603 UNDERDRAINS

603.01 DESCRIPTION

Work consists of trench excavation, dewatering, furnishing and placing filler materials including fabric if required, under drain pipe, connecting pipe, pipe risers, and backfill. Work includes all pipe connections plus installation and maintenance of shoring as needed to provide the specified trench width. The Contractor shall make the requisite excavations for constructing the under drain, appertaining structures, and connections and make provisions to maintain and protect fences, trees, underground installations, and other structures. He shall be responsible for the repair of all damage which may result from his operations.

The Contractor shall, after giving due notice to parties affected thereby, provide plank crossings, barricades or other means of maintaining and protecting travel on streets or roads in which trenches are excavated and shall maintain these in good and safe condition so long as may be necessary and shall then remove such temporary expedients and restore such ways to their proper condition.

Work shall include furnishing all materials, tools, labor, and equipment required to fully install and make operational the entire drainage system.

If the Chief Engineer determines that sufficient and proper shoring is not provided, extra shoring shall be installed at the Contractor's expense.

603.02 MATERIALS

Materials shall meet the following requirements:

Pervious fill – 805.02

Under drain pipe – 808.02(B), 808.03 or 809.02

Connecting pipe – 808.01(A) or 808.02(A)

Mortar – 806.05(B)(4)

Backfill material – 804 as determined by the depth

Blanket soils – 805.04

PCC for collar and block – 817, Class F

Pipe risers – 808.02(A) or 808.03

Pipe Jointing compound – 822.16

Cleanouts – cast-iron meeting 815.04, Class 30 (they shall have an adjustable housing with a countersunk cleanout plug and a scoriated Cast Iron cover)

Coarse Aggregate – 805.03

Geotextile Fabric – 822.09

603.03 CONSTRUCTION REQUIREMENTS

Trenches shall be excavated to the dimensions and grade as specified in the contract documents, standard drawings or as directed by the Chief Engineer. The sides and bottom of trenches shall be smooth and uniform to prevent tearing of geotextile fabric during backfilling.

When specified in the contract documents, geotextile fabric shall be placed tightly against the trench to eliminate voids beneath the geotextile. The geotextile fabric shall be of sufficient width to completely enclose the underdrain trench including any specified overlaps. Wrinkles and folds in the geotextile fabric shall be avoided, except where trench changes direction. Geotextile joints and overlaps shall be a minimum of 24 inches and pinned securely to hold the fabric in place during backfilling. Damaged geotextile fabric shall be replaced or repaired as directed by the Chief Engineer at the expense of the Contractor.

The slope of the underdrain pipe shall be so that positive drainage toward the under drain outlet is maintained. Perforated pipes shall be placed with perforations down. Pipe shall be placed with the bell end up grade. Pipe sections shall be joined with appropriate couplings. The ends of under drain pipe, except for combination under drains, shall be plugged up grade as directed by the Chief Engineer. When an under drain connects with a manhole or catch basin, a suitable connection shall be made through the wall of the manhole or catch basin.

Under drains shall be outletted into drainage structures wherever possible. Outlets that empty into a drainage structure shall be positioned a minimum of 6 inches above the normal flow level in the structure and shall be constructed of under drain pipe. A minimum of 18 inches of cover over the pipe shall be maintained. When outletted to a slope or ditch, the connector pipe shall slope a minimum of 3 % unless otherwise directed by the Chief Engineer. A sloped concrete headwall with removable rodent screen shall be constructed at the end of the connector pipe in conformance with the contract documents.

Pipe used for outlets shall be non-perforated rigid polyethylene or polyvinyl chloride. Flexible tube type pipe is prohibited. Geotextile fabric is prohibited for under drain outlets. Longitudinal under drains shall have outlets spaced at a maximum of 250 feet intervals, unless otherwise directed by the Chief Engineer, and at the lowest elevation on all vertical curves.

After pipe installation has been approved by the Chief Engineer, aggregate backfill shall be placed and compacted. Pipe and covering at open joints shall not be displaced during subsequent operations. The Contractor shall replace any geotextile, under drain or connector pipe damaged by excessive tamping at no additional cost to the District.

603.04 MEASURE

(A) UNDERDRAINS AND CONNECTOR PIPES. The unit of measure for Under drains and Connector pipes will be the linear foot. The number of linear feet will be measured along the center line out of the top of the pipe, complete in place. Measure for unde drain will be made from the spigot end of the pipe where it enters the bell of the fitting for the connecting pipe. When cleanouts are being installed, the measurement will terminate at the riser; otherwise, it will terminate at the end of the pipe. For connector pipe, measure will be made from the outside face of the headwall, inlet wall or manhole to the bell end of the connecting pipe where it meets the under drain pipes.

(B) ADDITIONAL EXCAVATION FOR UNDERDRAINS. When directed by the Chief Engineer, the additional excavation required to lower the trench to an elevation lower than specified in the contract documents or the standard drawings will be measured and paid as Additional Excavation for Under Drains. The unit of measure for Additional Excavation for Under Drains will be the cubic yard.

(C) UNDERDRAIN PIPE RISERS. The unit of measure of Under Drain Pipe Riser will be the vertical linear foot. The number of vertical linear feet will be measured along the center line on the outside of the pipe.

Measure will be made from the bell end of the under drain pipe where the elbow fits into the bell to the top of the cleanout plug.

603.05 PAYMENT

(A) UNDERDRAINS & CONNECTOR PIPES. The number of linear feet of Under drains and Connector Pipes, as measured in 603.04(A), will be paid for at the contract unit price per linear foot, which payment will include excavating to plan depth and width, or as specified herein. This payment will also include disposal of all excess and unsuitable excavated materials, the furnishing, hauling, and placing of all underdrain pipe, connector pipe, and backfill and all labor, geotextile fabric, materials, tools, equipment, and incidentals necessary to complete the work.

(B) ADDITIONAL EXCAVATION FOR UNDERDRAINS. The number of cubic yards of Additional Excavation for Under Drains as measured in 603.04(B), will be paid for at the contract price per cubic yard, which payment will include the excavation and disposal of all excess excavated materials, the furnishing, hauling and placing of all materials including additional pervious materials, and all labor, materials, tools, equipment and incidentals necessary to complete the work.

(C) UNDERDRAIN PIPE RISERS. The number of linear feet of Under Drain Pipe Risers, as measured in 603.04(C), will be paid for at the contract unit price per vertical linear foot which payment will include excavation and disposal of excess and unsuitable materials, the furnishing, hauling, and placement of all materials, including the elbow fitting, the PCC blocks, the cleanout box, and all labor, tools, equipment, and incidentals necessary to complete the work.