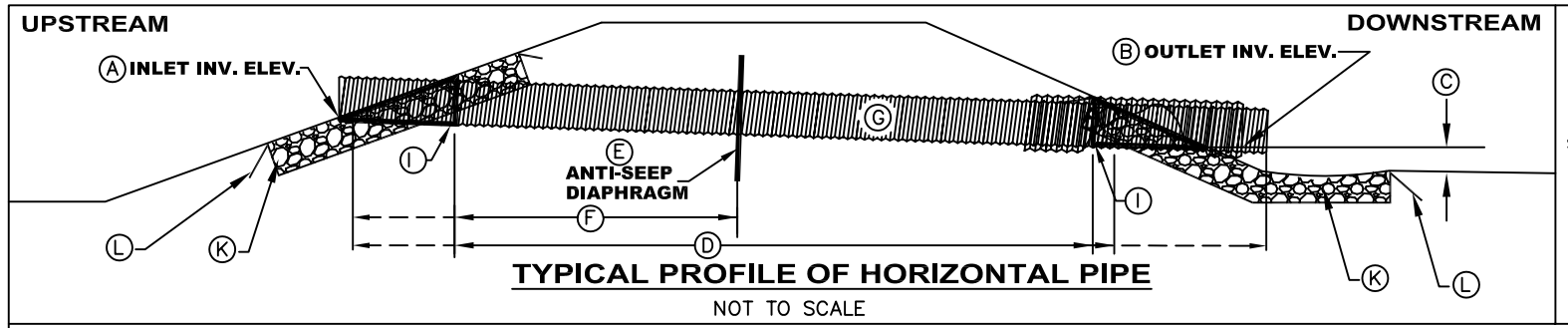
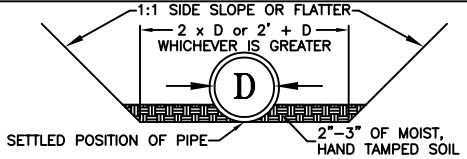


TYPICAL PROFILE OF HORIZONTAL PIPE

NOT TO SCALE



1. PIPE SHALL BE LOADED UNTIL HAND-TAMPED BACKFILL HOLDS IT SECURELY.
2. FILL NEXT TO THE PIPE SHALL BE PLACED IN LAYERS NOT MORE THAN 4" THICK BEFORE HAND COMPACTED.
3. HEAVY EQUIPMENT SHALL NOT BE OPERATED WITHIN 2 FEET OF THE TOP OR SIDES OF THE PIPE.

PIPE BEDDING DETAIL

NOT TO SCALE

CONSTRUCTION SPECIFICATIONS (HORIZONTAL PIPE):

GENERAL

All pipes, anti-seep diaphragms, connecting bands and other appurtenant sections shall be of the size, length, gauge and type specified on the drawing.

All materials are to be supplied by the Contractor unless otherwise specified in the plans. All materials must be handled and stored in a careful and workmanlike manner. Unless otherwise noted, all pipes and fittings must be attached according to manufacturers' recommendations. All materials shall be carefully inspected before they are installed.

MATERIALS (CORRUGATED METAL PIPE)

Unless otherwise specified, the pipe corrugations may be either riveted annular or lock-seam helical. Lock-seam helical pipe shall have re-rolled ends with each end having a minimum of four corrugations.

All corrugated metal pipe (CMP) shall be metallic zinc-coated unless otherwise specified. Other coatings include aluminum-coated, aluminum-zinc alloy-coated. The pipe shall conform to the requirements of ASTM-A-760, A 762, A-885, for the specified type, class, and fabrication of pipe and coating. When necessary, fittings including coupling bands shall be made from steel conforming to ASTM-A-444, A-742, A-806, and A-885. The coating of fittings shall be the same as that specified for the corrugated metallic-coated pipe.

When specified, aluminum corrugated pipe shall be used conforming to the requirements of ASTM-B-745 or B-790 for the specified pipe sheet thickness, shape type, and fabrication method. When necessary, fittings including coupling bands shall be made from sheet aluminum meeting the requirements contained in ASTM-B-744. The coating of fittings shall be the same as that specified for the corrugated aluminum pipe.

When coatings in addition to metallic coatings are specified, they shall conform to the requirements of ASTM-A-762, A-849 and A-885 for the specified type. These coatings shall be applied equally both on the inside and outside of the pipe surface. Polymer coated pipe shall be coated with a minimum thickness of 0.01 inches (10 mils), designated as grade 10/10 in ASTM-A-762.

Coupling bands of the appropriate size and type are to be provided for each pipe joint. The hardware for fastening the coupling bands to the connecting pipes shall be fabricated to permit sufficient tightening to provide the required joint tensile strength and water tightness, without failure of the fastening. Gaskets, if specified, are to be provided for each coupling band and fitting. These gaskets shall be those recommended by the manufacturer for use with the coupler, fitting, and pipe.

Annular Pipe - Watertight coupling bands for annular pipe shall either be an annular corrugated band with a minimum width of 25.5 inches (10 corrugations) and equipped with four rods and lugs for each band or a 12-inch wide "Hugger" band with O-ring gaskets or equal. Annular corrugated connecting bands for corrugated metal pipe shall be a minimum of 16 gauge. Annular corrugated coupling bands shall be coated on the inner surface with Trumbull 5x mastic sealer or other acceptable polymer caulking material.

Helical Pipe - Watertight coupling bands for helical pipe shall either be an annular corrugated band with a width of 20.4 inches (8 corrugations) and equipped with four rods and lugs for each band or a 12-inch wide "Hugger" band with O-ring gaskets or equal.

MATERIALS ("DUAL-WALL" HDPE PIPE)

Unless otherwise specified, the High Density Polyethylene Pipe (HDPE) shall have a smooth interior and annular exterior corrugations. Manning's "n" value for the pipe shall not exceed 0.012.

For pipe sizes 12 inches and larger, the pipe shall meet the requirements of AASHTO M294 Type S. Pipe and fitting material shall be high-density polyethylene meeting the requirements of ASTM D3350 Cell Classification 325420C. Where joints are necessary, pipes shall be joined with a bell-and-spigot joint meeting the requirements of AASHTO M252 or M294. The bell shall be an integral part of the pipe and provide a minimum pull-apart strength of 400 lbs. The bell-and-spigot joint shall incorporate a rubber gasket meeting the requirements of ASTM F477 and shall be watertight meeting ASTM D3212. Gaskets shall be installed on the pipe or as recommended by the pipe manufacturer. A joint lubricant supplied by the manufacturer shall be used on the gasket and bell during assembly.

For pipe sizes 10 inches & smaller, the pipe shall meet the requirements of AASHTO M252 Type S. Pipe and fitting material shall be high-density polyethylene meeting the requirements of ASTM D3350 minimum Cell Classification 324420C. Gasketed couplers shall be provided for each pipe joint and must meet the requirements of ASTM F477. The gaskets shall be those recommended by the manufacturer for use with the coupler, fittings, and pipe to provide water tightness to the joint.

MATERIALS (ANTI-SEEP DIAPHRAGM)

When required, the anti-seep diaphragm shall be manufactured from high density polyethylene (HDPE), unless otherwise stated. It shall be a two piece collar that conforms to the pipe material specified. The HDPE material shall be no less than 1/4 inch in thickness. The two portions of the anti-seep diaphragm shall overlap 1.5 inches prior to being bolted together. 3/8 inch holes shall be spaced 6 inches on center to allow for bolting of two portions together. 1/4 inch stainless steel bolts and hardware shall be supplied and used to connect the sheets together. Stainless steel bands shall also be supplied and used to clamp the collar to the pipe. Unless otherwise specified by the manufacturer, the inside yoke of the collar shall be coated with Trumbull 5X mastic sealer or other acceptable polymer caulking material prior to securing the pipe. All other installation requirements/instructions shall be in accordance with the recommendation of the manufacturer. The anti-seep diaphragm shall be located as staked or determined in the field by the Project Technician. Approved manufacturer: Scheib Drainage Products #660-446-2343 or equivalent.
observed.

HANDLING THE PIPE

The Contractor shall furnish all equipment necessary to transport and place the pipe without damaging it or its coatings. Measures shall be taken to prevent impact blows, abrasion damage, and gouging or cutting (by equipment or other site materials). The pipe shall be placed with care and shall not be dropped or dumped into the trench. All special handling requirements of the manufacturer shall be strictly observed. Special care shall be taken to avoid impact when the pipe must be handled at temperatures of 40° F or less.

LAYING AND BEDDING

The pipe shall be uniformly and continuously supported. Blocking or mounding shall not be done to bring the pipe to grade. Prior to any back filling, the pipe shall be firmly and uniformly bedded throughout its full length to the depth and in the manner specified on this drawing. Bell holes shall be made in the bedding under bells or couplings to prevent the pipe from being supported by the bell/coupling. The trench width shall be as shown to permit installation and provide adequate bedding conditions suitable to support the load on the conduit.

Unless otherwise stated, the HDPE pie shall be installed with the bell end facing upstream. Annular CMP pipe shall be laid with the outside laps of circumferential joints pointing upstream and the with longitudinal laps at the sides at about the vertical mid height of the pipe.

BACK FILLING

Compaction of the initial backfill shall be by hand tamping or manually directed power tampers adjacent to and to a depth of 2 feet over the pipe to provide adequate lateral support to the pipe. The backfill around any anti-seep diaphragms shall be done in a comparable manner. The initial backfill material shall be selected friable soil free from rocks or stones larger than 1 inch in diameter and earth clods greater than 2 inches in diameter. At the time of placement, the moisture content of the material shall be such that a firm compacted fill can be achieved. During the initial backfill, the thickness of layers before compaction shall not exceed 4 inches. The moisture content of the backfill material shall be maintained within the limits required to: a) allow the soil to form a ball that does not readily separate when kneaded in the hand; b) prevent adherence of the fill material to the equipment treads or tracks; c) prevent rutting by equipment, and; d) ensure that blending of the soil results in a reasonably homogenous mass. Initial backfill shall be compacted to a density equal to that of the surrounding undisturbed soil. Special care shall be taken to obtain compaction under the lower half of the pipe. The pipe shall be loaded sufficiently during backfilling around the sides to prevent it from being lifted from the bedding or sub grade and to maintain full contact with the bedding during placement operations.

The final backfill material shall be free of large rocks, frozen soil, and other debris larger than 4 inches in diameter. The material shall be placed and spread in approximately uniform layers in such a manner that there will be no unfilled spaces in the backfill and the backfill will be level with the natural ground or the design grade. Rolling equipment shall not be used to compact the final backfill until at least a 2-foot depth of cover has been placed over the pipe. During the final backfill, the thickness of layers before compaction shall not exceed 9 inches.

The use of compaction equipment or methods that produce horizontal or vertical earth pressures which may cause excessive displacements or which may damage the installed pipe will not be permitted. All special backfilling requirements of the pipe manufacturer shall be met.

OTHER:

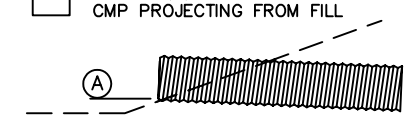
PIPE LOCATION INFORMATION

STRUCTURE/WETLAND BASIN # _____ STATION OF W.C.S. LOCATION _____

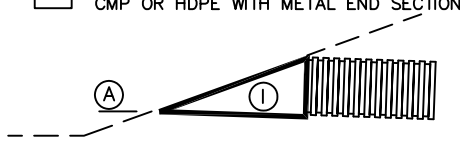
INLET DESIGN INFO.

CHOOSE ONE– (A) OR (B)

☐ OPTION (A)
CMP PROJECTING FROM FILL



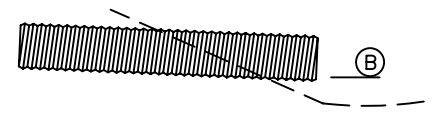
☐ OPTION (B)
CMP OR HDPE WITH METAL END SECTION



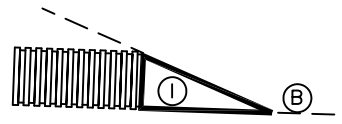
OUTLET DESIGN INFO.

CHOOSE ONE– (A), (B) OR (C)

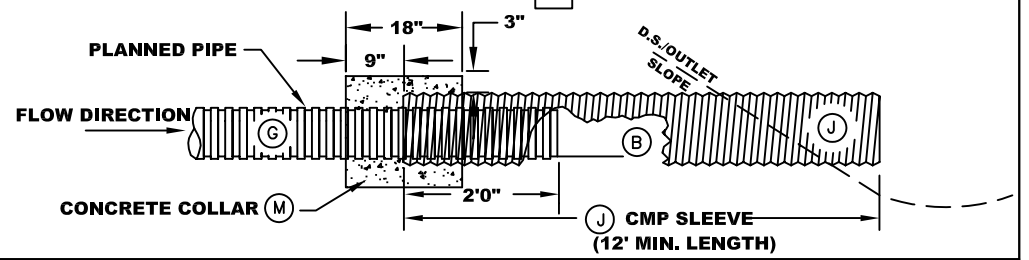
☐ OPTION (A)
CMP PROJECTING FROM FILL



☐ OPTION (B)
CMP OR HDPE WITH METAL END SECTION



☐ OPTION (C)



K RIPRAP DESIGN INFO.

☐ IS NOT REQUIRED ☐ REQUIRED AT INLET ☐ REQUIRED AT OUTLET

(SEE DWG# MN-ENG-208 FOR RIPRAP DETAILS, IF REQUIRED)

PIPE DESIGN INFO

A INLET INV. ELEV. = _____ FT.

B OUTLET INV. ELEV. = _____ FT.

C OUTLET CLEARANCE = _____ FT.

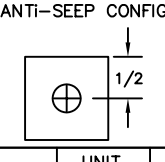
D LENGTH OF PIPE = _____ FT.

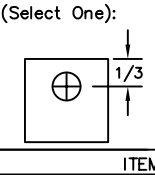
E ANTI–SEEP DIAPHRAGM

☐ IS REQUIRED ☐ IS NOT REQUIRED

F DISTANCE FROM U.S. END TO ANTI–SEEP DIA. = _____ FT.

ANTI–SEEP CONFIGURATION (Select One):

☐ 

☐ 

G PIPE MATERIAL INFO

TYPE OF PIPE REQUIRED (Select One)

☐ "DUAL–WALL" HDPE

☐ CMP, 16 ga. (Select type)

☐ HELICAL

☐ ANNULAR

☐ EITHER

SPECIAL CMP COATING REQ'S.

SIZE	UNIT	ITEM DESCRIPTION	UNIT	QTY.
	DIA. (IN.)	D PIPE LENGTH	LIN. FT.	
X	FT. x FT. (H) (W)	E ANTI–SEEP DIAPHRAGM (If required)	EACH	
	DIA. (IN.)	I METAL END SECTION (If required)	EACH	
	DIA. (IN.)	J CMP SLEEVE (16 ga. Annular or Helical) (If required)	LIN. FT.	
	CLASS	K ROCK RIPRAP (If required, see sheet # _____ for details)	C.Y.	
		L GEOTEXTILE MATERIAL (If req, see sheet # _____ for details)	SQ. YDS.	
		M CONCRETE COLLAR (If required)	EACH	

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

PRINT NAME: _____

SIGNATURE: _____

DATE: _____ LICENSE #: _____

Project Name:

HORIZONTAL PIPE/CULVERT

Approved By Date

Title

BWSR
NRCS
USFWS

Easement OR Project No.

Plan Sheet of

DWG# MN-ENG-207

Prepared by MInnesota Board of Water & Soil Resources-Rev 09/17/02