SECTION 331113 - POTABLE WATER SUPPLY WELLS

The content in this section will vary significantly depending on project specific requirements and should be closely coordinated with the findings of the project Hydrogeological Report.

1. GENERAL

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

* + - 1. SUMMARY
         1. Section Includes:

Well casings.

Grout.

Water well screens.

Pack materials.

[**Jet**] [**Line-shaft**] [**Submersible**] well pumps.

* + - 1. ALLOWANCES

Allowances shall be closely coordinated with the OGS PM. See the Evaluations in Section 012100 "Allowances" for discussion of allowances and how to include them in Project. Coordinate requirements in this article with Section 012100 "Allowances."

* + - * 1. Allowance amounts and quantities are specified in Section 012100 - Allowances.

Water Supply Well Depth Allowance: Install complete and functional well to depth indicated in Section 012100 - Allowances. If water supply well depths vary from quantities in the allowance, the Contract Sum will be adjusted according to unit prices listed in "Unit Prices" Article. Include the following in the Contract Amount:

Labor for water supply well installation.

Furnishing and installing casing materials, grout, well screen, and packing materials in required diameter to comply with minimum performance requirements specified in the Section Text.

Delete subparagraph below if well pumps are not included in the allowance or are in a separate allowance.

Furnishing and installing well pump.

Delete first paragraph below if well pump is part of well allowance specified in "Water Supply Well Depth Allowance" subparagraph.

* + - * 1. Water supply wells and well pumps are covered by cash allowance.[**Allowance includes labor and materials.**]
        2. Well pumps are covered by cash allowance.[**Allowance includes labor and materials.**]
      1. DEFINITIONS

Retain terms that remain after this Section has been edited for a project.

* + - * 1. ABS: Acrylonitrile-butadiene-styrene plastic.
        2. PA: Polyamide (nylon) plastic.
        3. PE: Polyethylene plastic.
        4. PP: Polypropylene plastic.
      1. SUBMITTALS
         1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
         2. Manufacturer’s installation instructions shall be provided along with product data.
         3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
         4. Product Data: Submit certified performance curves and rated capacities of selected well pumps and furnished specialties and accessories for each type and size of well pump indicated.
         5. Shop Drawings: For well pumps. Show layout and connections.

Include diagrams for power, signal, and control wiring.

Setting Drawings: Include templates and directions for installing foundation bolts, anchor bolts, and other anchorages.

* + - * 1. Field Quality-Control Reports:

For each well pump, include the following:

Substrata formations.

Water-bearing formations.

Water levels.

Laboratory water analysis.

Well-screen analysis.

Performance test data.

* + - 1. CLOSEOUT SUBMITTALS
         1. Operation and Maintenance Data: For each well pump to include in emergency, operation, and maintenance manuals.

Project Record Documents: Record the following data for each water supply well:

Data in five subparagraphs below are examples of required information.

Casings: Material, diameter, thickness, weight per foot = of length, and depth below grade.

Screen: Material, construction, diameter, and opening size.

Pumping Test: Static water level, maximum safe yield, and drawdown at maximum yield.

Log: Formation log indicating strata encountered.

Alignment: Certification that well is aligned and plumb within specified tolerances.

* + - 1. QUALITY ASSURANCE

Retain "Well Driller Qualifications" paragraph below if required; delete if unavailable at Project location.

* + - * 1. Well Driller Qualifications: An experienced water supply well driller licensed in the jurisdiction where Project is located.
      1. FIELD CONDITIONS

Retain first paragraph below if interruption of existing water service is required.

* + - * 1. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by the State or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:

Notify [**Director’s Representative**] no fewer than [**seven**] <**Insert number**> days in advance of proposed interruption of water service.

Do not proceed with interruption of water service without [Director’s Representative’s ] written permission.

Retain "Well Drilling Water" paragraph below if required. Verify, with OGS Project Manager, that water for drilling will be available to Contractor; determine if State will charge Contractor for use of well drilling water.

* + - * 1. Well Drilling Water: [**State will provide**] [**Provide**] temporary water and piping for drilling purposes. Provide necessary piping for water supply.

1. PRODUCTS
   * + 1. SYSTEM DESCRIPTION
          1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
          2. Comply with AWWA A100 for water supply wells.
       2. PERFORMANCE REQUIREMENTS

Insert required capacity in paragraph below for completed and tested water supply well. Data will be used to determine other variable information such as diameters of bore, casing, and screen, and data will affect allowances and unit prices if used.

* + - * 1. Minimum Tested Water Supply Well Performance Capacity: <**Insert capacity in gpm**>.
      1. WELL CASINGS

Retain one of first three paragraphs below. Authorities having jurisdiction may require or allow other materials.

* + - * 1. Steel Casing: AWWA C200, single ply, steel pipe with threaded ends and threaded couplings for threaded joints.

Delete "ABS Casing" and "PVC Casing" paragraphs below if well is deeper than 100 feet or water temperature is higher than 140 deg F.

* + - * 1. ABS Casing: ASTM F480, ABS, Schedule [**40**] [**80**] bell-and-spigot pipe and couplings for solvent-cemented joints.

Retain last option in "PVC Casing" paragraph below if NSF 14 compliance is required by authorities having jurisdiction.

* + - * 1. PVC Casing: ASTM F480 [**and NSF 14,**] PVC, Schedule [**40**] [**80**] bell-and-spigot pipe and couplings for solvent-cemented joints.[**Include NSF listing mark "NSF wc."**]

Retain "Pitless Adapter" or "Pitless Unit" paragraph below. These specialties are designed for use with jet and submersible pumps. Pitless adapter is installed in casing. Pitless unit replaces a portion of casing.

* + - * 1. Pitless Adapter: Fitting, of shape required to fit onto casing, with waterproof seals.
        2. Pitless Unit: Factory-assembled equipment that includes pitless adapter.
        3. Well Seals: Casing cap, with holes for piping and cables, that fits into top of casing and is removable, waterproof, and vermin proof.
      1. GROUT

Retain this article only if retaining rotary drilled or reverse-rotary drilled water well.

* + - * 1. Cement: ASTM C150, Type II.
        2. Aggregates: ASTM C33, fine and coarse grades.
        3. Water: Potable.
      1. WATER WELL SCREENS
         1. Screen Material: Fabricated of ASTM A666, Type 304 stainless steel[**, welded; with continuous-slot, V-shaped openings that widen inwardly**] [**tube; with slotted or perforated surface and designed for well-screen applications**].

Screen Couplings: Butt-type, stainless-steel coupling rings.

Screen Fittings: Screen, with necessary fittings, closes bottom and makes tight seal between top of screen and well casing.

Maximum Entering Velocity: 0.1 fps.

* + - 1. PACK MATERIALS

Retain this article only if rotary drilled or reverse-rotary drilled water well is specified and pack material is required.

Retain first paragraph below if soil formation is fine sand.

* + - * 1. Coarse, uniformly graded filter sand, maximum 1/8 inch in diameter.

Retain paragraph below if soil formation is medium or coarse sand.

* + - * 1. Fine gravel, maximum 1/4 inch in diameter.
      1. JET WELL PUMPS
         1. Description: [**Shallow**] [**Deep**]-well-design, jet well pump; self-priming; centrifugal pump capable of continuous operation.

Utilize link below to assist with pump manufacturer selection. Note that pump selection shall be by the Designer of Record and meet the requirements of the project.

* + - * 1. Manufacturers:

A.Y. McDonald Mfg. Co., (800) 292-2737, 4800 Chavenelle Road, Dubuque, IA 52002.

Goulds Water Technology, Xylem Inc., (866) 325-4210, 2881 East Bayard Street, Seneca Falls, NY 13148.

Pentair, (763) 545-1730, 70 London Road, Twickenham, London, United Kingdom.

Approved equivalent.

* + - * 1. Housing: Cast iron.
        2. Impeller: [**Single stage**] [**Multistage**], centrifugal; fabricated of corrosion-resistant materials.
        3. Seals: Mechanical.
        4. Shaft: Stainless steel.
        5. Motor: Manufacturer's standard, NEMA MG 1 motor, panel, and accessories.

Retain one of two subparagraphs below. Retain first for shallow wells 25 feet deep or less; retain second for deep wells. If electronic, variable-speed controls are used, both "Compression Tanks" subparagraphs in "Pump Accessories" paragraph below may be omitted.

* + - * 1. Motor Controls: Electronic; variable speed.
        2. Check valve, ejector, and pressure-control valve.

If Project has more than one type or configuration of jet well pump, identify and schedule multiple pumps below to match the Drawings.

* + - * 1. Pump Capacities and Characteristics:

Capacity: <**Insert gpm**>.

Discharge Head: <**Insert psig**>.

Discharge Size: <**Insert NPS**>.

Speed: <**Insert rpm**>.

Motor Horsepower: <**Insert value**>.

Lift: <**Insert feet**>.

Pressure Rating: <**Insert psig**>.

Volts: <**Insert value**>.

Phases: <**Insert value**>.

Hertz: <**Insert value**>.

Full-Load Amperes: <**Insert value**>.

Minimum Circuit Ampacity: <**Insert value**>.

Maximum Overcurrent Protection: <**Insert amperage**>.

Compression Tank Capacity: <**Insert gal.** >.

* + - * 1. Pump Accessories:

Retain one of two "Compression Tanks" subparagraphs below. Retain first if tanks are specified in Section 221223.11 "Facility Indoor Potable-Water Storage Tanks." Compression tanks may be omitted if pumps have electronic, variable-speed control.

Compression Tanks: Comply with requirements in Section 221223.11 - Facility Indoor Potable-Water Storage Tanks.

Compression Tanks: Precharged butyl rubber diaphragm, steel shell, fused polymeric lining, and 100-psig working pressure.

Pressure Switches: For pump control; for installation in piping.

Retain one of two "Water Piping" subparagraphs below.

Water Piping: ASTM A53, Schedule 40, galvanized-steel pipe with threaded ends.

Cast-Iron Fittings: ASME B16.4, threaded, galvanized.

Water Piping: ASTM D2239, SIDR Numbers 5.3, 7, or 9 PE pipe; made with PE compound number required to give pressure rating not less than [**160 psig**] [**200 psig**]. Include NSF listing mark "NSF pw."

Fittings for PE Pipe: ASTM D2609, made of PA, PP, or PVC with serrated, male insert ends matching inside of pipe. Include bands or crimp rings.

* + - 1. LINE-SHAFT WELL PUMPS

Water-lubricated pumps are normally used for column pipe and bowl assemblies that are 50 feet deep or less; oil-lubricated pumps are normally used for column pipe and bowl assemblies that are more than 50 feet deep.

* + - * 1. Description: Line-shaft, [**water**] [**oil**]-lubricated, vertical-turbine well pump.

Utilize link below to assist with pump manufacturer selection. Note that pump selection shall be by the Designer of Record and meet the requirements of the project.

* + - * 1. Manufacturers:

American Turbine, (509) 243-5387, 3692 Riverside Dr. Clarkston, WA 99403.

Crane Pumps & Systems, (937) 778-8947, 420 3rd St, Piqua, OH 45356.

Flowserve, (972) 443-6500, 5215 N. O'Connor Blvd., Ste 700, Irving, TX 75039.

Goulds Water Technology, Xylem Inc., (866) 325-4210, 2881 East Bayard Street, Seneca Falls, NY 13148.

Pentair, (763) 545-1730, 70 London Road, Twickenham, London, United Kingdom.

Peerless Pump, (317) 925-9661, 2005 Dr Martin Luther King Jr St, Indianapolis, IN 46202.

WDM Pumps, (800) 783-6756, 4501 5 86th East Ave, Tulsa, OK 74145.

Approved equivalent.

Cast-iron and bronze impellers comply with AWWA E101. Other available impellers are made of stainless steel and molded plastic but do not comply with AWWA E101.

* + - * 1. Standards: HI 2.1-2.2 and HI 2.3.
        2. Impeller Material: [**Stainless steel**] [**Carbon steel**] [**Bronze**].
        3. Pump Base: Cast iron or fabricated steel.
        4. Column Pipe: ASTM A53, Schedule 40, galvanized-steel pipe with threaded ends and cast-iron or steel threaded couplings.

If Project has more than one type or configuration of line-shaft well pump, identify and schedule multiple pumps below to match the Drawings.

* + - * 1. Capacities and Characteristics:

Capacity: <**Insert gpm**>.

Discharge Head: <**Insert psig**>.

Discharge Size: <**Insert NPS**>.

Speed: <**Insert rpm**>.

Motor Horsepower: <**Insert value**>.

Lift: <**Insert feet**>.

Pressure Rating: <**Insert psig**>.

Volts: <**Insert value**>.

Phases: <**Insert value**>.

Hertz: <**Insert value**>.

Full-Load Amperes: <**Insert value**>.

Minimum Circuit Ampacity: <**Insert value**>.

Maximum Overcurrent Protection: <**Insert amperage**>.

* + - 1. SUBMERSIBLE WELL PUMPS

Submersible pump in "Description" paragraph below may be used for any depth.

* + - * 1. Description: Submersible, vertical-turbine well pump.

Utilize link below to assist with pump manufacturer selection. Note that pump selection shall be by the Designer of Record and meet the requirements of the project.

* + - * 1. Manufacturers:

American Turbine, (509) 243-5387, 3692 Riverside Dr. Clarkston, WA 99403.

A.Y. McDonald Mfg. Co., (800) 292-2737, 4800 Chavenelle Road, Dubuque, IA 52002.

Crane Pumps & Systems, (937) 778-8947, 420 3rd St, Piqua, OH 45356.

Pentair, (763) 545-1730, 70 London Road, Twickenham, London, United Kingdom.

Peerless Pump, (317) 925-9661, 2005 Dr Martin Luther King Jr St, Indianapolis, IN 46202.

Webtrol, (800) 769-7867, 8417 New Hampshire Ave., St. Louis, MO 63123.

Wilo USA LLC., (888) 945-6872, 9550 W. Higgins Rd. #300, Rosemont, IL 60018.

Approved equivalent.

* + - * 1. Standards: HI 2.1-2.2 and HI 2.3.
        2. Impeller Material: [**Stainless steel**] [**Silicon bronze**].
        3. Motor: Capable of continuous operation under water, with protected submersible power cable.

Retain "Column Pipe" or "Discharge Piping" paragraph below.

* + - * 1. Column Pipe: ASTM A53, Schedule 40, galvanized-steel pipe with threaded ends and cast-iron or steel threaded couplings.
        2. Discharge Piping: ASTM D2239, SIDR Numbers 5.3, 7, or 9 PE pipe; made with PE compound number required to give pressure rating not less than [**160 psig**] [**200 psig**]. Include NSF listing mark "NSF pw."

Insert Fittings for PE Pipe: ASTM D2609, made of PA, PP, or PVC with serrated, male insert ends matching inside of pipe. Include bands or crimp rings.

If Project has more than one type or configuration of submersible well pump, identify and schedule multiple pumps below to match the Drawings.

* + - * 1. Capacities and Characteristics:

Capacity: <**Insert gpm**>.

Discharge Head: <**Insert psig**>.

Discharge Size: <**Insert NPS**>.

Speed: <**Insert rpm**>.

Motor Horsepower: <**Insert value**>.

Lift: <**Insert feet**>.

Pressure Rating: <**Insert psig**>.

Volts: <**Insert value**>.

Phases: <**Insert value**>.

Hertz: <**Insert value**>.

Full-Load Amperes: <**Insert value**>.

Minimum Circuit Ampacity: <**Insert value**>.

Maximum Overcurrent Protection: <**Insert amperage**>.

* + - 1. MOTORS

Default motor characteristics are specified in Section 220513 "Common Motor Requirements for Plumbing Equipment." If different characteristics are required, insert paragraphs in this article to suit Project.

* + - * 1. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 220513 - Common Motor Requirements for Plumbing Equipment.

Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in electrical Sections.

1. EXECUTION
   * + 1. PREPARATION
          1. Edit below depending on the availability of a Hydrogeological Report. Hydrogeological Report should be included as an Appendix to the Project Manual Hydrogeological Report: Review the findings of the Hydrogeological Report.
       2. INSTALLATION

Retain well construction method in first paragraph below that matches previous selections.

* + - * 1. Construct well using [**cable-tool**] [**rotary drilling**] [**reverse-rotary drilling**] [**driven**] method.
        2. Take samples of substrata formation at 10-foot intervals and at changes in formation throughout entire depth of each water supply well. Carefully preserve samples on-site in glass jars properly labeled for identification.

Retain first paragraph below if retaining rotary drilled or reverse-rotary drilled method in first paragraph above.

* + - * 1. Excavate for mud pit or provide aboveground structure, acceptable to authorities having jurisdiction, to allow settlement of cuttings and circulation of drill fluids back to well without discharging to on-site waterways.
        2. Enlarge pilot hole and install permanent casing, screen, and grout. Install first section of casing with hardened steel driving shoe of an OD slightly larger than casing couplings if threaded couplings are used.
        3. Set casing and liners round, plumb, and true to line.
        4. Join casing pipe as follows:

Ream ends of pipe and remove burrs.

Remove scale, slag, dirt, and debris from inside and outside casing before installation.

Retain first subparagraph below for steel casings.

Cut bevel in ends of casing pipe and make threaded joints.

Retain subparagraph below for ABS and PVC casings. Do not use ABS pipe for wells deeper than 100 feet.

Clean and make solvent-cemented joints.

Retain first two paragraphs below if rotary drilled or reverse-rotary drilled well is constructed. Revise first paragraph if another grout mix is required.

* + - * 1. Mix grout in proportions of 1 cu. ft. or a 94-lb sack of cement with 5 to 6 gal. of water. Bentonite clay may be added in amounts of 3 to 5 lb/cu. ft. for a 94-lb sack of cement. If bentonite clay is added, water may be increased to 6.5 gal./cu. ft. of cement.
        2. Place grout continuously, from bottom to top surface, to ensure filling of annular space in one operation. Do not perform other operations in well within 72 hours after grouting of casing. When quick-setting cement is used, this period may be reduced to 24 hours.

Retain first paragraph below if required.

* + - * 1. Provide permanent casing with temporary well cap. Install with top of casing 36 inches above finished grade.
        2. Develop wells to maximum yield per foot of drawdown.

Extract maximum practical quantity of sand, drill fluid, and other fine materials from water-bearing formation.

Avoid settlement and disturbance of strata above water-bearing formation.

Do not disturb sealing around well casings.

Continue developing wells until water contains no more than 2 ppm of sand by weight when pumped at maximum testing rate.

Retain first paragraph below if jet pumps are selected and well is less than 25 feet deep.

* + - * 1. Install jet well pumps with ejector in or attached to pump housing. Place check valve on suction line to prevent drainage of compression tank.

Retain first paragraph below if jet pumps are required and well is between 25 and 100 feet deep.

* + - * 1. Install jet well pumps and pressure and suction lines. Install ejector where pressure and suction lines connect above well screen. Install check valve in suction line, or install foot valve below ejector, to prevent drainage of compression tank.

Retain paragraph below if line-shaft or submersible well pumps are selected.

* + - * 1. Install [**line-shaft**] [**submersible**] well pumps according to HI 2.4 and provide access for periodic maintenance.

Before lowering permanent pump into well, lower a dummy pump that is slightly longer and wider than permanent pump to determine that permanent pump can be installed. Correct alignment problems.

Before lowering permanent pump into well, start pump to verify correct rotation.

Securely tighten discharge piping joints.

Retain first subparagraph below for line-shaft well pumps.

Locate line-shaft well pump near well bottom; locate motor above grade. Install driver plate to correctly align motor and pump.

Retain subparagraph below for submersible well pumps.

Connect motor to submersible pump and locate near well bottom.

Connect power cable while connection points are dry and undamaged.

Do not damage power cable during installation; use cable clamps that do not have sharp edges.

Install water-sealed surface plate that will support pump and piping.

* + - 1. CONNECTIONS

Coordinate piping installations and specialty arrangements with Drawings and with requirements specified in Section 221113 "Facility Water Distribution Piping." If Drawings are explicit enough, these requirements may be reduced or omitted.

* + - * 1. Piping installation requirements are specified in Section 221113 - Facility Water Distribution Piping. Drawings indicate general arrangement of piping, fittings, and specialties.

Connect piping between well pump and water piping.

If no well house is required, retain first subparagraph and one of two options below.

Connect water distribution system in trench to well pipe at pitless [**adapter**] [**unit**].

If well house is required, retain subparagraph below.

Connect building water distribution to well pipe inside well house.

* + - * 1. Ground equipment according to Section 260526 - Grounding and Bonding for Electrical Systems.
        2. Connect wiring according to Section 260519 - Low-Voltage Electrical Power Conductors and Cables.
      1. WELL ABANDONMENT

Retain one of two paragraphs in this article.

* + - * 1. Comply with AWWA A100 when abandoning water supply wells. Fill and seal holes and casings, and restore ground surface to finished grade.
        2. Follow well-abandonment procedures of the New York State Department of Health. Restore ground surface to finished grade.
      1. FIELD QUALITY CONTROL
         1. Test Preparation: Clean water supply wells of foreign substances. Swab casings using alkalis, if necessary, to remove foreign substances.

Retain "Testing Agency," "Manufacturer's Field Service," and "Perform the following tests and inspections" paragraphs below to identify who shall perform tests and inspections. If retaining second option in "Testing Agency" paragraph or if retaining "Manufacturer's Field Service" or "Perform the following tests and inspections" paragraph, retain "Field quality-control reports" paragraph in "Informational Submittals" Article.

* + - * 1. Testing Agency: [**State will engage**] a qualified testing agency to perform tests and inspections.

Retain "Manufacturer's Field Service" paragraph below to require a Company Service Advisor to perform tests and inspections.

* + - * 1. Manufacturer's Field Service: Engage a Company Service Advisor to test and inspect components, assemblies, and equipment installations, including connections.

Retain "Perform the following tests and inspections" paragraph below to require Contractor to perform tests and inspections.

* + - * 1. Perform the following tests and inspections [**with the assistance of a Company Service Advisor**]:

Plumbness and Alignment Testing: Comply with AWWA A100.

Furnish samples of water-bearing formation to testing laboratory and well-screen manufacturer for mechanical sieve analysis.

Prepare reports on static level of ground water, level of water for various pumping rates, and depth to water-bearing strata.

Performance Test Preparation: Start well pump and adjust controls and pressure setting. Replace damaged and malfunctioning controls and equipment.

Performance Testing: Conduct final pumping tests after wells have been constructed, cleaned, and tested for plumbness and alignment.

Arrange to conduct tests, with seven days' advance notice, after test pump and auxiliary equipment have been installed. Note water-level elevations referred to for each assigned datum in wells.

Provide discharge piping to conduct water to locations where disposal will not create a nuisance or endanger adjacent property. Comply with requirements of authorities having jurisdiction.

Provide and maintain equipment of adequate size and type for measuring flow of water, such as weir box, orifice, or water meter.

Measure elevation to water level in wells.

Perform two bailer or air-ejection tests to determine expected yield. Test at depths with sufficient quantity of water to satisfy desired yields.

Test Pump: Variable capacity test pump with capacity equal to maximum expected yields at pressure equal to drawdown in wells, plus losses in pump columns and discharge pipes.

Start and adjust test pumps and equipment to required pumping rates.

Revise maximum time intervals and minimum duration of pumping tests in first subparagraph below to suit Project.

Record readings of water levels in wells and pumping rates at [**30**] <**Insert number**>-minute maximum intervals throughout 24-hour minimum period.

Record maximum yields when drawdown is [**60 inches**] <**Insert dimension**> above top of suction screens after designated times.

Operate pumping units continuously for [**eight**] <**Insert number**> hours after maximum drawdown is reached.

Record returning water levels in wells and plot curves of well recovery rates.

Remove sand, stones, and other foreign materials that may become deposited in wells after completing final tests.

* + - * 1. Water supply well will be considered defective if it does not pass tests and inspections. Coordinate with Director’s Representative.
        2. Prepare test and inspection reports.
        3. Water Analysis Testing:

Retain one of two subparagraphs below.

[**State will engage**] a qualified testing agency to make bacteriological, physical, and chemical analyses of water from each finished well and report the results. Make analyses according to requirements of authorities having jurisdiction.

Analyze water sample from each finished well for bacteriological, physical, and chemical quality and report the results. Make analyses according to requirements of the New York State Department of Health.

* + - 1. CLEANING

Retain one of two paragraphs in this article.

* + - * 1. Disinfect water supply wells according to AWWA A100 and AWWA C654 before testing well pumps.
        2. Follow water supply well disinfection procedures required by the New York State Department of Health before testing well pumps.
      1. PROTECTION
         1. Water Quality Protection: Prevent well contamination, including undesirable physical and chemical characteristics.

Retain first paragraph below only if retaining rotary drilling method.

* + - * 1. Ensure that mud pit will not leak or overflow into streams or wetlands. When well is accepted, remove mud and solids in mud pit from Project site and restore site to finished grade.
        2. Provide casings, seals, sterilizing agents, and other materials to eliminate contamination; shut off contaminated water.
        3. Exercise care to prevent breakdown or collapse of strata overlaying that from which water is to be drawn.
        4. Protect water supply wells to prevent tampering and introducing foreign matter. Retain temporary well cap until installation is complete.

END OF SECTION 331113