

## **DEEP DRAINAGE WELLS.**

**(REV 11-9-93) (7-00)**

PAGE 409. The following new Section is added after Section 443:

### **SECTION 444 DEEP DRAINAGE WELLS**

#### **444-1 Description.**

Construct deep wells in accordance with the details shown in the plans.

#### **444-2 Materials.**

Use casing constructed of 0.375 inch [9.5 mm] wall black steel pipe meeting the external diameter shown in the plans.

#### **444-3 Construction.**

**444-3.1 General:** Furnish all labor, materials and equipment required to construct, test and maintain deep drainage wells. Drill the wells of the specified diameter to a depth which will produce the minimum discharge capacity shown in the plans.

**444-3.2 Installation of Casing:** Construct the wells with casing from the given rim elevations shown in the plans to a water bearing strata capable of accepting the specified minimum discharge. The minimum required chloride content for this water bearing strata is 1,500 parts per million.

**444-3.3 Construction of Open Hole:** Construct an open hole, of the same diameter as the casing, to a depth which will provide the minimum discharge capacity. Use the "Air-Lift Method" (reverse circulation drilling) to remove all sand and gravel from the open hole.

**444-3.4 Testing:** The pumping test employed to determine the capacity of the well and whether or not it meets the specific capacity called for in the plans for the specific well will be the Constant Rate Method.

Furnish, install, and remove the necessary measuring instruments and pumping equipment capable of pumping to the required point of discharge a minimum of 3,000 gpm [0.19 m<sup>3</sup>/s] against a head of 10 feet [3 m], and with satisfactory throttling devices, so that the discharge may be reduced to 800 gpm [0.05 m<sup>3</sup>/s]. Use a pumping unit, complete with an ample power source, controls, and appurtenances, capable of being operated without interruption for a period of 30 minutes. Locate the intake of the test pump at least 5 feet [1.5 m] below the estimated pumping level, with sufficient power and capacity to achieve the designated discharge rates. Measure the discharge with an accurate totalizing meter and stopwatch, or a circular orifice meter, or a Venturi meter, or using the Horizontal Open Discharge Method, any of which are subject to approval by the Engineer. Maintain the discharge within  $\pm 5\%$  of the designated specific capacity rate by means of a gate valve or throttling device. Check, and if necessary adjust, the discharge every five minutes for a period of 20 minutes. Record the discharge and time of measurement each time it is checked and make note of any adjustments. Establish the static or non-pumping water level prior to the start of the test.

**444-3.5 Maintenance of Wells:** Cap and seal the completed deep wells immediately following construction and testing of the well. During the construction operations, do not allow

the discharge of any materials or fluids into the well, without written consent from the Engineer, unless it is for the purpose of testing the capacity of the wells.

When all paving and grassing operations have been completed, prior to final acceptance, remove the cap and seal and clean the well, removing all solid material. At this time, have all inlets and other drainage structures in place and operational.

#### **444-4 Basis of Measurement.**

The quantities to be paid for will be the actual quantities installed, measured in feet [meters], of Deep Well Casing and Deep Well Open Hole, tested and accepted.

#### **444-5 Basis of Payment.**

**444-5.1 General:** Prices and payment will be full compensation for all work specified in this Section.

**444-5.2 Deep Well Casing:** Price and payment for Deep Well Casing will be paid for under the item for the specific casing diameter and will include the cost of furnishing and installation of the casing, and the removal of all material from within the casing.

**444-5.3 Deep Well Open Hole:** Price and payment for Deep Well Open Hole will be paid for under the item for the specific hole diameter and will include the cost of all work specified in testing and maintaining of the Deep Well.

#### **444-5.4 Payment:**

Payment will be made under:

Item No. 444- 70-	Deep Well Open Hole - per foot.
Item No. 2444- 70-	Deep Well Open Hole - per meter.
Item No. 444- 71-	Deep Well Casing - per foot.
Item No. 2444- 71-	Deep Well Casing - per meter.