

**632.1**

ITEM	DESCRIPTION	UNIT
631001-*	ELECTRICAL WORK	LUMP SUM

\* Sequence number

## SECTION 632 HORIZONTAL DRAINS

**632.1-DESCRIPTION**

This work shall consist of furnishing and installing plastic horizontal drains and associated plastic outlet pipes, in borings drilled into the faces of cuts, fills, and retaining walls. The installation shall be at locations and at angles as shown on the Plans or directed by the Engineer during construction and shall be in accordance with these Specifications. This work shall also consist of constructing terminal chambers, or collector pipes, when required, in accordance with these Specifications.

**632.2-MATERIALS:**

**632.2.1 - Horizontal Drains:** Horizontal drains shall be constructed of slotted and solid plastic pipe. The pipe shall consist of nominal 1½ inch I.D. Schedule 80, Type II PVC 2110 pipe conforming to the requirements of ASTM Designation D 1785.

The pipe shall have three rows of slots cut circumferentially in the pipe on the third points (120 degrees apart). The average configuration shall be from 22 slots, plus or minus one slot, per row per foot (300 mm) using 0.050 inch (1 mm) slots, to 46 slots plus or minus one slot, per row per foot (300 mm), using 0.010 inch (250 µm) slots. The number and width of slots will be as specified on the Plans or as approved by the Engineer depending upon the type of soil or rock. Perforated pipe shall not be used.

Solvent cement shall meet the requirements of ASTM D 2564.

**632.2.2 - Terminal Chamber:** Horizontal drain terminal chambers shall be constructed of 48 inch (0.109" Th.) (1200 mm (2.7 mm)) metallic coated corrugated steel pipe meeting the requirements of [713.2](#).

Concrete used for the chamber foundation and incidentals shall meet the requirements of [715.12](#).

Pipe used to drain the chambers shall meet the requirements of [714.22](#).

**632.2.3 - Collector Pipes:** Collector pipes, if any, shall be nominal 1½ inch unslotted or unperforated PVC pipe meeting the requirements of [714.22](#).

Fittings for collector pipes shall be rigid PVC, Type II, high impact fittings and shall be the solvent weld type. The fittings shall have a bursting pressure equal to or exceeding that of the pipe.

**632.3 - GENERAL:**

The Contractor shall provide a method to determine the end elevations of

all plastic horizontal drains. It shall be the Contractor's responsibility to control the drain elevations to avoid all utilities and drainage structures existing at the site.

#### **632.4 - DRILLING:**

The holes shall be drilled with approved rotary equipment capable of drilling three to six inch (75 to 150 mm) diameter holes through soil or rock formations or retaining walls to the lengths and angles designated on the Plans.

Steel drill casing with an expendable bit having a "J" slot adaptor on the first section, or an equivalent substitute, shall be used for drilling the hole.

#### **632.5 - INSTALLATION OF HORIZONTAL DRAIN PIPE:**

Prior to removing the casing, the slotted and solid section of the horizontal drain pipe shall be inserted. The end of the first section of the horizontal drain pipe inserted into each hole shall be plugged with an approved stopper. Each successive length of pipe shall be cemented to the previous section.

The last 10 feet (3 meters) of horizontal drain pipe, nearest the slope or wall face, shall be unslotted pipe.

Each drain shall be identified with a two inch by two inch (50 by 50 mm) or two inch (50 mm) diameter copper tag with the identification number stamped on the tag. The tag shall be permanently attached to the outlet end of the drain.

After all the horizontal drains are installed, bentonite pellets shall be thoroughly tamped or packed in the annuli to eliminate all voids between the drill hole and the plastic pipe. The Contractor shall pack the bentonite a minimum of 3 feet (900 mm) into each annulus as measured from the surface.

To verify this measurement a bulkhead must be fashioned around the pipe at a distance of three (3) (900 mm) from the surface. The bulkhead may consist of rope or other similar material i.e., oakum.

#### **632.6 - TERMINAL CHAMBER INSTALLATION:**

After the horizontal drains have been installed, the terminal chamber shall be constructed of metallic coated corrugated pipe meeting the requirements of 713.2, and placed at the locations and elevations shown on the Plans.

The metal portion of the chamber may be fabricated at the site or in the shop.

After the chamber is in place and the concrete has cured, the area around the chamber shall be backfilled, site graded to drain, seeded, and mulched, as directed by the Engineer. Before the backfill is placed around the horizontal drains and the chamber, the Contractor shall ensure the bentonite placed between the circumference of the drill holes and the drains is still properly placed. When directed by the Engineer, the Contractor shall place and compact more bentonite.

All bare metal and welded areas shall be thoroughly cleaned and painted with one coat of zinc rich paint meeting the requirements of 711.21.

The horizontal drains, installed at each horizontal drain terminal chamber

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in location, shall be left in a condition that will ensure proper connections can be made to the finished chamber and that the water will be drained into and away from the chamber construction area.

**632.7 - COLLECTOR PIPE INSTALLATION:**

After the horizontal drains have been installed, the collector pipes shall be attached to the horizontal drains as shown on the Plans.

When a collector pipe system is required, the outlet ends of all horizontal drains shall be connected to the collector pipe by means of approved fittings; i.e., tees, plugs, street ells, etc.

**632.8 - METHOD OF MEASUREMENT:**

The quantity of work done for "Horizontal Drains" will be measured in linear 3 (meters) of pipe, which measurement will include the actual length of drain pipe, and outlet pipe, complete in place and accepted. The installation shall include the drilling, fittings, and bentonite.

The quantity of work performed in installing the horizontal drain terminal chamber and the furnishing of all materials necessary to complete the installation will be measured per each terminal chamber in place and accepted.

The quantity of work performed in installing the collector pipes will be measured per each for collector pipes, which will include the total length of all collector pipes and fittings; i.e., tees, plugs, street ells, etc., for each installation complete in place and accepted.

**632.9 - BASIS OF PAYMENT:**

The quantities, determined as provided above, will be paid for at the Contract unit bid price for the items below, which price and payment will be full compensation for drilling, site grading, seeding, and furnishing all materials and doing all the work prescribed in a workmanlike and acceptable manner, including all tools, equipment, supplies, labor and incidentals necessary to complete the work.

**632.10 - PAY ITEMS:**

<b>ITEM</b>	<b>DESCRIPTION</b>	<b>UNIT</b>
632001- *	HORIZONTAL DRAIN	LINEAR FOOT (METER)
632002- *	HORIZONTAL DRAIN TERMINAL CHAMBER	EACH
632003- *	HORIZONTAL DRAIN COLLECTOR PIPE	EACH

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