NATURAL RESOURCES CONSERVATION SERVICE

MISSOURI CONSTRUCTION SPECIFICATION

UNDERGRUND OUTLET

INLET

CODE 620

GENERAL

Construction operations shall be carried out in a manner and sequence that erosion and air and water pollution are minimized and held within legal limits.

The completed job shall present a workmanlike appearance and shall conform to the line, grades, and elevations shown on the drawings or as staked in the field.

All operations shall be carried out in a safe and skillful manner. Safety and health regulations shall be observed and appropriate safety measures used. Contractor shall be assured that all state laws concerning buried utilities have been met.

MATERIALS

Inlets may be fabricated from plastic or metal according to the following requirements:

(a) Smooth Plastic Pipe:

(1) Polyvinyl Chloride (PVC) with SDR or DR equal to 41 or less conforming to ASTM D1785, D2241, D3034 or AWWA C900.

(2) High Density Polyethylene (HDPE) with SIDR, SDR, or DR equal to 21 or less conforming to ASTM D2239, D3035, or F714.

(3) Molded inlets made of PVC or HDPE shall be of equivalent strength to the pipes listed in (1) or (2).

(b) Corrugated Plastic Tubing:

(1) Polyethylene (PE) Smooth Interior AASHTO-M-294, Type S. Pipe stiffness equals 30 pounds per square inch at 5% deflection and 25 pounds per square inch at 10% deflection.

(2) Polyvinyl Chloride (PVC) Sewer Pipe with a Smooth Interior conforming to ASTM F949. Pipe stiffness equals 46 pounds per square inch at 5% deflection.

(c) Metal pipe:

(1) Smooth steel pipe with 3/16" minimum wall thickness or 16 gage corrugated metal pipe (galvanized or aluminum).

All plastic inlets shall include an ultra-violet stabilizer or coating to protect from solar degradation.

FABRICATION

Inlet holes shall be smooth and burr free. Holes shall not remove more than 50 percent of material in any horizontal or vertical row of holes. For inlets fabricated from metal or smooth plastic, 1" x 4" slots may be used in lieu of 1" diameter holes as long as the openings provide an equal cross-sectional area.

Holes larger than 5/16" diameter that are more than 6 inches below the channel bottom shall be covered with plastic, fiberglass, nylon, gravel or other filter material to prevent soil from entering the inlet.

Other combinations of the number and size of holes may be acceptable if approved prior to fabrication. Other materials and methods of fabrication may be used for the inlet, tee and other appurtenances as long as the functional intent of the inlet is satisfied and it is approved prior to installation.

ORIFICES

Flow may be restricted by use of an orifice plate installed above the tee. It should be firmly supported and able to be removed for maintenance. Orifice plates shall be made from durable plastic or metal. The opening shall be burr free.

TRASH GUARDS

The trash guard for Type II inlets shall be securely fastened to the inlet. Trash guards may be fabricated from metal rods (1/4" diameter or larger) or galvanized welded wire fabric (16 gage or larger). The spacing between vertical members should be 1 inch. If welded wire fabric is used, the spacing between the horizontal members should be 2 inches (1 inch if orifice plates are used.)

As approved by NRCS, other equivalent designs may be used.

INSTALLATION

Refer to construction drawings and specifications for installation details.

Additional Details: _____

_____

_____

_____

_____

_____

Maximum fill height over plastic pipe or tubing = _____ feet

Minimum fill height over plastic pipe or tubing prior to tamping with construction equipment or crossing with heavy equipment such as a loaded scraper = _____ feet

NATURAL RESOURCES CONSERVATION SERVICE

MISSOURI CONSTRUCTION SPECIFICATION

UNDERGRUND OUTLET

UGO CONDUIT

CODE 620

GENERAL

Construction operations shall be carried out in a manner and sequence that erosion and air and water pollution are minimized and held within legal limits.

The completed job shall present a workmanlike appearance and shall conform to the line, grades, and elevations shown on the drawings or as staked in the field.

All operations shall be carried out in a safe and skillful manner. Safety and health regulations shall be observed and appropriate safety measures used.

MATERIALS

Conduits shall be plastic or metal pipe or tubing conforming to the following requirements:

(a) Smooth Plastic Pipe:

(1) Polyvinyl Chloride (PVC) with SDR or DR equal to 41 or less conforming to ASTM D1785, D2241, D3034 or AWWA C900.

(2) High Density Polyethylene (HDPE) with SIDR, SDR, or DR equal to 21 or less conforming to ASTM D2239, D3035, or F714.

(b) Corrugated Plastic Tubing:

(1) Polyethylene (PE) Smooth Interior AASHTO-M-294, Type S. Pipe stiffness equals 30 pounds per square inch at 5% deflection and 25 pounds per square inch at 10% deflection.

(2) Polyvinyl Chloride (PVC) Sewer Pipe with a Smooth Interior conforming to ASTM F949. Pipe stiffness equals 46 pounds per square inch at 5% deflection.

(c) Metal pipe:

(1) Smooth steel pipe with 3/16" minimum wall thickness or 16 gage corrugated metal pipe (galvanized or aluminum).

All plastic inlets shall include an ultra-violet stabilizer or coating to protect from solar degradation.

TRENCH EXCAVATION

Unless otherwise shown in the “Additional Details” section of this specification, the trench excavation shall be sufficient to provide 24 inches or more cover over all conduit lines except metal pipe. The cover over metal pipe shall be 12 inches or more.

The bottom of the trench shall be grooved for proper conduit bedding. The groove should be at the side of the trench when backhoes are used. Maximum trench width shall be 24 inches measured 12 inches above top of conduit. Minimum trench width shall be conduit outside diameter plus four (4) inches except when the trench is shaped to fit the conduit.

A properly sized mole plow may be used.

INSTALLATION

Underground outlet systems shall be installed as shown on the construction drawings. Conduits shall be installed with a positive grade toward the outlet throughout their entire length. Conduit lines should be installed and properly backfilled prior to placement of earth fill for the storage basin or terrace ridge.

Provide at least 2 inches of compacted earth or sand filter bedding when the conduit line is to be installed in a rock trench or where rock is exposed in the trench bottom.

Changes in conduit line size shall be made at the tee joint immediately upstream from the inlet. The tee diameter must be equal to or larger than the diameter of the conduit line downstream from the inlet.

Conduit lines shall be joined with standard factory couplers. Conduit ends shall be protected during installation. All conduit ends except the outlet and inlets with screens shall be capped with standard factory end caps or concrete. When corrugated plastic tubing is used no more than five (5) percent stretch will be allowed.

Outlet section shall be of rigid pipe and have an animal guard installed.

TRENCH BACKFILL

Conduits shall be bedded and backfilled as shown on the drawings or described in the specifications. Friable soil material shall be used for blinding around the conduit prior to machine backfilling. The conduit shall not be displaced during backfilling. Mound excess material over the trench. Frozen soil material shall not be used unless it is of small size (1/2 inch or less) and friable with trench temperature conditions such that the material will quickly thaw once placed.

Trench backfill under the basin embankment or terrace ridge shall be placed in successive 6 inch layers and tamped until a depth of at least 12 inches over the top of the conduit is reached. Water packing of the backfill material may be used in lieu of tamping, except where high clay content (CH) backfill is used. The remainder of the trench shall be sloped to 1.5:1 or flatter and be machine compacted

INLET INSTALLATION

The inlet shall be installed as plumb as possible. The maximum length of inlet with holes or slots below channel bottom shall be 6 inches. A trash guard, end cap, or screen shall be installed with each inlet. Backfill shall have sufficient moisture and compaction.

Additional Details: _____

_____

_____

Maximum fill height over plastic pipe or tubing = _____ feet

Minimum fill height over plastic pipe or tubing prior to tamping with construction equipment or crossing with heavy equipment such as a loaded scraper = _____ feet

NATURAL RESOURCES CONSERVATION SERVICE

MISSOURI OPERATION AND MAINTENANCE

UNDERGROUND OUTLET

INLET

CODE 620

OPERATION AND MAINTENANCE

The following University of Missouri Agricultural Guides provide information on the operation and maintenance of terrace systems and their outlets:

1501 "Operating and Maintaining Under-ground Outlet Terrace Systems"

Other operation and maintenance items to address:

- Periodic inspections, especially immediately following significant runoff events, to keeping inlets, trash guards, and collection boxes and structures clean and free of materials that can reduce flow.
- Prompt repair or replacement of damaged components.
- Repair or replacement of inlets damaged by farm equipment.

Additional Details: _____

_____

_____

_____

_____

PAGE LEFT BLANK ON PURPOSE

NATURAL RESOURCES CONSERVATION SERVICE

MISSOURI OPERATION AND MAINTENANCE

UNDERGROUND OUTLET

UGO CONDUIT

CODE 620

OPERATION AND MAINTENANCE

The following University of Missouri Agricultural Guides provide information on the operation and maintenance of terrace systems and their outlets:

1501 "Operating and Maintaining Under-ground Outlet Terrace Systems"

Other operation and maintenance items to address:

- Periodic inspections, especially immediately following significant runoff events, to keeping inlets, trash guards, and collection boxes and structures clean and free of materials that can reduce flow.
- Prompt repair or replacement of damaged components.
- Repair of leaks and broken or crushed lines to insure proper functioning of the conduit.
- Periodic checking of the outlet and animal guards to ensure proper functioning.
- Repair of eroded areas at the pipe outlet.
- Maintenance of adequate backfill over the conduit.

Additional Details: _____

_____

_____

_____

_____