NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE SPECIFICATION

606A - SUBSURFACE DRAIN PIPE, 15 - INCHES OR LESS

I. SCOPE

The work shall consist of furnishing drain pipe and installing a subsurface drain including the filter and/or envelope materials and associated structures to the lines, grades, and elevations as shown on the drawings or as staked in the field.

II. INSPECTION AND HANDLING OF MATERIALS

Material for subsurface drains shall be given a careful inspection before installation. All material shall be satisfactory for its intended use and shall meet applicable specifications and requirements. Envelope and filter material shall be carefully inspected and tested for gradation. Plastic pipe shall be protected from hazards causing deformation or warping. Plastic pipe with physical imperfections shall not be installed. A damaged section shall be removed and a suitable joint made connecting the replaced and retained sections.

III. TRENCHING

Trench widths must be adequate for proper installation of conduit, allow proper joining of sections, and allow proper placement of filter, envelope, or blinding materials. The trench bottom shall be constructed to proper grade before placement of the conduit.

When rock in encountered the trench will be over excavated a minimum of 6 inches and refilled to proper grade with a suitable bedding material.

Provisions for safety during trenching operations shall be in compliance with the applicable safety and health regulations for construction.

In unstable trenches, means must be provided to protect the pipe from deformation or floating until it has been properly laid and blinded.

The recommended minimum cover in mineral soil to protect the pipe from crushing due to live loads is 2 feet. The minimum in organic soils is 2.5 feet.

IV. PLOW INSTALLATION

Plow installation has been satisfactorily used in many situations. Special care needs to be exercised relative to grade control and bedding conditions. Special attention needs to be paid to the type of soils to prevent sealing of the trench wall. Special equipment may be required where soil texture tends to seal the trench walls.

V. BEDDING

Placement and Bedding. The conduit should not be placed on exposed rock or stones more than 1.5 inches in diameter for 6 inch or larger subsurface drains and stones no more than ¾ inch diameter for subsurface drains less than 6 inches. Where such conditions are present the trench must be over-excavated, a minimum of 6 inches and refilled to grade with a suitable bedding material.

The conduit must be placed on a firm foundation to ensure proper alignment. Prevent runoff and surface water from entering the trench.

If installation will be below a water table or where unstable soils are present, special equipment, installation procedures, or bedding materials may be needed. These special requirements may also be necessary to prevent soil movement into the drain or plugging of the envelope if installation will be made in such materials as quicksand or silt slurry.

In unstable soils, a trench shield (gravel hopper) may be required to allow the placement of the pipe and the envelope material simultaneously on grade before contact with the adjacent trench walls. These shoeboxes are made to hold the sides and bottom of the trench in place as the pipe and envelope materials are placed to grade and as the box moves forward, the unstable trench materials come in contact with the in-place drain without causing any displacement of the pipe.

For trench installations of corrugated plastic pipe 8 inches or less in diameter, one of the following bedding methods will be specified:

1. A shaped groove or 90° V-notch in the bottom of the trench for pipe support and alignment.
2. A sand-gravel envelope, at least 3 inches thick, to provide support.
3. Compacted soil bedding material beside and to 3 inches above the pipe.

For trench installations of corrugated plastic pipe larger than 8 inches, the same bedding requirements will be met except that a semi-circular or trapezoidal groove shaped to fit the conduit will be used rather than a V-shaped groove.

For rigid conduits installed in a trench, the same requirements will be met except that a groove or notch is not required.

All trench installations should be made when the soil profile is in its driest possible condition in order to minimize problems of trench stability, conduit alignment, and soil movement into the drain.

For trench installations where a sand-gravel or compacted bedding is not specified, the conduit should be blinded with selected material containing no hard objects larger than 1.5 inches in diameter. Blinding should be carried to a minimum of 3 inches above the conduit.

All installations shall meet the minimum requirements of the appropriate ASTM specification (F 449, Standard Practice for Subsurface Installation of Corregated Polyethylene Pipe for Agricultural Drainage or Water Table Control; D 2321 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications).

VI. FILTER AND ENVELOPES

If a sand-gravel filter is specified, it shall be clean, hard, durable material and of the gradation specified.

When sand-gravel envelopes are used they will be of clean, hard, durable material with less than 5 percent passing the #200 sieve, not more than 30 percent passing the #60 sieve with a maximum size of 1/1/2 inches.

The envelope or filter material shall be carefully placed to form an even firm bedding without disturbing the pipe grade and alignment. When artificial fabric filter material is used, all open joints and perforations will be protected. If fabric filter material is damaged during installation, it shall be repaired before backfilling with a minimum 4-inch overlap.

VII. PLACEMENT

During the installation of the pipe, special measurements must be made to assure that the pipe is not stretched more than 5 percent between any pair of corrugations. Immediately after placement of the pipe and envelope, the blinding material shall be placed and properly compacted, then the backfill can be placed and compacted to complete filling of the trench.

Additional care is needed when installing pipe on hot or cool days. On hot days the pipe will be too flexible and thus will stretch beyond the allowable limits; and on cool days the pipe will be too brittle and may crack during the placement operation.

Fittings shall be installed in accordance with the manufacturer's instructions. Couplers shall be used at all joints and fittings. Special fittings shall be used at all changes in direction, junction with another line, and at the end of the lines. Reducers shall be of the tangent type (not of the concentric type) with the smooth line at the crown of the pipe. (This allows air movement in the line). All fittings shall be compatible with the pipe.

Non-perforated pipe may be used when the line passes through areas where root growth may create an obstruction, or crossing irrigation ditches.

Non-perforated pipe will also be used where small pockets of non-cohesive soil are encountered unless special envelopes or other means are used to stabilize the soil.

VIII. BACKFILL

Place the backfill material so that displacement or deflection of the pipe will not occur. This is preferably on an angle, so the material flows down the front slope. No large stones, frozen material, and dry clods shall be in the backfill. The trench should be backfilled as soon as the possible after blinding.

Corrugated thermoplastic pipe installed by mole plow will meet the same requirements stated above for envelopes and filter material.

IX. ASSOCIATED STRUCTURES

Associated structures may include manholes, inspection wells, road crossings, irrigation ditch crossings, air vents, and sump wells or outlet guard. These structures will require additional drawings showing the size, location, and grade lines.

X. MATERIALS

The following ASTM specifications pertain to pipe that is currently acceptable for use as subsurface drains:

ASTM	SPECIFICATION
F 405	Corrugated Polyethelyne (PE) Pipe and Fittings
F 667	Large Diameter Corrugated Polyethylene Pipe and Fittings
F 949	Poly(Vinyl Chloride) (PVC) Corrugated Sewer Pipe With a Smooth Interior and Fittings
D 2729	Polyvinyl Chloride (PVC) Sewer Pipe and Fittings
D 3034	Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings

The pipe used shall be listed on the "Practice Requirements" sheet. Prior to purchase of the pipe, the owner should provide the Engineer with the name of the pipe manufacturer and the markings on the pipe for the Engineer's determination of acceptance.

All fittings and couplers shall meet or exceed the same strength requirements as those of the pipe.

Such fittings and joints shall be capable of withstanding a working pressure equal to or greater than that for the pipe.

Joints can be either rubber gasket or solvent cemented joints. When solvent cement joints are used, they shall be constructed and cemented according to the recommendations of the pipe manufacturer.

If perforations are needed in smooth wall conduits, they shall be in compliance with ASTM-D-2729.

If perforations are specified in corrugated plastic pipe, the water inlet area shall be at least 1.0 square inch in 22 feet. of pipe length. The inlets shall be either circular perforations or slots about equally spaced along the length and circumference of the pipe in not less than three rows. Circular perforations shall not exceed 3/16 inch in diameter, and slots shall not be more than 1/8 inch wide and 1-1/4 inch long for 3, 4, and 5-inch diameter pipe or 1-1/2 for 6 and 8-inch diameter pipe or 1-3/4 inches for 10, 12 and 15 inch diameter pipe and in the middle of the valley so that there is a shoulder on each slot. Slots and circular perforations shall be cleanly cut.

Round perforations greater than 3/16 inch in diameter but equal to or less than 3/4 inch shall be permitted on mineral soils if special requirements on blinding, envelopes, or filters are used. On organic soils, the fiber contact shall govern the need for these special requirements on larger perforations.

XI. BASIS OF ACCEPTANCE

The acceptability of the drain shall be determined by inspections to insure compliance with all the provisions of this specification with respect to the design of the line, the pipe and pipe markings, the appurtenances, and the minimum installation requirements.

The installing Contractor shall certify that the installation complies with the requirements of the specification. A written guarantee shall be furnished protecting the owner against defective workmanship and materials for not less than 1 year. The certification shall identify all materials used, the manufacturer, and the markings.

XII. VEGETATIVE COVER

Unless otherwise specified, a protective cover of vegetation shall be established on the disturbed area. The planting of vegetative materials shall conform to the requirements of Practice Specification 342, Critical Area Planting.

XIII. SPECIAL MEASURES

Measures and construction methods shall be incorporated as needed and practical that enhance fish and wildlife values. Special attention shall be given to protecting visual resources and maintaining key shade, food and den trees.

XIV. CONSTRUCTION OPERATIONS

Construction operations shall be done in such a manner that erosion and air and water pollution are minimized and held within legal limits. The owner, operator, contractor or other persons will conduct all work and operations in accordance with proper safety codes for the type of construction being performed with due regards to the safety of all persons and property.

The completed job shall be workmanlike and present a good appearance.

OPERATION AND MAINTENANCE ITEM

A properly operated and maintained subsurface drain is an asset to your farm. This subsurface drain was designed and installed to remove and safely discharge subsurface water from your farm. The estimated life span of this installation is at least 10 years. The life of the structure can be assured and usually increased by developing and carrying out a good operation and maintenance program.

This practice will require you to perform periodic maintenance and may also require operational items to maintain satisfactory performance. Here are some recommendations to help you develop a good operation and maintenance program.

Maintain the design depth of cover.

Avoid travel by heavy equipment over drain lines when the soil is saturated except at designed crossings.

Avoid travel over pipelines by tillage equipment when the soil is saturated.

Limit traffic to sections that were designed for traffic loads.

Avoid any subsoiling operation that may disturb the drain or its filter materials.

Make sure that outlets are free flowing and rodent guards are in place.

Remove all foreign debris that hinders system operation.

Immediately remove any obstructions or blockage of, trash racks, drain inlets or drain outlets.

All settlement or cracks in the soil should be investigated to determine the cause and immediately repaired.

Immediately repair any vandalism, vehicular, or livestock damage to any outlets and appurtenances.

Eradicate or otherwise remove all rodents or burrowing animals. Immediately repair any damage caused by their activity.

Other items specific to your project are listed on the "Practice Requirement" sheet.