ITEM 658.0300NN08 – DRINKING WATER WELL DRILLING

DESCRIPTION

A. General. This work shall consist of all the necessary labor, equipment and materials associated with the construction and installation of new drinking water wells, including but not limited to well development, yield testing, disinfection, and well cap installation. All debris associated with this work shall be removed from the site. Drinking Water Well Drilling shall be performed as specified herein and as indicated on the General Notes and Plans.

B. Submittals.

1. Qualification Data: Submit qualification data for personnel specified in Quality Assurance article that demonstrates that the personnel have the capabilities and experience complying with requirements specified herein.

2. Product Data: Submit name, manufacturer, make, model, specification, and / or capacity as applicable for all materials.

3. Laboratory: Submit name, address and Environmental Laboratory Approval Program (ELAP) number of the laboratory that will be used to analyze water quality samples.

C. Quality Assurance.

1. Installer’s Qualifications. The Contractor shall be regularly engaged in the drilling of potable water wells. The Contractor must have a valid and current water well contractor certificate of registration issued by the New York State Department of Environmental Conservation (NYSDEC). Any individual who is responsible for the on-site supervision of water well drilling activities must have passed, with at least a seventy percent score, a two-part certification exam by the National Ground Water Association (or equivalent).

2. Reference Standards. Comply with the requirements of the following standards and with the requirements specified in the Section. In case of conflict, the most stringent and restrictive requirement shall govern.


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h. New York State Department of Health, Part 5, Subpart 5-1 Standards for Water Wells - Appendix 5-B.

i. New York State Water Well Definitions [Environmental Conservation Law (ECL) 15-1502].

j. New York State Water Well Driller Registration Law (ECL 15-1525). This also includes requirements for filing of a preliminary notice and completion report with the NYSDEC.


l. Residential Code of New York State, Chapter 26, General Plumbing Requirements, Subsection P2602.1.1 – Individual water supply sources.

D. Project Conditions.

1. Laws and Regulations. Perform all work in this Item in compliance with all Federal, state and local laws and regulations. Properly and legally dispose of all waste materials.

2. Safety. Use all necessary means to protect all persons, whether engaged in the work of this Item or not, from harm resulting from the work. Secure the work area at the end of each work day.

3. Protection. Use all necessary means to protect existing structures and existing landscaping from damage caused by the work, unless otherwise noted on the General Notes and Plans.

4. Dimensions. The Contractor is responsible for field verifying all locations show on Plans and for the collection of field measurements related to well depth and all other details required for completion of the NYSDEC’s “Well Drilling and Completion Report”.

5. Environmental Conditions. Proceed with work only when existing and forecasted weather conditions permit work to be performed safely (i.e., no lightning or high winds).
MATERIALS

Materials for drinking water well drilling shall conform to the requirements of the following subsections:

- Section 619 Work Zone Traffic Control
- Section 625 Survey Operations
- Section 699 Mobilization
- Section 713 Landscape Development Materials

In addition to the requirements specified in the preceding subsections and in the Reference Standards, the following shall apply:

A. Well casing: All permanent well casing shall be new black steel line pipe. Pipe shall meet the specifications of American Petroleum Institute (API) Standard 5L, Grade A or B line pipe, as summarized herein:
   1. Nominal size = six inches
   2. External diameter = 6.625 inches
   3. Minimum wall thickness = 0.280 inches
   4. Minimum casing weight = 18.97 lbs/ft
   5. Minimum test pressure = 1520 psi

B. Hardened steel drive shoe.

C. Well drop pipe: Schedule 80 PVC of sufficient diameter to house the submersible pump.

D. Check valve: spring loaded check valve(s) and/or drop line check valve(s).

E. Brass or stainless steel pitless adapter.

F. Six-inch diameter sanitary well cap (water-proof and vermin-proof), with 20 to 30 mesh per inch stainless steel vent screen.

G. Annular seal (grout): Portland cement (ASTM C150) and water. Hydrated lime may be added to facilitate pumping of the grout mixture. Bentonite may be added to reduce shrinkage. Cement grout placed to seal the annular space between the permanent well casing and oversize borehole shall be mixed in the proportion of not less than five nor more than six gallons of water to one bag (94 lbs) of cement. Hydrated lime (10% by volume) and bentonite (3% by volume) may be added to facilitate pumping and reduce shrinkage respectively.

H. Well disinfection: chlorine bleach containing 5.25% available chlorine.

I. Any other incidental materials required for completion of the work described herein and in the General Notes and Plans.
CONSTRUCTION DETAILS

A. Coordination.

1. Complete utility mark-out by contacting DigSafely New York at 1-800-962-7962 at least two working days prior to the start of excavation, but not more than ten.
2. Coordinate any survey work necessary to locate the proposed well locations on each property. The Contractor shall conduct this work in accordance with Section 625 - Survey Operations.
3. Conduct each mobilization in accordance with Section 699 - Mobilization.
4. The Contractor shall implement any traffic controls required under Section 619-1 – Work Zone Traffic Control.
5. Contractor is responsible for coordinating and scheduling property access with the respective property owners in conjunction with the Engineer-in-Charge. Property owner contact information will be provided to the Contractor by the Engineer-in-Charge.

B. Drilling / well installation.

1. The Contractor shall drill a well at the locations shown on the Plans or as ordered by the Engineer-in-Charge. Drilling shall be by air rotary rig.

2. Drilling fluids other than water will not be permitted, unless specifically approved by the Engineer-in-Charge.

3. All work shall be done under the supervision of personnel experienced in the construction of wells. The Contractor shall be responsible for driving the well straight and shall test for plumbness and alignment.

4. The Contractor shall create a ten-inch borehole and install a six-inch casing. The casing shall be fitted with a drive shoe that is firmly seated in the bedrock. The minimum thickness of the seal around the casing should be two inches and the annular space filled with grout. The well casing shall extend a minimum of 100 feet into rock.

5. During drilling, the Contractor shall collect water samples for field screening and use an appropriate meter to check conductivity / salinity concentrations before setting the casing. After drilling through the overburden and at least 100 feet into rock, the Contractor shall collect a sample every 40 feet and at any significant fractures, as directed by the Engineer-in-Charge. An acceptable sodium concentration is 15 mg/L and an acceptable chloride concentration is 230 mg/L. Meter readings shall be recorded by the Contractor and provided to the Engineer-in-Charge. The final well depth will be dependent on an acceptable quantity of water and water quality conditions, at the direction of the Engineer-In-Charge.

6. If, at 600 feet, it is determined that the location does not appear acceptable for a drinking water well, the drilling would cease and the borehole would be properly
abandoned in accordance with NYSDEC and DCDOH requirements.

7. The casing shall be sealed with grout throughout its entire length. Grouting shall be continuous from the bottom of the permanent casing to within one foot of the field connection of the pitless adapter.

8. The finished casing shall project at least one foot above final grade and shall be capped. The casing shall be sealed with a pitless adapter. The pitless adapter must be installed below the frost line.

9. The Contractor shall install a PVC drop pipe to sufficient depth for the submersible pump and electrical connections. Check valves shall be installed every 200 feet of vertical and horizontal piping run.

C. Well Development.

The Contractor shall develop the well by such methods that will effectively extract from the water-bearing formation the maximum practical quantity of sand, drilling mud and other fine materials in order to bring the well to maximum yield per foot of drawdown and to a sand-free condition. Air lift or surging may be used for the development work. The work shall be done in a manner that does not cause undue settlement and disturbance of the strata above the water-bearing formation nor disturb the seal around the well casing and thereby reduce the sanitary protection otherwise afforded by such seal. Development of the well shall be continued until water pumped from the well at the maximum test pumping rate is clear and free of sand.

D. Well Yield Testing.

1. Upon successful completion of development, including water quality, the Contractor shall perform a yield test. The test shall not be started until after the static level in the well has recovered. The pumping unit shall be completed with an ample power source, controls and appurtenances and shall be capable of being operated without interruption for a minimum period of 24 hours.

2. Water level measurements may be determined by steel tape, calibrated pressure gauge attached to an air line terminating at least five feet above the pump intake, electric sounder or pressure transducer. Measurements of pumping rate and water level shall be made every one minute for the first 10 minutes of the test, every 2 minutes for the next 10 minutes, every 5 minutes for the next 40 minutes, every 15 minutes for the next hour, every 30 minutes for the next three hours and hourly for the remainder of the pumping period. Recovery water-level measurements shall be made with the same frequency until sufficient data has been collected to extrapolate the full recovery of the well. Once the stabilized test yield is obtained, it shall be maintained for a minimum period of four hours.

3. During the period of stabilized drawdown, the stabilized water level shall not fluctuate more than plus or minus 0.5 foot for each 100 feet of water in the well over
the duration of constant flow rate of pumping. The recovery period shall include observation of the water level in the well after cessation of pumping from the drawdown level back to at least 90% of the initial water level or for a period of 24 hours, whichever occurs first. If the water level does not recover to 90% after 24 hours, the tested flow rate may not be sustainable for an extended period of time, and the well may not be viable.

4. Discharged water shall be conducted from the pump to the nearest surface water body, storm sewer, or ditch, as approved by the Engineer-in-Charge, through approved piping or lined ditches to prevent recirculation of discharged water into the aquifer being tested. The Contractor shall ensure that no damage by flooding or erosion is caused to the selected drainage structure or disposal site.

5. The Contractor shall keep accurate records of the yield test and furnish a copy of all records to the Engineer-In-Charge and the property owner upon completion of the test. Records shall include the date of the test, time and elapsed pumping time, depth to water below the measuring point, and pumping rate at the time of measurements.

E. Sample Collection. The Contractor shall collect water samples for water quality testing following each well installation and development and prior to homeowner use, as directed by the Engineer-in-Charge. The Contractor is responsible for providing all equipment, materials, and labor for sample collection as well as submittal and payment to the selected laboratory. All samples must be analyzed by an ELAP-certified laboratory for testing potable water. A one-week turnaround time shall be requested. The sample(s) shall be analyzed for chloride, total dissolved solids and the parameters identified in the table found in NYSDOH Fact Sheet #3 – Recommended Residential Water Quality Testing (coliform bacteria, lead, nitrate, nitrite, iron, manganese, iron plus manganese, sodium, pH, hardness, alkalinity, turbidity). Proper sample collection and chain of custody protocols must be followed. Water Quality sample results shall be provided to Engineer-in-Charge and the homeowner.

F. Disinfection.

Upon receipt of acceptable Water Quality sample results and the completion of the installation of permanent pumping equipment, the well shall be disinfected. Disinfect the well and well drop pipe as follows: pump the well for one hour or until the water runs clear. Divert all flow out of the water line at the well head. Prepare a solution of 64 fluid ounces chlorine bleach (bleach containing 5.25% available chlorine) and five gallons of water. Pour 1.72 gallons of solution per 100 ft of well into the well while continuing to pump, in such a manner as to distribute the solution throughout the entire well and prevent slugs of solution to pass through the well. Resume pumping until chlorine odor is evident in the well discharge. Stop the pump and let the system stand idle for at least 12 hours but not more than 24 hours. After this time period has elapsed, resume pumping until the residual chlorine contact is less than 1.0 ppm, as measured by the Contractor via field screening methods. The samples must be checked within 15 minutes of sample collection. Field screening results shall be provided to the Engineer-in-Charge. The well shall be pumped to waste for an additional 15 minutes (with less
than 1 ppm chlorine residual).

G. Water Well Capping.

1. A welded metal plate or a threaded cap shall be installed.

2. All well caps, temporary or permanent, shall be effectively located/sealed against the entrance of water, vermin and contaminants.

3. At all times during the progress of work, the Contractor shall provide protection to prevent tampering with the well or entrance of foreign materials.

H. Grading & Restoration.

Grade the area surrounding the well to eliminate ponding and direct surface water away from the top of the well casing. Concrete shall not be used for grading purposes.

All lawn areas and ornamental planting beds disturbed due to construction access and activities associated with this work shall be restored pre-construction condition or better per Section 713 Landscape Development Materials.

I. Reporting.

The Contractor shall be responsible for the preparation and submittal of required documentation associated with water well installation to the appropriate state and local regulatory agencies for each property. The Contractor shall furnish and pay for all permits and application or reporting fees. A “Preliminary Notice of Proposed Water Well” must be submitted to the NYSDEC. An “Application to Construct or Abandon a Water Well” (for well installation) must be submitted to the County Department of Health. A “Well Completion Report” must be submitted to the NYSDEC, County Department of Health and the property owner. A copy of all required documentation shall also be provided to the Engineer-in-Charge.

METHOD OF MEASUREMENT

This work will be measured for payment on a linear foot basis for the work completed in accordance with the Contract Documents to the satisfaction of the Engineer-in-Charge.

BASIS OF PAYMENT

The linear foot price bid for Drinking Water Well Drilling shall include the cost of furnishing all labor, materials, equipment, and appliances necessary to complete the work as indicated on the General Notes and Plans, and as specified under this Item. Removal of all debris associated with this work will be included in the price bid for this Item.

Payments will be made for the Item in proportion to the total amount of work completed.
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Before the first payment estimate is issued for work under this Item, the Contractor shall provide the Engineer-in-Charge with a detailed estimate of quantities and prices of all materials and labor under this Item, which shall aggregate the contract linear foot price bid for this item. This estimate shall be made out as required to support the linear foot bid. This evidence shall include certified copies of subcontracts.

Contractor agrees that this detailed estimate shall not become effective until it has been approved by the Engineer-in-Charge, who may revise the estimate as may be required to make the various subdivisions of work conform to their specified value. The approved detailed estimate will be used as a basis for payments for work completed under this Item.

(NN Denotes Well Locations).