Construction Specification 46—Tile Drains

1. Scope
The work consists of furnishing and installing drain tile and necessary fittings and appurtenances.

2. Material
Unless otherwise specified, the drain tile and fittings shall conform to the requirements of Material Specification 543, Nonreinforced Concrete Pipe, or Material Specification 544, Clay Pipe and Drain Tile, whichever is applicable.

3. Excavation
Unless otherwise specified, excavation for the installation of each tile line shall begin at the outlet end and progress upstream.

The trench or excavation for the tile shall be constructed to the depths and cross-sections shown on the drawings. The trench width may be increased above the top of the tile at the option of the contractor.

Trench shields, shoring and bracing, or other methods necessary to safeguard construction personnel and to prevent damage to the existing improvements shall be furnished, placed, and subsequently removed by the contractor.

4. Preparing the tile bed
***Method 1*—**In stable soils the tile shall be firmly and uniformly bedded throughout its entire length to the specified depth and in the specified manner.

When the bottom of the trench does not provide a sufficiently stable or firm foundation for the drain tile, cradles for the tile (constructed of timber or fabricated lumber of a cleat-and-rail type construction), a sand-gravel mix, or other approved material shall be used to stabilize the bottom of the trench.

Drain tile shall not be laid on a rock foundation. In the event that boulders, rocks or ledge rock, or cemented material that prevents satisfactory bedding are encountered at the required grade with the trench cross-section, the trench shall be excavated to a minimum depth of 6 inches below grade and backfilled to grade with a sand-gravel mixture or other approved material. The bedding material shall be shaped to grade and compacted.

***Method 2*—**Tile shall be bedded as shown on the drawings or as specified in section 10 of this specification.

5. Laying tile and joint covering
***Method 1*—**Gaps between tile ordinarily shall be from 1/8 inch to 1/4 inch in clay, clay loam, and cohesive soil. Tile is laid without gaps in sandy soils and on lines to convey water with no intention of providing drainage.

Where tile is installed with the width of joint opening exceeding the limits stated above for noncohesive silts and fine and medium sands, the joint shall be covered with a permanent type material, such as coal tar pitch treated roofing paper, fiber glass sheet or mat, or plastic sheeting.

For tile installations on a curve alignment, the outside tile gap shall be covered with tile bats (broken tile) or covered as described above when the gap exceeds the recommended gap for the type of soil encountered. To maintain the gap within the allowable range, the inside pipe lip may be chipped and fitted to secure the required joint opening.

The ends and inside surface of all tiles shall be kept clean during installation. All earth or other extraneous material within the tile shall be removed before installation of the next tile section. At the end of work each day and when laying has been temporarily suspended, the inlet end shall be blocked so that earth or other extraneous material cannot enter the tile. The upper end of each tile line shall be blocked with permanent type material following satisfactory completion of tile installation.

Method 2—Tile shall be laid and joints shall be covered in the manner shown on the drawings or as specified in section 10 of this specification.

6. Connections

Lateral connections are made with manufactured junctions comparable in strength with the specified tile unless otherwise specified.

Where existing tile lines not shown on the drawings are crossed, they shall be bridged across the new trench or they shall be connected into the new tile lines, as directed by the engineer.

7. Blinding or filter material

Method 1—As soon as the tiles are placed satisfactorily, they shall be blinded by covering with friable soil material to a minimum depth of 6 inches. Material used for blinding shall not be frozen and, unless otherwise specified in section 10 of this specification, shall contain no rocks or stones that when dropped may cause tile damage. Sandy and other noncohesive soil shall not be used for blinding unless the joints are covered. All tile placed during any day shall be blinded at the completion of the work activities that day.

Method 2—Tile shall be covered with sand and gravel meeting the gradation, quality, quantities, and dimensions requirements and installed as shown on the drawings or as specified in section 10 of this specification. Material used for blinding shall not be frozen or contain rocks or stones that when dropped may cause tile damage. All tile placed during any day shall be blinded at the completion of the work activities that day.

Method 3—Unless otherwise specified, tile shall be covered with material obtained from required trench excavations.

8. Backfilling

Backfilling of the trench shall be completed as rapidly as consistent with the soil conditions.

Automatic backfilling machines may be used only when approved by the engineer. Backfill shall extend above the ground surface and be well rounded and centered over the trench.

Unless otherwise specified, where drain tile is installed under roads and at other designated locations shown on the drawings, the backfill shall be placed in successive layers of not more than 6 inches and each layer shall be compacted before the next layer is placed. The density of the compacted backfill shall not be less than the density of the surrounding adjacent earth material unless otherwise specified in section 10 of this specification.

9. Measurement and payment

For items of work for which specific unit prices are established in the contract, the quantity of each kind, size, and class of tile is determined to the nearest foot of length measured along the centerline of the installed tile. Payment for each kind, size, and class of tile is made at the contract unit price for that kind, size, and class of tile. Such payment constitutes full compensation for furnishing, transporting, and installing the tile, including excavation, shoring, backfill, and all fittings, appurtenances, and other items necessary and incidental to the completion of the work. Payment for appurtenances listed separately in the bid schedule is made at the contract prices for the sizes and types of appurtenances listed.

Compensation for any item of work described in the contract, but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in section 10 of this specification.

10. Items of work and construction details