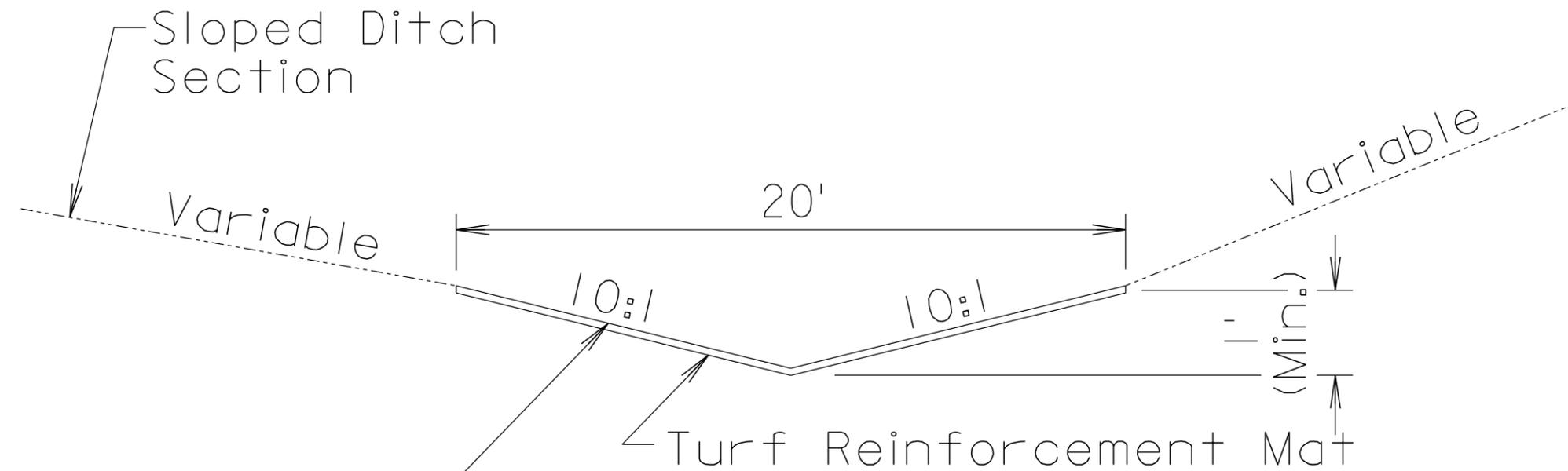


PLOTTED FROM - TRYA1NT46

|                       |            |       |              |
|-----------------------|------------|-------|--------------|
| STATE OF SOUTH DAKOTA | PROJECT    | SHEET | TOTAL SHEETS |
|                       | P 0022(42) | 10    | 20           |

Plotting Date: 04/04/2014

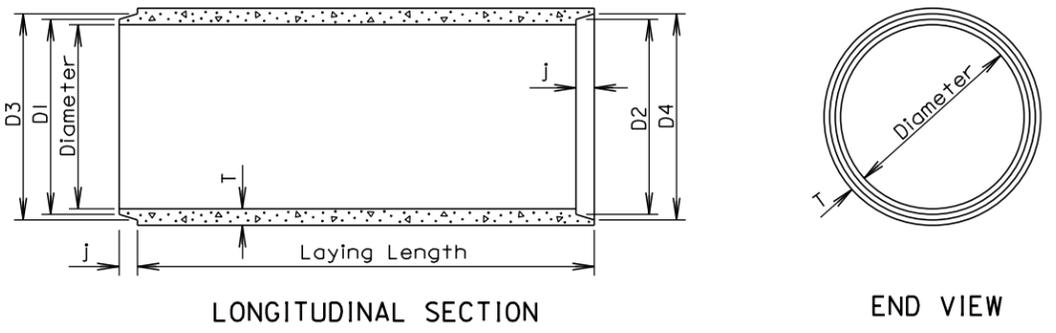
# TURF REINFORCEMENT MAT DETAIL for MRM 5.79 on I229 N and MRM 5.81 on I229 S



This ditch section shall be constructed when installing turf reinforcement mat.

**TOLERANCES IN DIMENSIONS**

Diameter:  $\pm 1.5\%$  for 24" Dia. or less and  $\pm 1\%$  or  $\frac{3}{8}$ " whichever is more for 27" Dia. or greater.  
 Diameters at Joints:  $\pm 3/16$ " for 30" Dia. or less and  $\pm 1/4$ " for 36" or greater.  
 Length of joint (j):  $\pm 1/4$ ".  
 Wall thickness (T): not less than design T by more than 5% or  $\frac{3}{16}$ ", whichever is greater.  
 Laying length: shall not underrun by more than  $\frac{1}{2}$ ".



**GENERAL NOTES:**

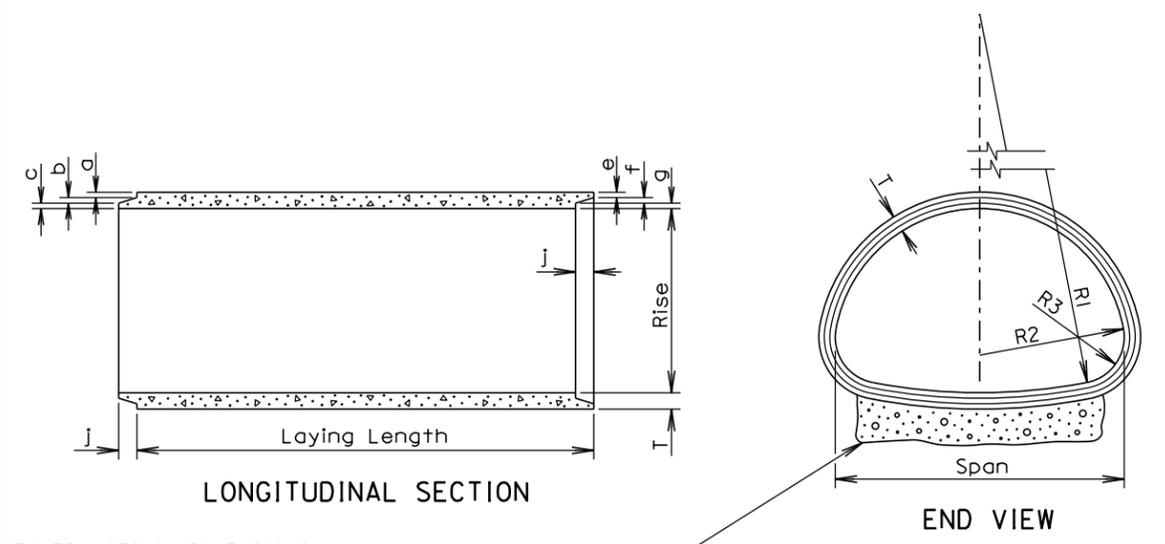
Construction of R. C. P. shall conform to the requirements of Section 990 of the Standard Specifications for Roads and Bridges.

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.

| Diam. (in.) | Approx. Wt./Ft. (lb.) | T (in.) | J (in.) | D1 (in.) | D2 (in.) | D3 (in.) | D4 (in.) |
|-------------|-----------------------|---------|---------|----------|----------|----------|----------|
| 12          | 92                    | 2       | 1 3/4   | 13 1/4   | 13 5/8   | 13 7/8   | 14 1/4   |
| 15          | 127                   | 2 1/4   | 2       | 16 1/2   | 16 7/8   | 17 1/4   | 17 5/8   |
| 18          | 168                   | 2 1/2   | 2 1/4   | 19 5/8   | 20       | 20 3/8   | 20 3/4   |
| 21          | 214                   | 2 3/4   | 2 1/2   | 22 7/8   | 23 1/4   | 23 3/4   | 24 1/8   |
| 24          | 265                   | 3       | 2 3/4   | 26       | 26 3/8   | 27       | 27 3/8   |
| 27          | 322                   | 3 1/4   | 3       | 29 1/4   | 29 5/8   | 30 1/4   | 30 5/8   |
| 30          | 384                   | 3 1/2   | 3 1/4   | 32 3/8   | 32 3/4   | 33 1/2   | 33 5/8   |
| 36          | 524                   | 4       | 3 3/4   | 38 3/4   | 39 1/4   | 40       | 40 1/2   |
| 42          | 685                   | 4 1/2   | 4       | 45 1/8   | 45 5/8   | 46 1/2   | 47       |
| 48          | 867                   | 5       | 4 1/2   | 51 1/2   | 52       | 53       | 53 1/2   |
| 54          | 1070                  | 5 1/2   | 4 1/2   | 57 7/8   | 58 3/8   | 59 3/8   | 59 7/8   |
| 60          | 1296                  | 6       | 5       | 64 1/4   | 64 3/4   | 66       | 66 1/2   |
| 66          | 1542                  | 6 1/2   | 5 1/2   | 70 5/8   | 71 1/8   | 72 1/2   | 73       |
| 72          | 1810                  | 7       | 6       | 77       | 77 1/2   | 79       | 79 1/2   |
| 78          | 2098                  | 7 1/2   | 6 1/2   | 83 3/8   | 83 7/8   | 85 5/8   | 86 1/8   |
| 84          | 2410                  | 8       | 7       | 89 3/4   | 90 1/4   | 92 1/8   | 92 5/8   |
| 90          | 2740                  | 8 1/2   | 7       | 95 3/4   | 96 1/4   | 98 1/8   | 98 5/8   |
| 96          | 2950                  | 9       | 7       | 102 1/8  | 102 5/8  | 104 1/2  | 105      |
| 102         | 3075                  | 9 1/2   | 7 1/2   | 109      | 109 1/2  | 111 1/2  | 112      |
| 108         | 3870                  | 10      | 7 1/2   | 115 1/2  | 116      | 118      | 118 1/2  |

March 31, 2000

|                               |                       |                          |                        |
|-------------------------------|-----------------------|--------------------------|------------------------|
| Published Date: 1st Qtr. 2014 | S<br>D<br>D<br>O<br>T | REINFORCED CONCRETE PIPE | PLATE NUMBER<br>450.01 |
|                               |                       |                          | Sheet 1 of 1           |



**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  $\frac{3}{16}$ ", whichever is greater.  
 Laying length: shall not underrun by more than  $\frac{1}{2}$ ".

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 3/16  | 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   |

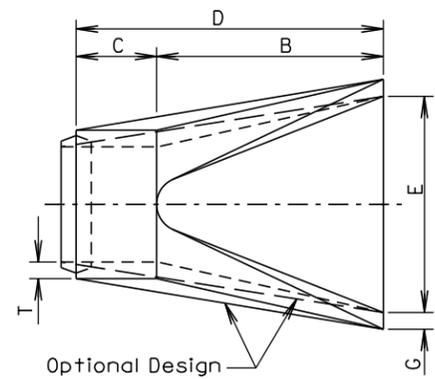
\* Equivalent Diameter of Circular R. C. P.

**GENERAL NOTES:**

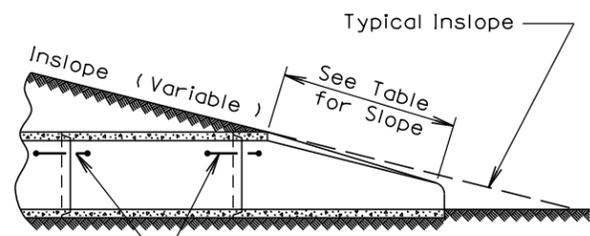
Construction of R.C.P. Arch shall conform to the requirements of Section 990 of the Standard Specifications for Roads and Bridges. Not more than 2 four foot sections shall be permitted near the ends of any culvert. Four foot lengths shall be used only to secure the required length of culvert.

March 31, 2000

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



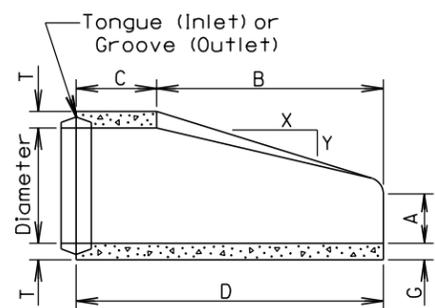
TOP VIEW



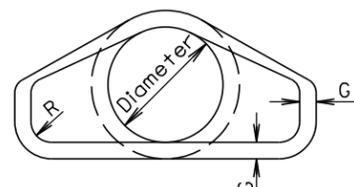
SLOPE DETAIL

GENERAL NOTES:

Lengths of concrete pipe shown on Plan Sheets are between flared Ends only.  
Construction of R.C.P. Flared End shall conform to the requirements of Section 990 of the Standard Specifications for Roads and Bridges.



LONGITUDINAL SECTION



END VIEW

| Dia. (in.) | Approx. Wt. of Section (lbs.) | Approx. Slope (X to Y) | T (in.) | A (in.) | B (in.) | C (in.) | D (in.) | E (in.) | G (in.) | R (in.) |
|------------|-------------------------------|------------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| 12         | 530                           | 2.4:1                  | 2       | 4       | 24      | 48 7/8  | 72 7/8  | 24      | 2       | 1 1/2   |
| 15         | 740                           | 2.4:1                  | 2 1/4   | 6       | 27      | 46      | 73      | 30      | 2 1/4   | 1 1/2   |
| 18         | 990                           | 2.3:1                  | 2 1/2   | 9       | 27      | 46      | 73      | 36      | 2 1/2   | 1 1/2   |
| 21         | 1280                          | 2.4:1                  | 2 3/4   | 9       | 36      | 37 1/2  | 73 1/2  | 42      | 2 3/4   | 1 1/2   |
| 24         | 1520                          | 2.5:1                  | 3       | 9 1/2   | 43 1/2  | 30      | 73 1/2  | 48      | 3       | 1 1/2   |
| 27         | 1930                          | 2.5:1                  | 3 1/4   | 10 1/2  | 49 1/2  | 24      | 73 1/2  | 54      | 3 1/4   | 1 1/2   |
| 30         | 2190                          | 2.5:1                  | 3 1/2   | 12      | 54      | 19 3/4  | 73 3/4  | 60      | 3 1/2   | 1 1/2   |
| 36         | 4100                          | 2.5:1                  | 4       | 15      | 63      | 34 3/4  | 97 3/4  | 72      | 4       | 1 1/2   |
| 42         | 5380                          | 2.5:1                  | 4 1/2   | 21      | 63      | 35      | 98      | 78      | 4 1/2   | 1 1/2   |
| 48         | 6550                          | 2.5:1                  | 5       | 24      | 72      | 26      | 98      | 84      | 5       | 1 1/2   |
| 54         | 8240                          | 2:1                    | 5 1/2   | 27      | 65      | 33 1/4  | 98 1/4  | 90      | 5 1/2   | 1 1/2   |
| 60         | 8730                          | 1.9:1                  | 6       | 35      | 60      | 39      | 99      | 96      | 5       | 1 1/2   |
| 66         | 10710                         | 1.7:1                  | 6 1/2   | 30      | 72      | 27      | 99      | 102     | 5 1/2   | 1 1/2   |
| 72         | 12520                         | 1.8:1                  | 7       | 36      | 78      | 21      | 99      | 108     | 6       | 1 1/2   |
| 78         | 14770                         | 1.8:1                  | 7 1/2   | 36      | 90      | 21      | 111     | 114     | 6 1/2   | 1 1/2   |
| 84         | 18160                         | 1.6:1                  | 8       | 36      | 90 1/2  | 21      | 111 1/2 | 120     | 6 1/2   | 1 1/2   |
| 90         | 20900                         | 1.5:1                  | 8 1/2   | 41      | 87 1/2  | 24      | 111 1/2 | 132     | 6 1/2   | 6       |

March 31, 2000

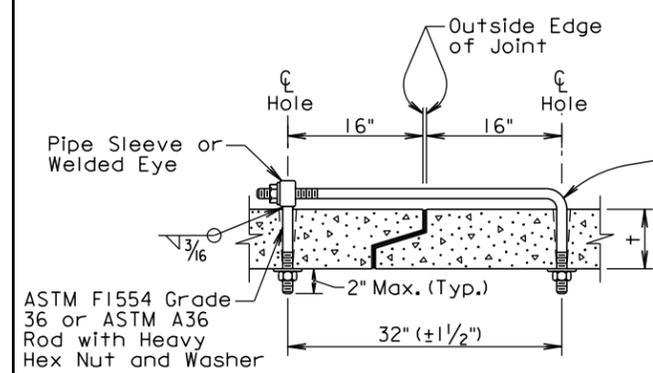
| Wall "t" (in.) | Rod Dia. (in.) | Pipe Sleeve Dia. (nominal) |
|----------------|----------------|----------------------------|
| < 3 1/4        | 5/8            | 3/4                        |
| 3 1/2 - 6 1/2  | 3/4            | 1                          |
| > 7            | 1              | 1 1/4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

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.



ADJUSTABLE EYE BOLT TIE

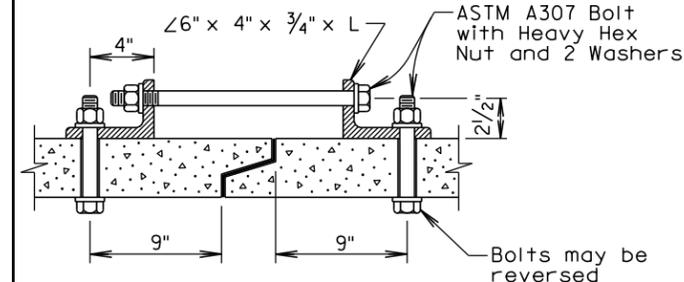
| Pipe Dia. (in.) | "L" (in.) | Bolt Dia. (in.) |
|-----------------|-----------|-----------------|
| < 48            | 4         | 3/4             |
| > 48            | 6         | 1               |

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.



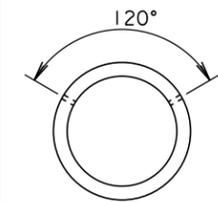
ANGLE AND BOLT TIE

GENERAL NOTES:

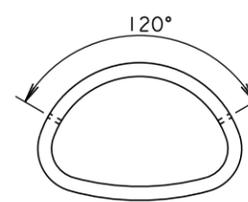
In lieu of the tie bolts detailed above other types of tie bolt connections may be installed as approved by the Office of Bridge Design.

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"

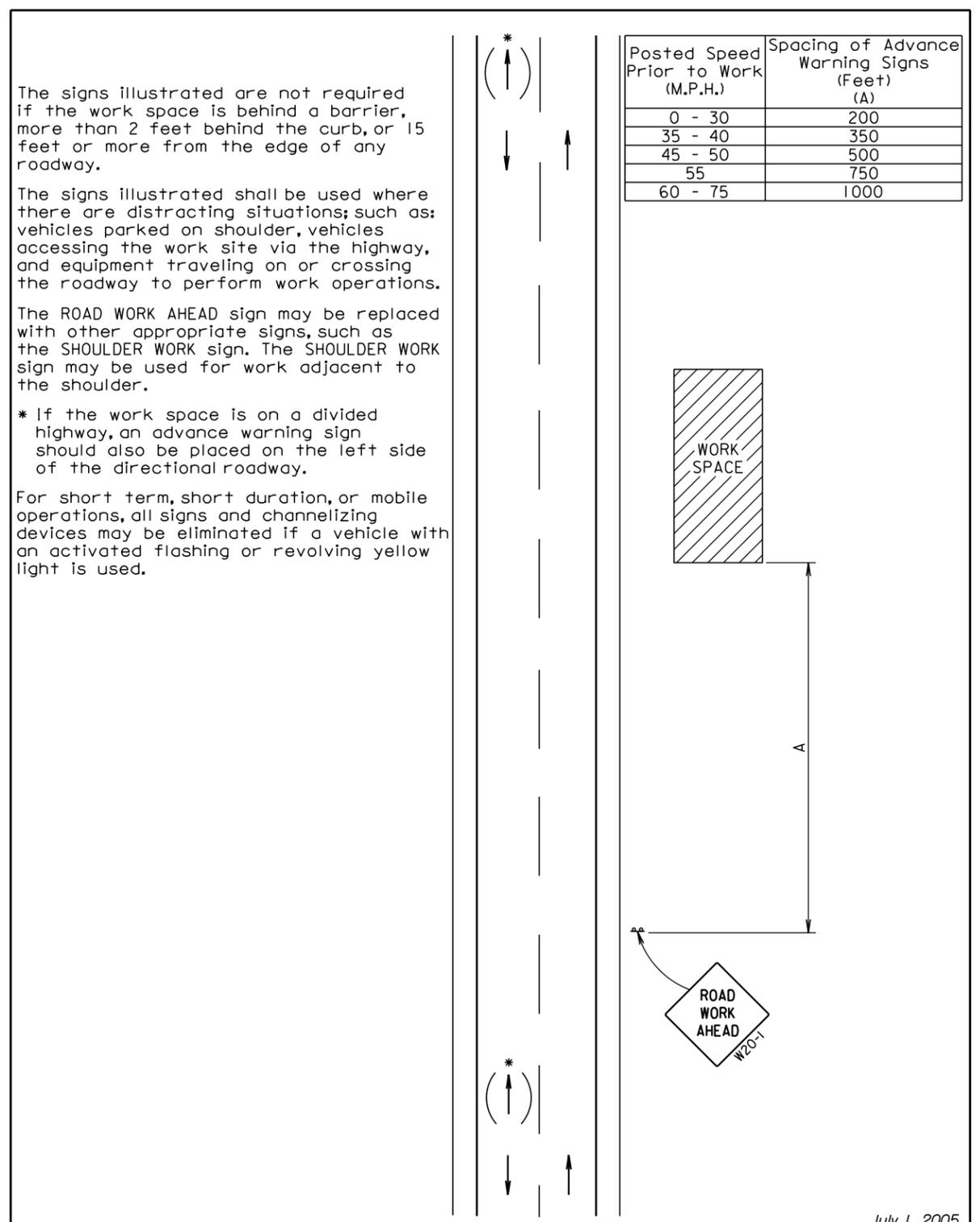


END VIEW "ARCH"

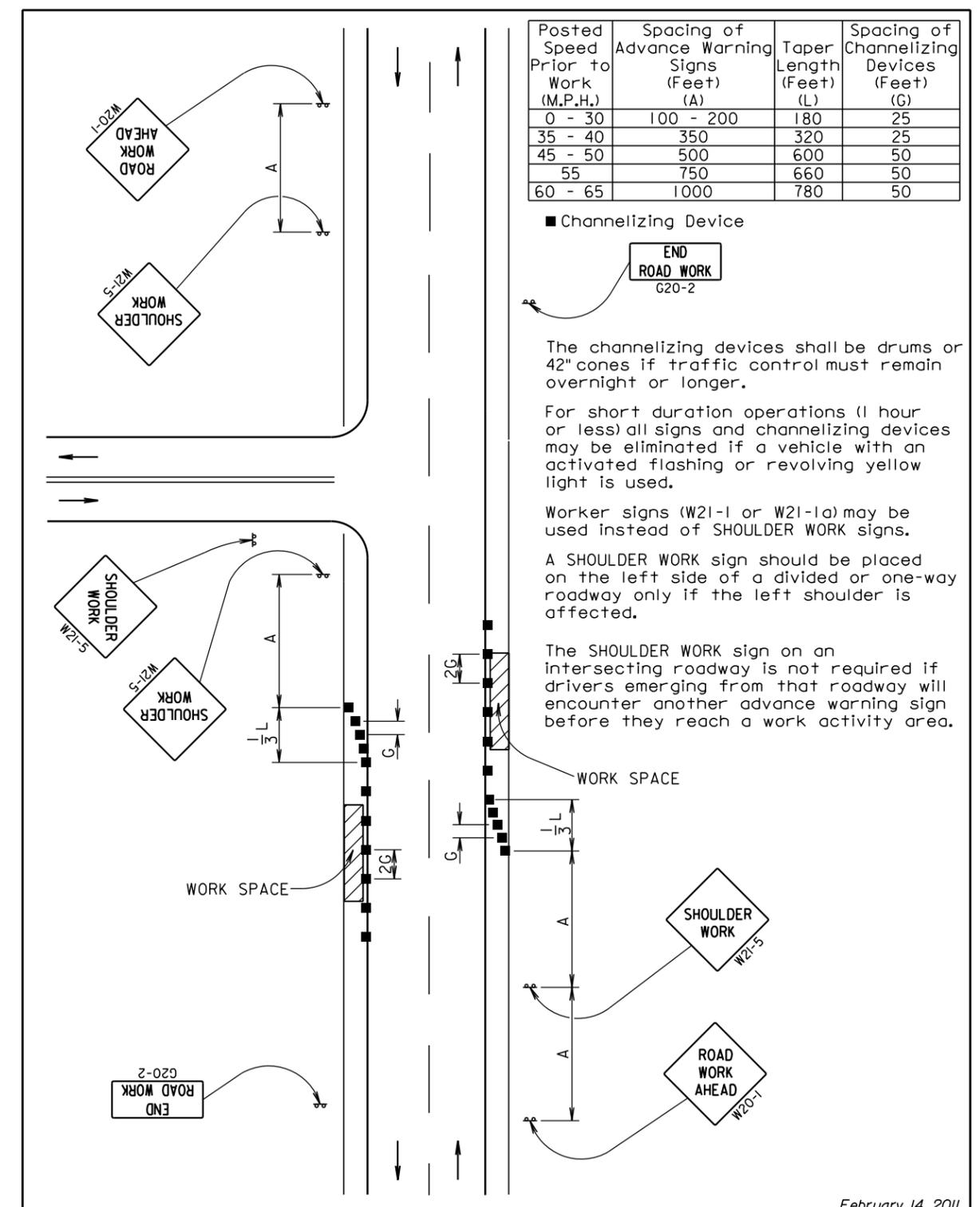
February 28, 2013

|                               |                       |                      |                        |
|-------------------------------|-----------------------|----------------------|------------------------|
| Published Date: 1st Qtr. 2014 | S<br>D<br>D<br>O<br>T | R. C. P. FLARED ENDS | PLATE NUMBER<br>450.10 |
|                               |                       |                      | Sheet 1 of 1           |

|                               |                       |                                      |                        |
|-------------------------------|-----------------------|--------------------------------------|------------------------|
| Published Date: 1st Qtr. 2014 | S<br>D<br>D<br>O<br>T | TIE BOLTS FOR R.C.P. AND R.C.P. ARCH | PLATE NUMBER<br>450.18 |
|                               |                       |                                      | Sheet 1 of 1           |

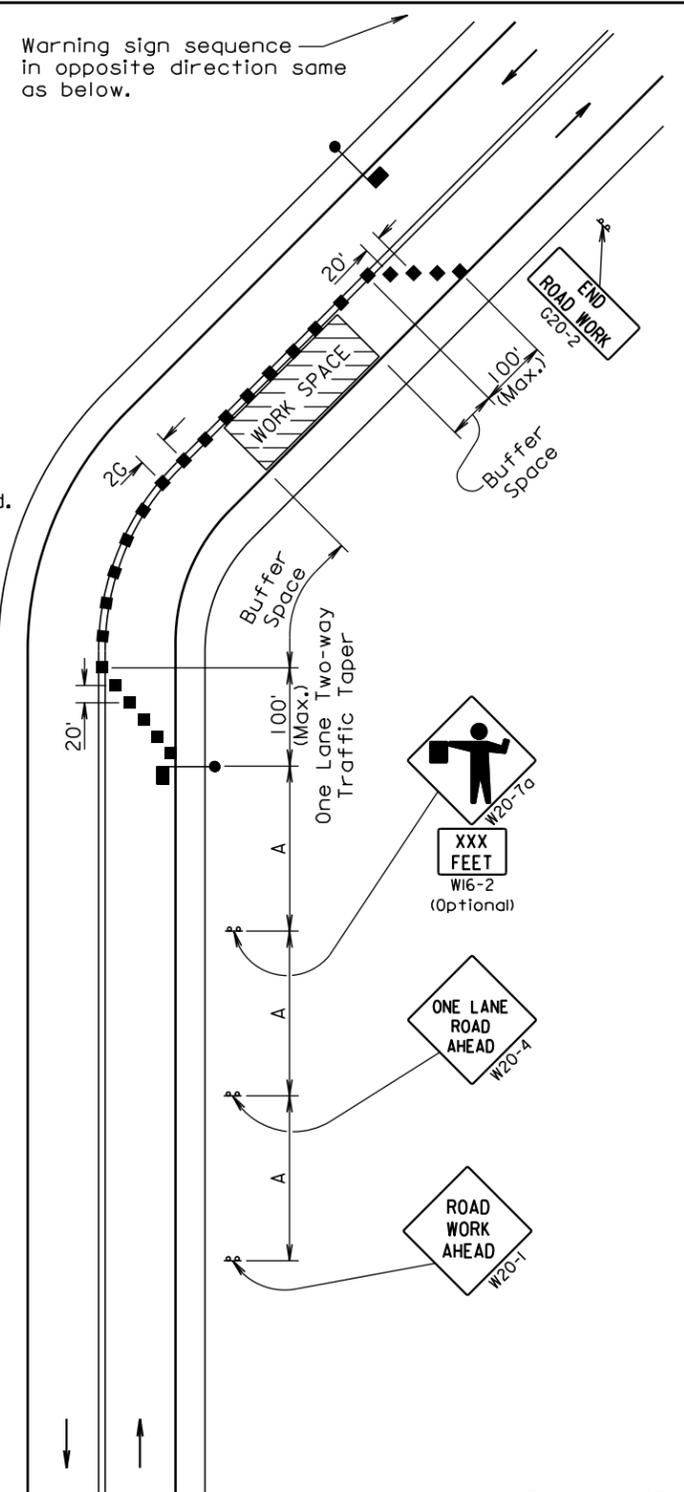


July 1, 2005



February 14, 2011

| Posted Speed Prior to Work (M.P.H.) | Spacing of Advance Warning Signs (Feet) (A) | Spacing of Channelizing Devices (Feet) (G) |
|-------------------------------------|---|--|
| 0 - 30                              | 200   | 25   |
| 35 - 40                             | 350   | 25   |
| 45 - 50                             | 500   | 50   |
| 55                                  | 750   | 50   |
| 60 - 65                             | 1000  | 50   |



Warning sign sequence in opposite direction same as below.

For low-volume traffic situations with short work zones on straight roadways where the flagger is visible to road users approaching from both directions, a single flagger may be used.

The ROAD WORK AHEAD and the END ROAD WORK signs may be omitted for short duration operations (1 hour or less).

For tack and/or flush seal operations, when flaggers are not being used, the FRESH OIL sign (W21-2) shall be displayed in advance of the liquid asphalt areas.

Flashing warning lights and/or flags may be used to call attention to the advance warning signs.

The channelizing devices shall be drums or 42" cones.

Channelizing devices are not required along the centerline adjacent to work area when pilot cars are utilized for escorting traffic through the work area.

Channelizing devices and flaggers shall be used at intersecting roads to control intersecting road traffic as required.

The buffer space should be extended so that the two-way traffic taper is placed before a horizontal or vertical curve to provide adequate sight distance for the flagger and queue of stopped vehicles.

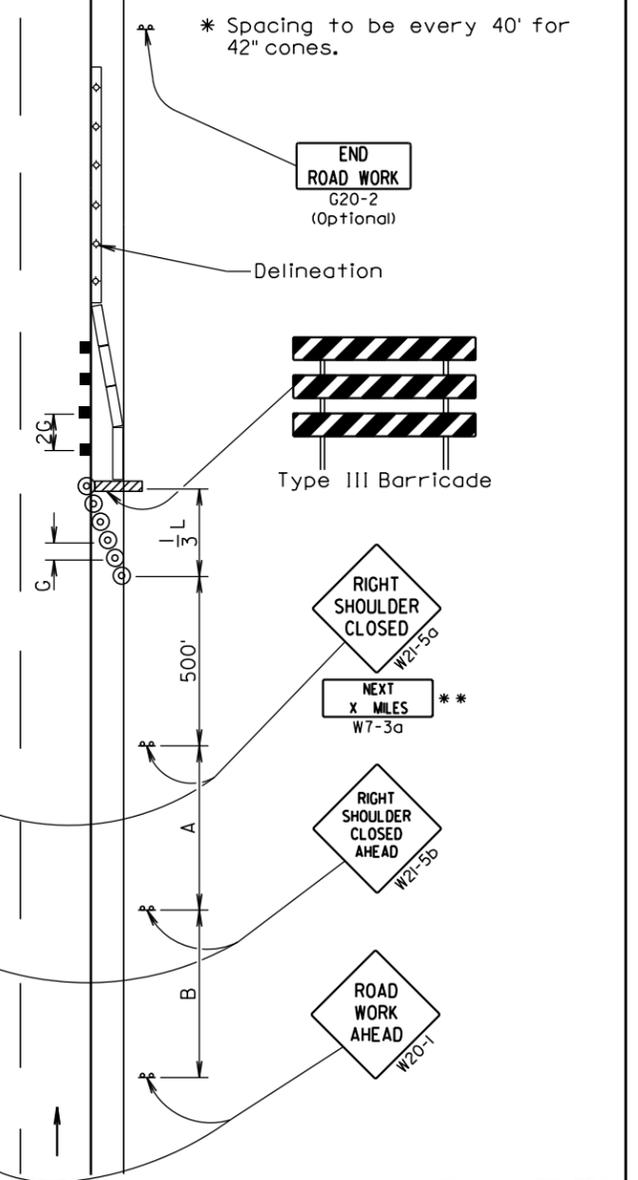
- ⊙ Reflectorized Drum
  - Channelizing Device shall be 42" cones or drums
  - Movable Concrete Barrier
- 42" cones may be used in place of the drums shown in the taper if setup will not be used during any night time hours.

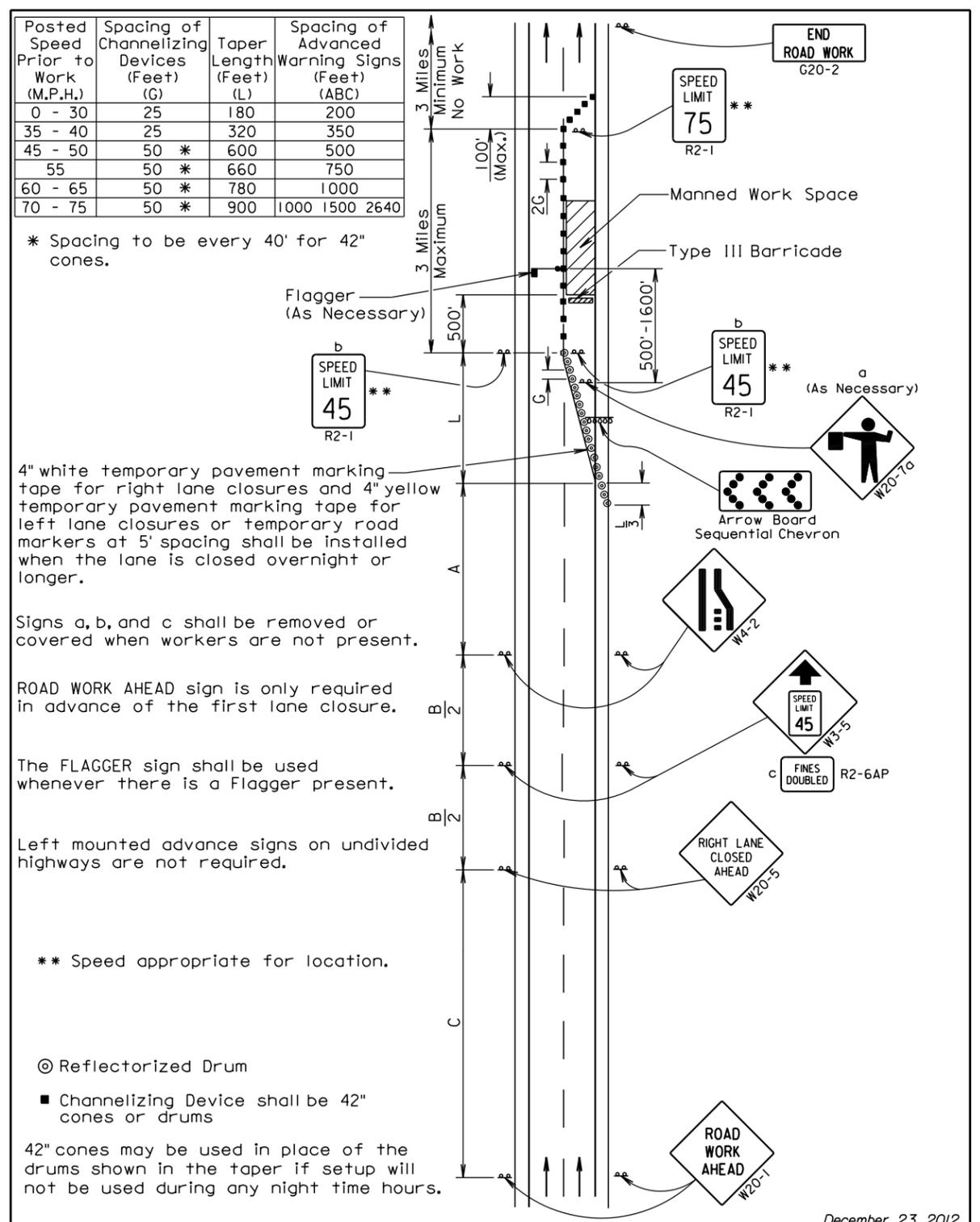
\*\*For distances 1/2 mile or greater.

The barrier in this diagram shows one method that may be used to close a shoulder of a long term project. The use of a barrier should be based on the need determined by the Highway Authority.

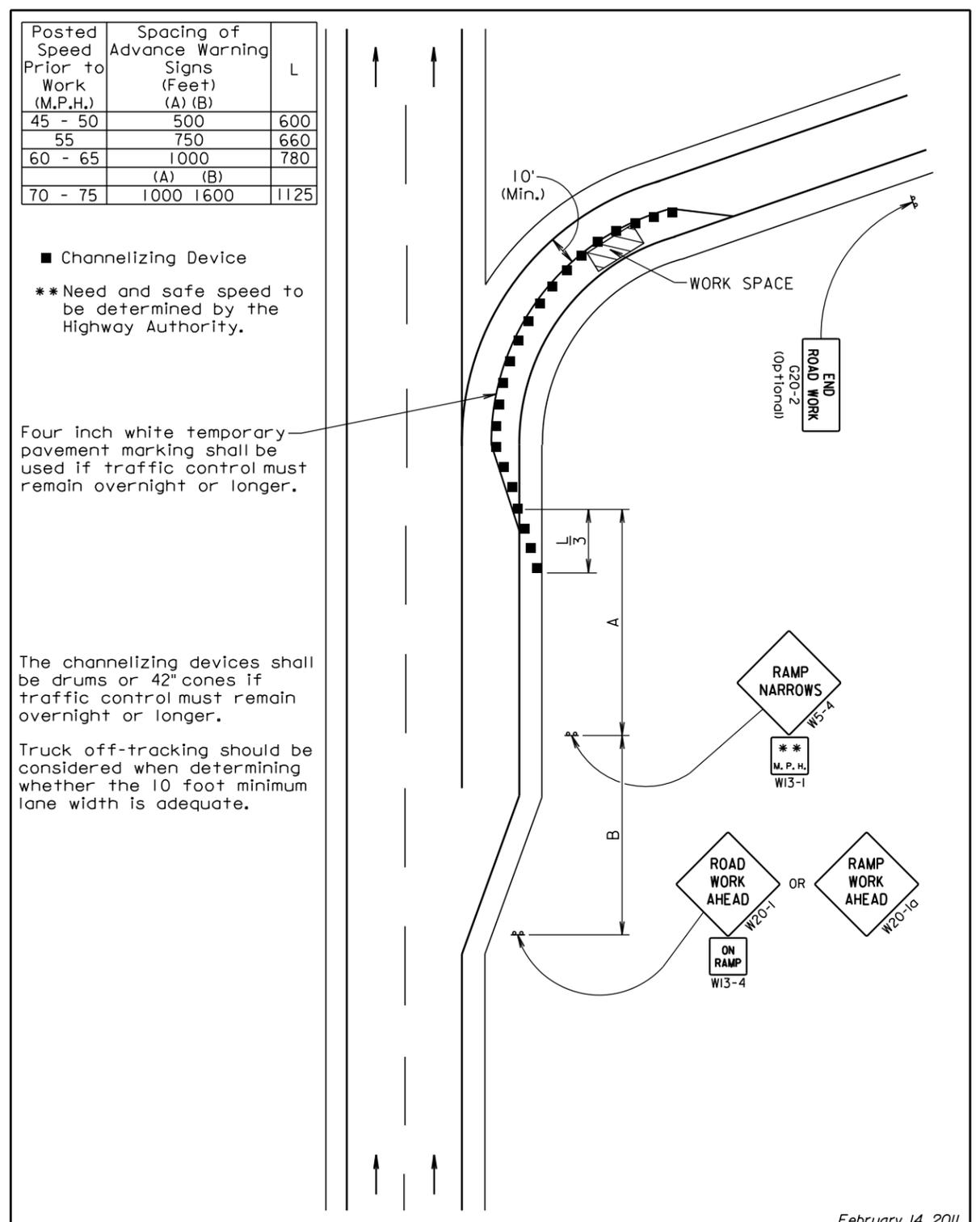
The movable concrete barrier layout is shown elsewhere in the plans.

| Posted Speed Prior to Work (M.P.H.) | Spacing of Advance Warning Signs (Feet) |      |     | Taper Length (Feet) (L) | Spacing of Channelizing Devices (Feet) (G) |
|-------------------------------------|---|------|-----|-------------------------|--|
|                                     | (A)                                     | (B)  | (C) |                         |  |
| 0 - 30                              | 200                                     |      |     | 180                     | 25   |
| 35 - 40                             | 350                                     |      |     | 320                     | 25   |
| 45 - 50                             | 500                                     |      |     | 600                     | 50 *                                       |
| 55                                  | 750                                     |      |     | 660                     | 50 *                                       |
| 60 - 65                             | 1000                                    |      |     | 780                     | 50 *                                       |
|                                     | (A)                                     | (B)  |     |                         |  |
| 70 - 75                             | 1000                                    | 1600 |     | 1125                    | 50 *                                       |





December 23, 2012



February 14, 2011

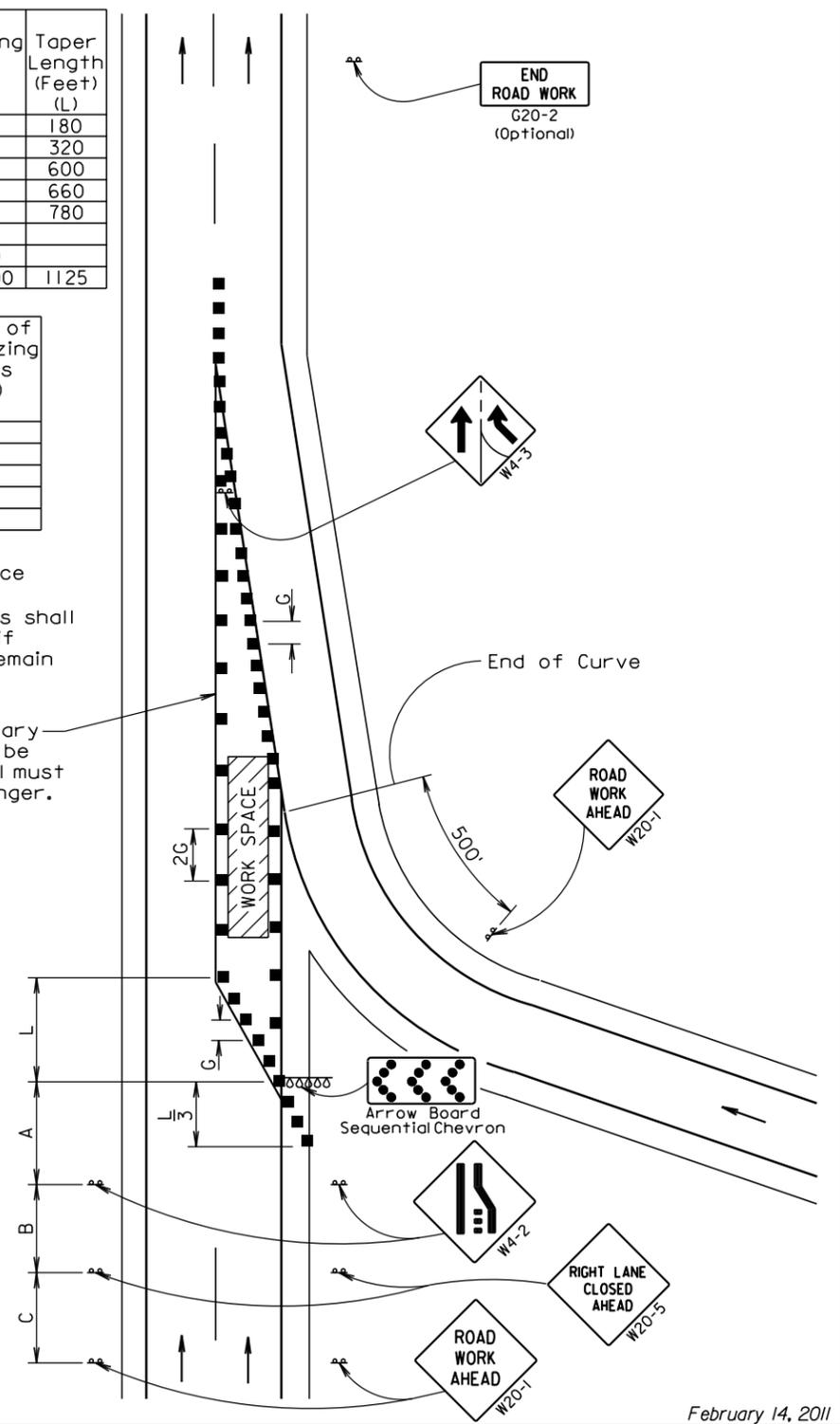
| Posted Speed Prior to Work (M.P.H.) | Spacing of Advance Warning Signs (Feet) |      |      | Taper Length (Feet) (L) |
|-------------------------------------|---|------|------|-------------------------|
|                                     | (A)                                     | (B)  | (C)  |                         |
| 0 - 30                              | 200                                     |      |      | 180                     |
| 35 - 40                             | 350                                     |      |      | 320                     |
| 45 - 50                             | 500                                     |      |      | 600                     |
| 55                                  | 750                                     |      |      | 660                     |
| 60 - 65                             | 1000                                    |      |      | 780                     |
|                                     | (A)                                     | (B)  | (C)  |                         |
| 70 - 75                             | 1000                                    | 1600 | 2600 | 1125                    |

| Posted Speed Prior to Work (M.P.H.) | Spacing of Channelizing Devices (Feet) (G) |     |
|-------------------------------------|--|-----|
|                                     | (A)  | (B) |
| 0 - 30                              | 25   |     |
| 35 - 40                             | 25   |     |
| 45 - 50                             | 50   |     |
| 55                                  | 50   |     |
| 60 - 65                             | 50   |     |

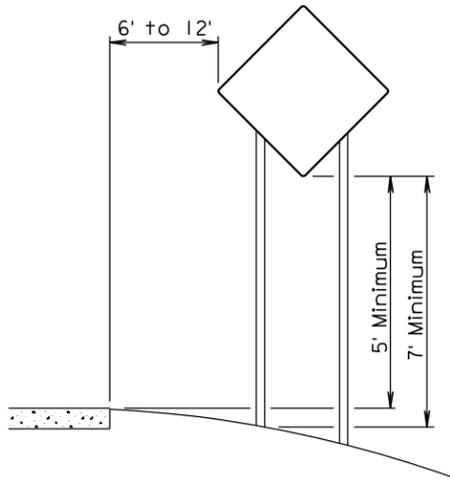
■ Channelizing Device

The channelizing devices shall be drums or 42" cones if traffic control must remain overnight or longer.

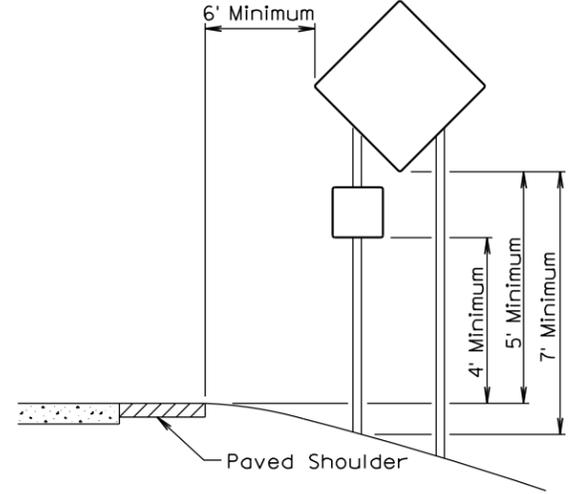
Four inch white temporary pavement marking shall be used if traffic control must remain overnight or longer.



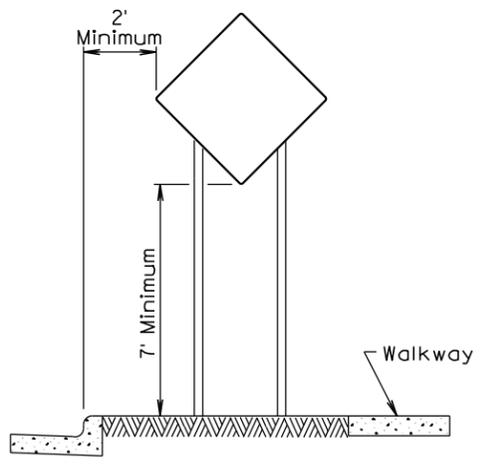
February 14, 2011



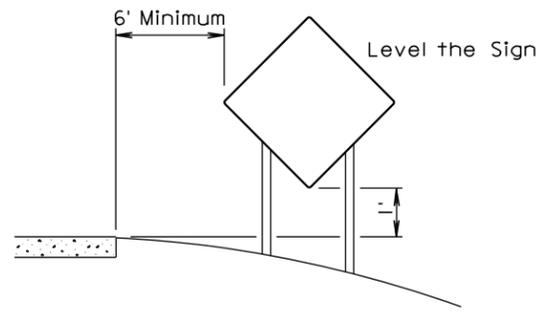
RURAL DISTRICT



RURAL DISTRICT WITH SUPPLEMENTAL PLATE



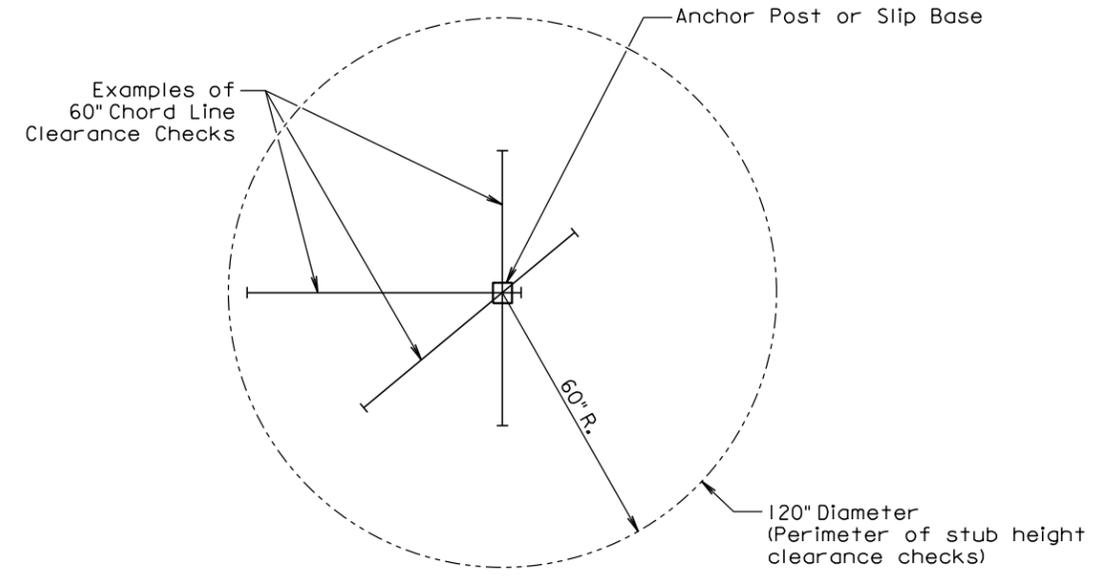
URBAN DISTRICT



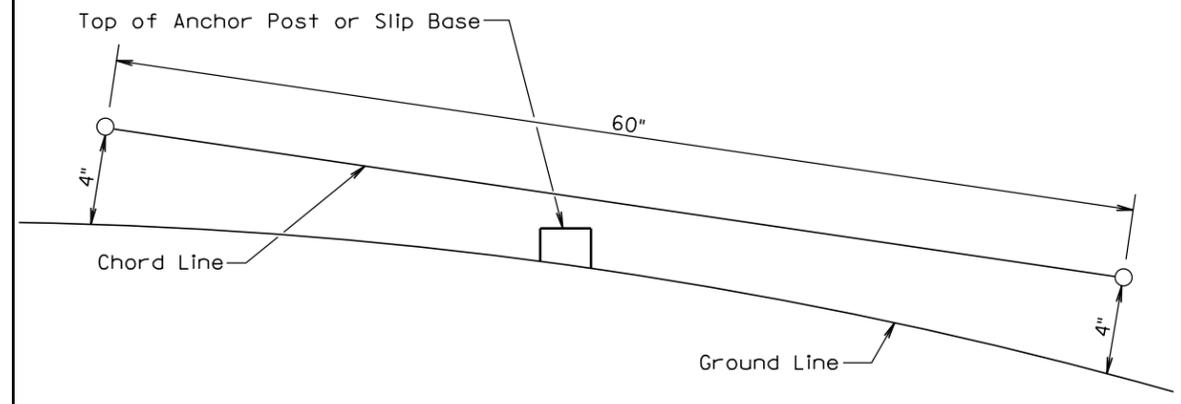
RURAL DISTRICT 3 DAY MAXIMUM

February 14, 2011

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



PLAN VIEW  
(Examples of stub height clearance checks)



ELEVATION VIEW

GENERAL NOTES:

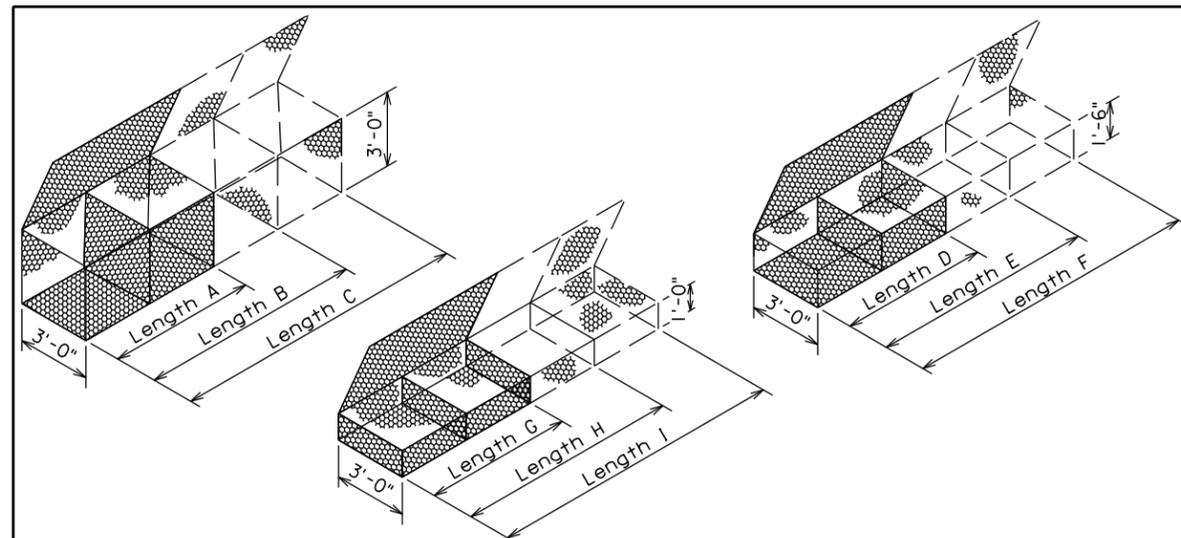
The top of anchor posts and slip bases SHALL NOT extend above a 60" chord line within a 120" diameter circle around the post with ends 4" above the ground.

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<br>D<br>D<br>O<br>T | BREAKAWAY SUPPORT STUB CLEARANCE | PLATE NUMBER<br>634.99 |
|                               |                       |                                  | Sheet 1 of 1           |



**GABION DETAILS  
STANDARD SIZES**

| SIZE | LENGTH | WIDTH | HEIGHT | NUMBER OF CELLS | CAPACITY, Cu. Yd. |
|------|--------|-------|--------|-----------------|-------------------|
| A    | 6'-0"  | 3'-0" | 3'-0"  | 2               | 2.0               |
| B    | 9'-0"  | 3'-0" | 3'-0"  | 3               | 3.0               |
| C    | 12'-0" | 3'-0" | 3'-0"  | 4               | 4.0               |
| D    | 6'-0"  | 3'-0" | 1'-6"  | 2               | 1.0               |
| E    | 9'-0"  | 3'-0" | 1'-6"  | 3               | 1.5               |
| F    | 12'-0" | 3'-0" | 1'-6"  | 4               | 2.0               |
| G    | 6'-0"  | 3'-0" | 1'-0"  | 2               | 0.7               |
| H    | 9'-0"  | 3'-0" | 1'-0"  | 3               | 1.0               |
| I    | 12'-0" | 3'-0" | 1'-0"  | 4               | 1.3               |

Above Dimensions subject to mill tolerances.

**GENERAL NOTES:**

Lacing and internal connecting wire shall be 0.0866 inch diameter steel wire ASTM A641 Class 3 soft temper measured after galvanizing and for PVC coated gabions shall be 0.0866 inch diameter steel wire measured after galvanizing but before PVC coating.

The lacing procedure is as follows:

1. Cut a length of lacing wire approximately 1 1/2 times the distance to be laced but not exceeding 5 feet.
2. Secure the wire terminal at the corner by looping and twisting.
3. Proceed lacing with alternating single and double loops at a spacing not to exceed 6 inches.
4. Securely fasten the other lacing wire terminal.

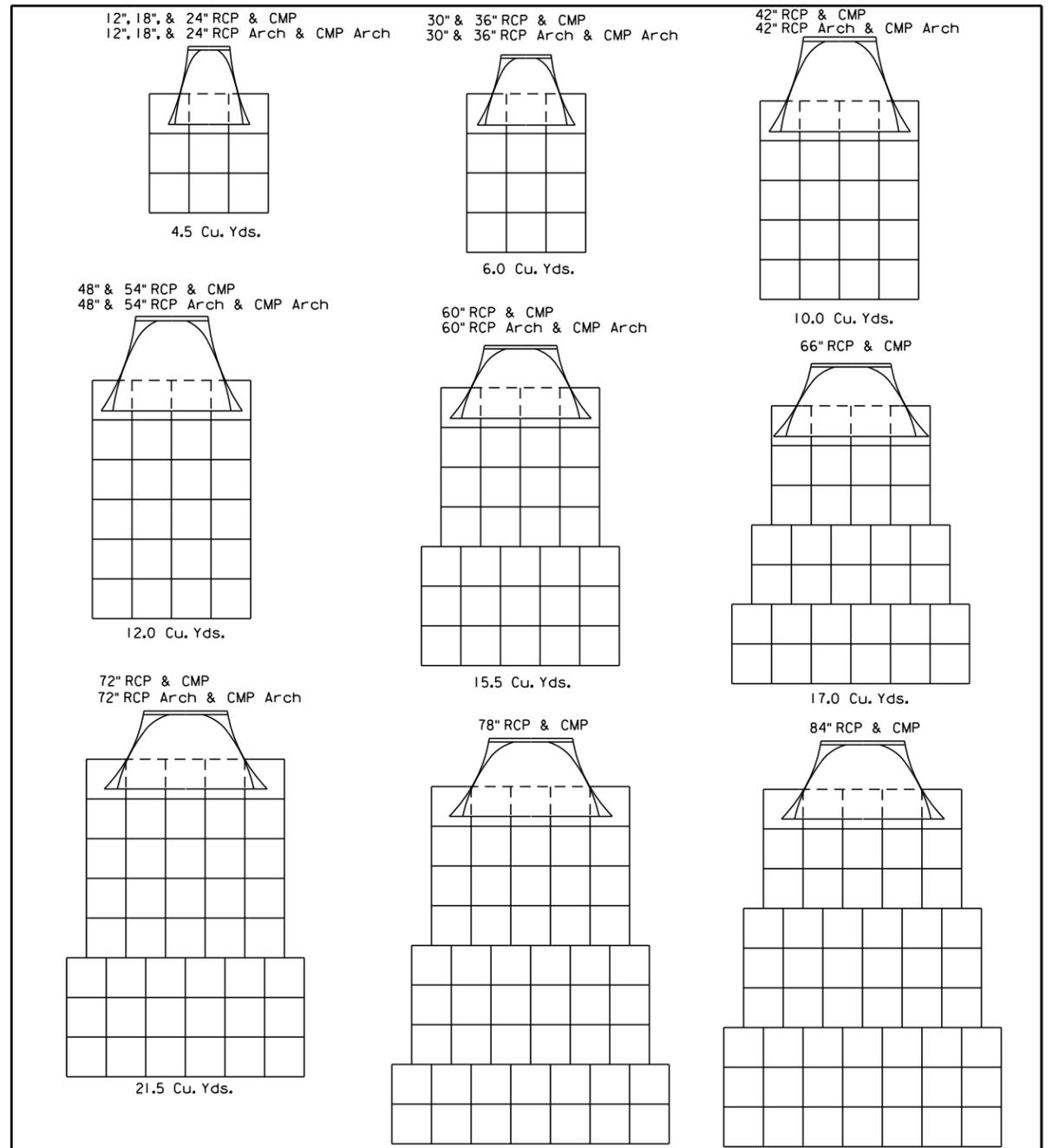
Wire lacing or interlocking type fasteners shall be used for gabion assembly and final construction of gabion structures. Interlocking fasteners for galvanized gabions shall be high tensile 0.120 inch diameter galvanized steel wire measured after galvanizing. The galvanizing shall conform to ASTM A641-92 Class 3 coating. Fasteners shall also be in accordance with ASTM A764, Class II, Type III.

Interlocking fasteners for PVC coated gabions shall be high tensile 0.120 inch diameter stainless steel wire conforming to ASTM A313, Type 302, Class I. The spacing of the interlocking fasteners during all phases of assembly and construction shall not exceed 6 inches.

All fasteners shall be placed where the mesh weaves around the selvage wire at the vertical and horizontal joints.

June 26, 2001

|                               |                       |                                     |                        |
|-------------------------------|-----------------------|-------------------------------------|------------------------|
| Published Date: 1st Qtr. 2014 | S<br>D<br>D<br>O<br>T | BANK AND CHANNEL PROTECTION GABIONS | PLATE NUMBER<br>720.01 |
|                               |                       |                                     | Sheet 1 of 1           |



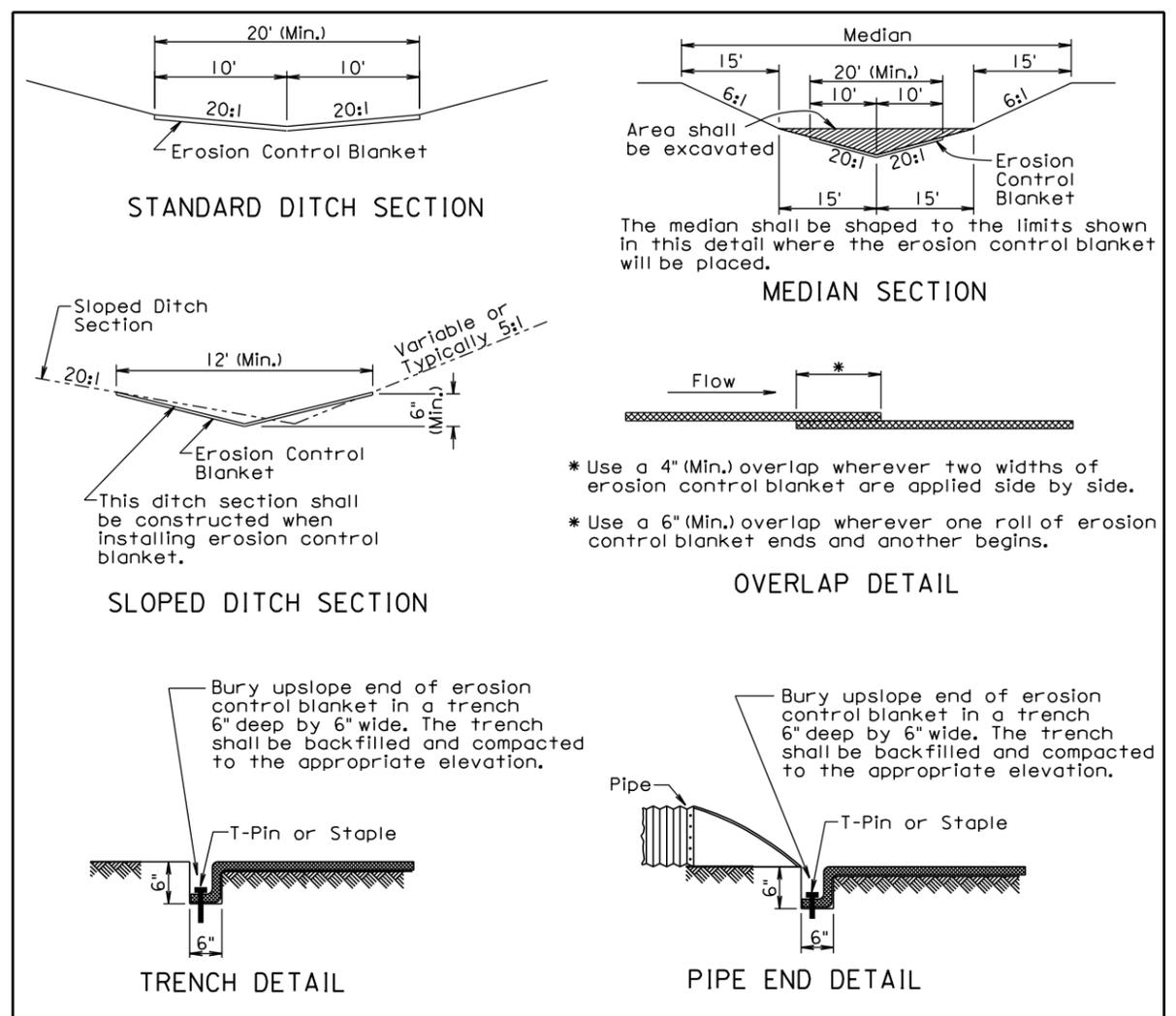
**GENERAL NOTES:**

Gabions at outlets of C.M. pipe and R.C. pipe shall be placed under the end section a distance of 2' from the outlet end of the section. For C.M. pipe end section installations, the upper fabric of the gabions shall be modified to accommodate the metal end section in a manner approved by the Engineer.

Quantities shown on this standard plate are based on standard gabion sizes D, E, and F (See Standard Plate 720.01).

June 26, 2001

|                               |                       |   |                        |
|-------------------------------|-----------------------|---|------------------------|
| Published Date: 1st Qtr. 2014 | S<br>D<br>D<br>O<br>T | BANK AND CHANNEL PROTECTION GABION<br>PLACEMENT UNDER PIPE END SECTIONS | PLATE NUMBER<br>720.03 |
|                               |                       |   | 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.

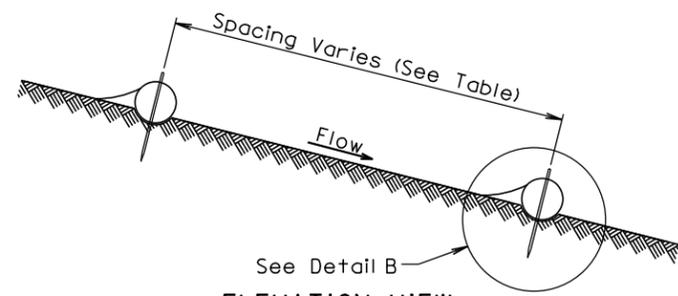
The erosion control blanket shall be pinned to the ground according to the manufacturer's installation recommendations.

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".

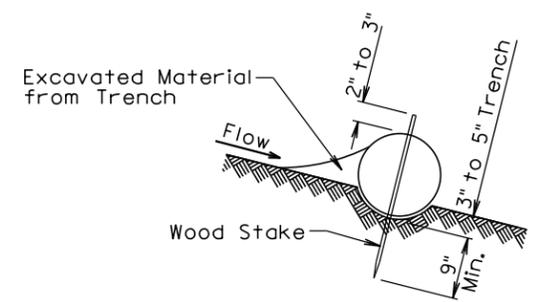
December 23, 2004

|                               |                       |                         |                        |
|-------------------------------|-----------------------|-------------------------|------------------------|
| Published Date: 1st Qtr. 2014 | S<br>D<br>D<br>O<br>T | EROSION CONTROL BLANKET | PLATE NUMBER<br>734.01 |
|                               |                       |                         | Sheet 1 of 1           |

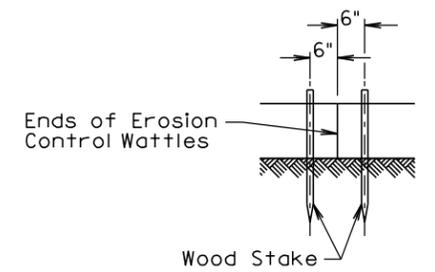


| CUT OR FILL SLOPE INSTALLATION |              |
|--------------------------------|--------------|
| Slope                          | Spacing (Ft) |
| 1:1                            | 10           |
| 2:1                            | 20           |
| 3:1                            | 30           |
|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

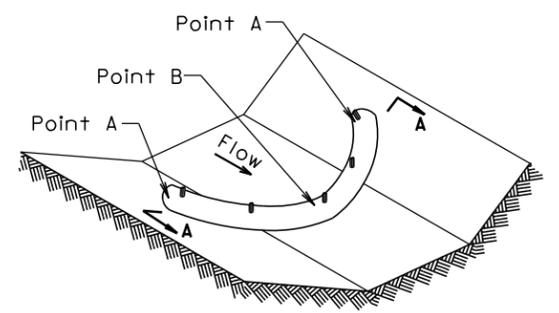
ELEVATION VIEW  
CUT OR FILL SLOPE INSTALLATION



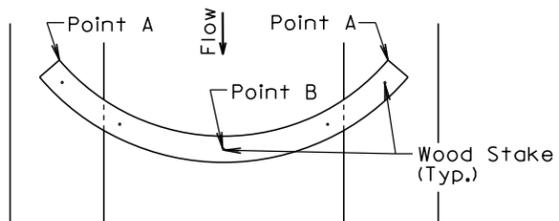
DETAIL B  
(TYPICAL OF ALL INSTALLATIONS)



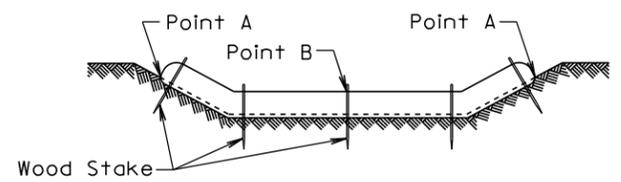
DETAIL C



ISOMETRIC VIEW  
DITCH INSTALLATION



PLAN VIEW  
DITCH INSTALLATION



SECTION A-A

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

December 23, 2004

|                               |                       |                        |                        |
|-------------------------------|-----------------------|------------------------|------------------------|
| Published Date: 1st Qtr. 2014 | S<br>D<br>D<br>O<br>T | EROSION CONTROL WATTLE | PLATE NUMBER<br>734.06 |
|                               |                       |                        | Sheet 1 of 2           |

**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".

December 23, 2004

|                               |                       |                        |                        |
|-------------------------------|-----------------------|------------------------|------------------------|
| Published Date: 1st Qtr. 2014 | S<br>D<br>D<br>O<br>T | EROSION CONTROL WATTLE | PLATE NUMBER<br>734.06 |
|                               |                       |                        | Sheet 2 of 2           |