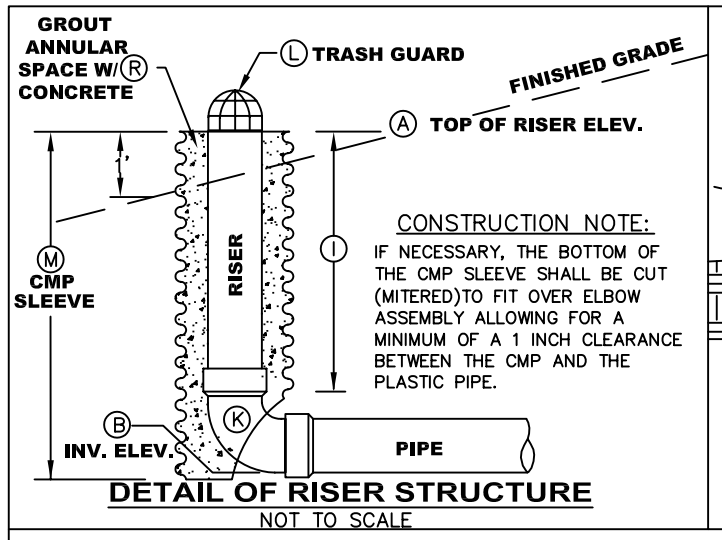
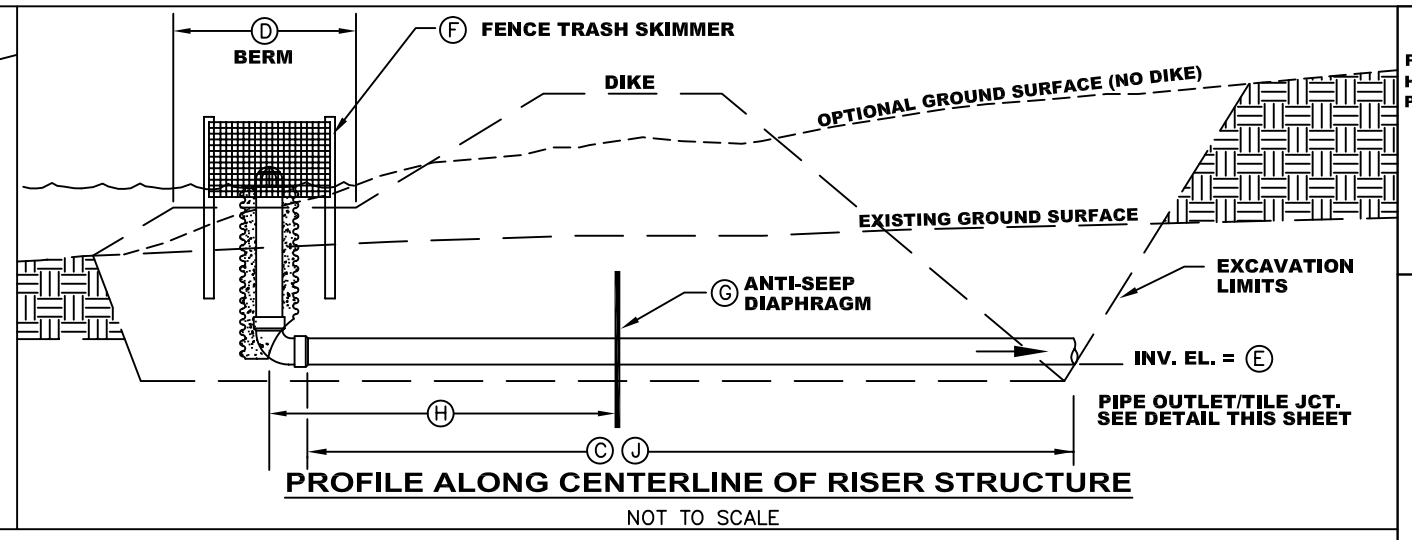


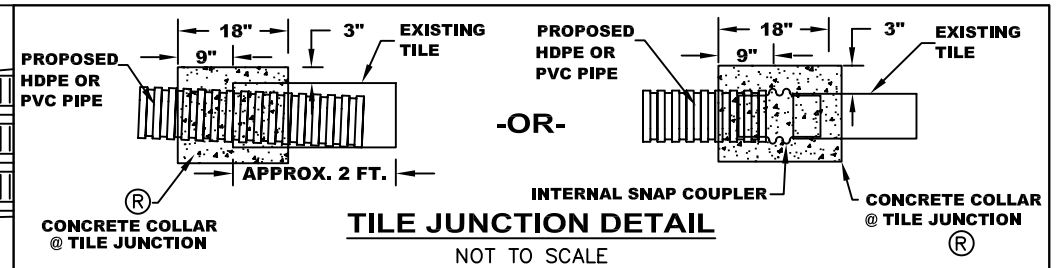
DETAIL OF RISER STRUCTURE

NOT TO SCALE



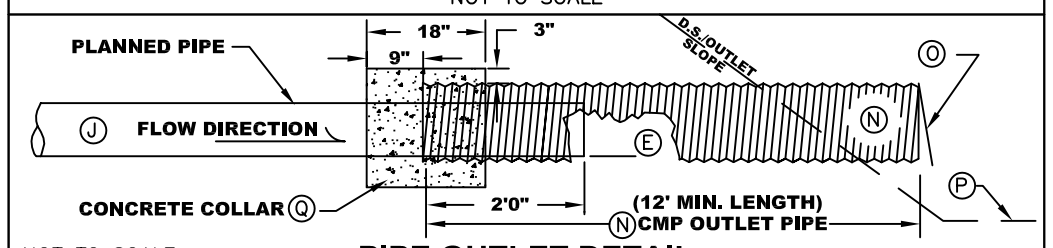
PROFILE ALONG CENTERLINE OF RISER STRUCTURE

NOT TO SCALE



TILE JUNCTION DETAIL

NOT TO SCALE



NOT TO SCALE

PIPE OUTLET DETAIL

CONSTRUCTION SPECIFICATIONS (PIPE OUTLETS):

DESCRIPTION
The work shall include all labor, materials, and equipment required to assemble the pipe sections, excavate and prepare the bed for the pipe, and place and compact the backfill to the lines and grades shown on the drawings.

MATERIALS (GENERAL)
All materials must be handled and stored in a careful and workmanlike manner. All pipes and fittings must be of the length, size and type specified. All materials with physical imperfections or that are damaged, lost, broken or deemed unsuitable due to the Contractor's method of installation, handling, or negligence must be replaced at the Contractor's expense.

MATERIALS (PVC PIPE)
Thermoplastic smooth wall Polyvinyl Chloride (PVC) pipe and fittings as specified shall meet or exceed the requirements specified for the type of pipe required:

Schedule 40 or Schedule 80 Pipe: ASTM D-1785 1120 Pressure Pipe
SDR-26 (160 PSI) or SDR-21 (200 PSI) Pipe: ASTM D-2241 1120 Pressure Pipe

Joints for PVC pipe and fittings shall be the bell-and-spigot type with an integral bell coupler that meets ASTM D-3139 and utilizes the gasketed sealing system meeting the specification defined in ASTM F-477. All fittings shall be the same class and type as the PVC pipe.

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 6- to 10-inch, 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. Fabricated fittings shall be welded on the interior and exterior at all junctions. Welds shall be done as recommended by the manufacturer. When required, coupling bands of the appropriate size and type for each section of pipe for sizes 10 inch and smaller. Gasketed couplers shall be provided for each pipe junction and fitting 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 watertightness to the joint.

MATERIALS (CORRUGATED METAL PIPE)
All corrugated steel pipe (CMP) shall be metallic zinc-coated unless otherwise specified. 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.

MATERIALS (TRASH RACK)
Unless otherwise specified, trash racks shall be of the "beehive type" with bar spacings at the base of the trash rack no smaller than 2.0" and with a bar diameter of no less than $\frac{1}{4}$". Trash racks to be constructed of steel and finished in accordance with the manufacturers specifications.

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 manufactuer, 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. When handling and placing pipe materials, measures shall be taken to prevent impact blows, abrasion damage, and gouging or cutting (by equipment or other site materials). 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.
To avoid exposure to ultraviolet radiation, the pipe shall be covered with an opaque material when stored outdoors for a period of fifteen days or longer.

INSTALLATION AND ASSEMBLY OF PIPE
The trench or excavation for the placement of the conduit shall be constructed to the elevations and grades shown or as staked. Trench shields, shoring and bracing, or other methods necessary to safeguard the workers and the work shall be furnished, placed, and subsequently removed by the Contractor.

Unless otherwise specified, no filter or envelope is required. The bottom of the trench shall be shaped to form a semicircular groove in its center. The conduit shall be firmly and uniformly bedded throughout its entire length to the specified elevation and grade. The minimum trench width at the top of the conduit should be adequate to permit installation and provide bedding conditions suitable to support the load on the conduit.

Unless otherwise specified, the pipe shall be assembled and installed in accordance with the manufacturer's recommendations. The pipe shall be laid to the elevations and grades shown on the drawings or as staked.

Unless otherwise specified, excavation and subsequent installation of conduit sections shall begin at the outlet end and progress upstream. Bell and spigot pipe, shall be installed with the bell end upstream. Bell-holes shall be made in the bedding under bells to prevent the pipe from being supported by the fittings. All field cut pipe ends shall have all burrs removed prior to assembling the joints. All pipelines shall be free of foreign material and joints shall be made in accordance with the recommendation of the pipe manufacturer.

BACKFILLING
The initial backfill shall be manually compacted around the pipe and to a depth of 2 feet over the pipe to provide adequate lateral support to the pipe. 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. 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. Compaction shall be by hand tamping or manually directed power tampers. The initial backfill shall be placed in layers no thicker than 4 inches and compacted to a density greater than or 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 subgrade.

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 with a maximum thickness of 9 inches 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. 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 nor be permitted.
Place backfill to the lines and grades shown on the plans or as staked.

OTHER:

DESIGN DATA

STRUCTURE/WETLAND BASIN # _____

DRAINAGE AREA = _____ ACRES POOL AREA = _____ ACRES

DRAINAGE AREA TO POOL AREA RATIO = _____ DESIGN ZONE: _____

(A) TOP OF RISER ELEV. = _____ FT.

(B) INV. ELEV. OF RISER = _____ FT. OR ☐ TO BE FIELD DETERMINED.

(C) GRADE OF PIPE = _____ % OR ☐ TO BE FIELD DETERMINED.

(D) WIDTH OF BERM = _____ FT.

(E) INV. ELEV. AT PIPE OUTLET/TILE JUNCTION = _____ FT. OR ☐ TO BE FIELD DETERMINED.

OUTLET TYPE: (Select One) ☐ TILE JNCT. ☐ PIPE OUTLET

(F) FENCE TRASH SKIMMER ☐ IS REQUIRED ☐ IS NOT REQUIRED

(G) ANTI-SEEP DIAPHRAGM ☐ IS REQUIRED ☐ IS NOT REQUIRED

(H) DISTANCE FROM RISER TO ANTI-SEEP DIAPHRAGM = _____ FT.

BILL OF MATERIALS

(TYPE OF GASKETED PIPE MATERIAL REQUIRED FOR ITEMS (I) (J) (K) – Check Appropriate Box)

☐ SCHEDULE 40 PVC OR SDR 26 PVC ☐ SCHEDULE 80 PVC OR SDR 21 PVC ☐ HDPE "DUAL-WALL"

SIZE	UNIT	ITEM DESCRIPTION	UNIT	QTY.
		(F) FENCE SKIMMER (If required) See Sheet # _____ for details)	EACH	
X	FT. x FT. (H) (W)	(G) HDPE ANTI-SEEP DIAPHRAGM (If required)	EACH	
	DIA. INCHES	(I) HEIGHT OF RISER PIPE	LIN. FT.	
	DIA. INCHES	(J) PIPE LENGTH	LIN. FT.	
	DIA. INCHES	(K) 90 DEG. ELBOW	EACH	
	DIA. INCHES	(L) BEEHIVE TYPE TRASH GUARD	EACH	
	DIA. INCHES	(M) RISER SLEEVE LENGTH (5 ft. min., Annular CMP – 16 ga.)	LIN. FT.	
	DIA. INCHES	(N) CMP OUTLET PIPE (16 ga. Annular or Helical) (If required)	LIN. FT.	
		(O) HINGED TYPE RODENT GUARD FOR CMP OUTLET PIPE	EACH	
		(P) EXCAVATE AREA FOR PIPE OUTLET (As directed)		
		(Q) GROUTED JUNCTION AT PIPE OUTLET	EACH	
		(R) GROUTED TILE JUNCTION (May Require Coupler)	EACH	

DESIGN NOTES:
THE MAXIMUM SIZE OF PIPE TO BE USED WITH THIS STANDARD DWG IS 10 INCHES.

Project Name:

PVC/HDPE TRICKLE TUBE

Approved By Date

Title

BWSR
NRCS
USFWS

Easement OR Project No. Plan Sheet of **DWG# MN-ENG-205**

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