

Brazos MDWCA  
Rio Arriba County, NM  
September 2019

## SECTION 33 21 00 GROUNDWATER SUPPLY WELL

**Formatted:** Left, Tab stops: 4.96", Left + 6.63", Right + 6.65", Right + Not at 6.5"

**Formatted:** Bottom: 0.88"

**Deleted:** ¶  
¶

**Formatted:** Heading 1, Centered, Indent: Left: 1.73", Right: 1.73", Space Before: 3.7 pt

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS/REFERENCES

The following documents will apply to this project.

- A. Project drawings prepared by a New Mexico licensed professional engineer and provided for bidding and construction purposes.
- B. American Water Works Association (AWWA)
  - 1. A100-06 Water Wells
  - 2. B100 Granular Filter Material
  - 3. C654 Disinfection of Wells
- C. ASTM
  - 1. F480-14: Standard Specification for Thermoplastic Well Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR), SCH 40 and SCH 80.
  - 2. D1784: Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
  - 3. D1785: Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
  - 4. C150: Standard Specification for Portland Cement
- D. New Mexico Environment Department Construction Programs Bureau
  - 1. Recommended Standards for Water Utilities, 2006
- E. New Mexico Office of the State Engineer
  - 1. Rules and Regulations for Well Driller Licensing, Well Drilling, and Construction Requirements
  - 2. Rules and Regulations Governing Well Driller Licensing, Construction Repair and Plugging of Wells (19.27.4 NMAC).
  - 3. The Use of Public Underground Waters for Household or Other Domestic use in Accordance with Section 72-12-1.1 NMSA (19.27.5 NMAC)
- F. NSF 61 Drinking Water System Components

#### 1.2 WELL PERMIT

- A. An exploratory well permit has been obtained by Brazos MDWCA from the Office of the State Engineer. The Contractor will be responsible for obtaining all other applicable permits and will be responsible to comply with any applicable Local, State, and Federal regulations.

#### 1.3 SUMMARY

On behalf of the Brazos Mutual Domestic Water Consumers Association, Martin and Martin Engineers, Inc., (hereafter, ENGINEER) requests bids from qualified drilling companies to furnish all plant, materials, fuel, labor, and expenses to drill, complete and test an EXPLORATORY WATER SUPPLY WELL for the utility. It is intended that the exploratory well will be equipped and integrated into the existing water supply system if tests of the well production and water quality are adequate for the intended purpose of the well.

Formatted: Left, Tab stops: 4.96", Left + 6.63", Right + 6.65", Right + Not at 6.5"

The projected depth to groundwater at the proposed drilling location is approximately 50 feet below land surface. It is anticipated that well will penetrate unconsolidated to semiconsolidated sand, silt, clay, gravel and boulders of Quaternary Alluvium, as well as sandstone and shale of the Triassic Chinle Formation and quartzite bedrock of the PreCambrian Kiowa Formation. However, it shall be the CONTRACTOR's sole responsibility to perform the necessary investigations to obtain adequate information for proper work preparation; selection of tools and materials; and drilling methodologies for completion of the well.

It is intended that the well will initially be drilled as a pilot hole to evaluate the types and water-bearing potential of penetrated rocks and that a decision to proceed with completing and testing the well or abandoning the well will be made by the BMDWCA and the Engineer upon reaching total depth and evaluation of logs and drilling data. In order to ensure that the final well is completed with a minimum of 50 feet of surface casing and annular seal, and depending upon the water bearing potential of earth materials penetrated below a depth of 50 feet, it is anticipated that the well will be drilled to a minimum depth of no less than 75 feet, or to a maximum depth of 400 feet.

Formatted: Indent: Left: 0.68"

It is preferable to complete the well using air-rotary techniques with minimum introduction of foreign fluids into the borehole and resultant formation damage and water production during drilling.

The drilling equipment used to complete the well shall be capable of advancing a minimum 12-inch-diameter borehole from the ground surface to a depth of 50 feet bgs and minimum 8-inch borehole from 50 feet to a maximum depth of 400 feet bgs. The drilling rig shall be capable of installing a minimum 5-inch Schedule 40 PVC flush joint threaded well casing and screen; annular materials; and centralizers to a depth of 400 feet bgs. The CONTRACTOR may suggest equivalent alternate materials but shall obtain prior approval from the ENGINEER.

Estimated quantities for drilling and well construction materials are listed on the attached "Bid Form for Construction Contract"; and final payment will be based upon actual quantities of footage drilled and materials installed. The CONTRACTOR will drill and complete the exploratory test well in accordance with these General Provisions and Technical Specifications. Drilling activities will be overseen by the ENGINEER. The ENGINEER will serve as Brazos MDWCA's representative, and is empowered by Brazos MDWCA to perform oversight of the work conducted by the CONTRACTOR, as well as to administer and enforce these General Provisions and Technical Specifications.

The work includes the furnishing of all labor, materials, supplies, equipment, tools, transportation, recommendations, testing, services, and appurtenances, unless hereinafter specifically excepted, necessary to mobilize, demobilize, drill, log, install, disinfect, test and clean-up a complete in place an **Exploratory Groundwater Supply Well**. All work shall be coordinated with the Engineer and the Owner's Representative.

All equipment and materials shall comply with NSF 61.

- A. This Section generally includes the following:
  - 1. Rotary drilled water supply wells.

- B. Related work:
  - 1. A water system improvements project is planned in the near future. The well drilling Contractor must coordinate work with the Owner's Representative.

#### 1.4 DEFINITIONS

- A. PA: Polyamide (nylon) plastic.
- B. PVC: Polyvinyl chloride plastic.
- C. PE: polyethylene plastic.
- D. DIP: Ductile iron pipe.

#### 1.5 PERFORMANCE REQUIREMENTS

- A. Minimum Tested Water Supply Well Performance Capacity: **20 gpm**
- B. The Contractor shall keep a log and progress record at the site readily available for inspection during construction of the pilot hole, well and well development, logging, testing and disinfection and copies of such shall be available to the District. The Contractor shall keep records providing the following information:
  - 1. A log of the formations drilled from surface to total depth showing each change information, sample locations, and rates of penetration.
  - 2. Development and test records shall be dated and time noted showing production rate, static water level, pumping level, drawdown, production of sand, and all other pertinent information concerning the method of development and test pumping.
  - 3. The final developed and completed exploratory well shall have water quality and bacteriological analyses as required by this specification and be acceptable to the New Mexico Environment Department Drinking Water Bureau.
- B. Cuttings samples shall be collected by the Contractor at intervals no greater than each 10 ft while drilling for the pilot hole; additional samples shall be collected at formation changes. Samples shall be collected from the discharge with an appropriate sample screen and immediately placed in oil-field type cloth sample bags. Each bag shall be labeled with permanent identification as follows:
  - 1. Well name and number
  - 2. Depth interval represented by the sample
  - 3. Date sample collected
- C. The Contractor shall be held responsible and payment will be withheld for damages to the well due to any act of omission, error, or faulty operation by the Contractor or the Contractor's employees or agents. Resulting repairs shall be completed by the Contractor to the satisfaction of the Owner, or a replacement well drilled at no additional cost to the Owner, and without claim against the Owner, Engineer, Project Representative, or agents.
- D. The Contractor shall be responsible for all health and safety at the site and shall ensure that all personnel working at the site have, and use, appropriate personal protective equipment, and that all appropriate safety devices and engineering controls are properly installed and functioning. Contractor shall comply with all applicable Local, State, and Federal safety rules and regulations.
- E. Contractor shall inspect the site for the presence of existing overhead and underground utilities

Formatted: Left, Tab stops: 4.96", Left + 6.63", Right + 6.65", Right + Not at 6.5"

prior to submitting a Bid. Contractor shall call New Mexico One Call, the Owner, and other appropriate entities to have utilities spotted prior to beginning any subsurface work. A safe distance shall be maintained from power lines.

- F. In the event that the Contractor does not comply with the technical specifications or any portion of the contract documents for this project, the Contractor will be issued a stop work order. Contractor will not be paid for any work, materials, supplies, stand-by time, rig-rate, per-diem, or any other item during the period for which the work stoppage order is in effect.
- G. No unnecessary delays or work stoppages will be allowed. The Contractor shall be held responsible, and payment will be withheld for damages to the well due to any act of omission, error, or faulty operation by the Contractor or the Contractor's employees or agents. Resulting repairs shall be completed by the Contractor to the satisfaction of the Owner, Engineer, and Project Representative, or a replacement well drilled by the Contractor at no additional cost to the Owner and without claim against the Owner, Engineer, Project Representative, or agents.

## 1.2 BASIS OF BID

- A. The Owner, Engineer, or Project Representative may order drilling to depths shallower or deeper than depths shown on the drawings or in the Basis of Bid. If the quantity of borehole drilled or quantity of materials actually utilized for well construction change, unit bid prices shall prevail. Minor variations in methods proposed herein, including but not limited to, running development tools or pumps to greater depths than proposed, drilling to depths of up to 15 percent greater than proposed, and installation of greater quantities of casing and annular materials than proposed shall be performed at the unit prices bid, and shall not be considered additional services beyond the scope of these specifications.
- B. Groundwater Supply Well: Install complete and functional exploratory groundwater supply well to a maximum depth of **400 ft**. Variations in quantities shown in the following Basis of Bid table will result in adjustment of the Contract Sum according to the Contractors bid unit prices.
  - a. Labor and equipment for water supply well installation, completion and abandonment, complete in place.
  - b. Furnishing and installing casing materials, grout, well screen, and sand packing materials in required diameter to comply with minimum performance requirements.
  - c. Furnishing and installing well pump, piping, and appurtenances.

Basis of Bid	
Total Well Depth	400 ft.
Pilot hole	400 ft.
9 in. Steel Surface Casing Depth	50 ft.
5 in. PVC Well Casing and Silt Leg	300 ft.
5 in. Hi Flow PVC Well Screen	100 ft.
4 in. Submersible Test Pump Depth with 1.5 in. drop pipe	375 ft.

1.3 UNIT PRICES

- A. Unit-Price Amounts: As indicated in the Bid Schedule and Contractor's bid.
- B. Measurement and Payment Procedures: Lump Sum, Payment within 30 days from Engineer and Owner approved invoice.
- C. Measurement Units for Water Supply Wells - Per linear foot of depth.

1.4 SUBMITTALS

- A. Bid Qualifications:
  - 1. Each bidder shall submit their NMOSE well driller license number.
  - 2. Each bidder shall submit well drilling qualifications for similar projects for the past 5 years.
  - 3. Each bidder shall submit a complete list of equipment that the Contractor proposes to use on the work, together with a description of the methods by which the Contractor proposes to drill, sample, construct, develop, and test pump the well. If the Contractor fails to submit, or if the equipment and proposed methods do not meet the Owner, Engineer, and Project Representative's approval, the Owner reserves the right to reject the bid as non-responsive.
- B. Product Data:
  - 1. Submit steel surface casing product information.
  - 2. Submit PVC well casing, screen and associated appurtenances product information.
- C. Shop Drawings: NA
- D. Documents required by the Office of the State Engineer.

1.5 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports, including the following:
  - 1. Well log.
  - 2. Pump test data.

1.6 CLOSEOUT SUBMITTALS

- A. Bacterial test results.
- B. Select Exploratory Well Drinking Water Standards Laboratory Analytical Report.

1.7 QUALITY ASSURANCE

- A. Well Driller Qualifications: The Contractor must be a licensed well driller in the State of New Mexico and shall perform the drilling work and construction of the well in accordance with these specifications and in accordance with AWWA A100-15 and the National Ground Water Association Water Well Construction Standard (ANSI/NGWA-01-14).
- B. An experienced water supply well driller licensed in the State of New Mexico with more than 5 years of experience performing similar types of projects.
- C. The Contractor shall employ only competent workers for the execution of the work and all such work shall be performed under the direct supervision of an experienced well driller, and pump technician satisfactory to the Owner and Engineer.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for

intended use.

- E. Comply with AWWA A100 for water supply wells.
- F. Laboratory analysis shall be performed by a State of New Mexico certified analytical laboratory.

#### 1.8 PROJECT CONDITIONS

- A. The site identified in the drawings is accessible for equipment and personnel. Contractor shall maintain proper distances from all existing overhead and underground utilities at all times.
- B. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
  - 1. Notify the Owner no fewer than seven days in advance of proposed interruption of water service.
  - 2. Do not proceed with interruption of water service without Owner's written permission.
  - 3. Provide temporary irrigation water at the locations indicated and agreed upon by the Owner.
- C. Well Drilling Water: Water for drilling will be furnished by the Contractor at his expense. The Contractor will be responsible for transporting or piping this water to drill site. If piping or hoses are required to be placed in roadways, such pipes or hoses shall be able to withstand existing vehicle traffic. Water may be available from the Owner. Contractor shall compensate Owner for metered use based on agreed upon unit cost for Owner supplied water.
- D. During well and pump testing, the Contractor is responsible for any temporary piping required for well discharge.

#### PART 2 - PRODUCTS

##### 2.1 DRILLING FLUID

- A. Air and/or air-foam are requested drilling fluids for this project. All drilling fluid and additives used shall conform to National Sanitary Foundation (NSF) Standard 60 and shall not result in any toxicity or promote bacterial growth or contamination. Other chemicals (disinfection agents, dispersants, or any other) used during well construction shall also conform to NSF Standard 60. If there is a conflict between the drilling fluid requirements for ease in drilling, and the drilling fluid requirements for protection of an aquifer, then the drilling fluid requirements for aquifer protection shall take precedence.

##### 2.2 WELL CASING AND SCREEN

- A. Schedule 40 PVC, 5-inch.
- B. All blank casing and well screen installed in each well shall be new, free of dents and cracks, and shall meet well depth requirements.
- C. The well screen will be accurately placed opposite the most favorable water-bearing bed as identified during pilot hole drilling. Centralizers shall be installed a minimum of every 50 ft. of depth. The screen-casing string shall be installed immediately after the hole has been drilled to the required depth and the Engineer, in consultation with the Brazos MDWCA directs the well to be completed, rather than abandoned.
- D. Blank casing shall be utilized to install a 10 ft. silt leg at the bottom of the well beneath the screen.

- E. Screen Material: Schedule 40 PVC, High Flow.
  - 1. Screen Couplings: Flush threaded
  - 2. Percent open area: 8.8% minimum for 0.040 in. slot openings Sch. 40 PVC.
- F. Centralizers: Install stainless steel well centralizers a minimum one every 50 ft. of depth.
- G. Pitless Adaptor: Fitting, of shape required to fit onto casing, with waterproof seals.
  - 1. PVC or 304 stainless steel
  - 2. Provide and install pitless unit complete with fittings and accessories required for the intended use.
- H. Well Seal: Secure completed exploratory well with tamper proof well cap and lock.

#### 2.3 ANNULAR GROUT SEAL

- A. Portland Neat Cement: ASTM C 150, Type II or NL Baroid Quik-Grout equivalent (avoids heat of hydration issues, allows single lift grout install seal).
- B. Water: Potable.
- C. Bentonite may be used as an additive, but must be in powdered form and cannot exceed 5 percent by volume of the cement, or cement and sand.
- D. Accelerators shall not be used.
- E. Potable water shall be used in preparing the cement grout slurry.
- F. When installing the grout seal around PVC blank casing, precautions shall be taken to prevent casing collapse.

#### 2.4 ANNULAR BENTONITE SEAL

An annular seal of at least 10 linear feet shall be placed in the annulus immediately above the sand filter pack to prevent grout intrusion into the sand filter pack. The annular seal shall consist of dry, ¼-inch-diameter bentonite pellets or an approved equivalent. The CONTRACTOR shall place the bentonite pellet seal material using a pump and tremie line, and the bentonite seal shall be hydrated in-place using fresh potable water.

#### 2.5 SCREEN PACKING MATERIALS

- A. When the screen and casing have been placed in their proper position, a 10/16 sand or appropriate gravel pack provided by Colorado Silica Sand, Inc., or approved equal, shall be placed in the annular space between the screen and the borehole from the bottom of the borehole up to a point 10 ft. above the top of the screen. For the sand/gravel pack, only clean, uniformly graded gravel composed predominantly of rounded, siliceous, non-calcareous particles shall be used. Sand/gravel packing shall be done using the tremie pipe method.

#### 2.6 SUBMERSIBLE WELL PUMP - **NA**

PART 3 - EXECUTION

A.1 PREPARATION

- A. The Contractor is responsible for the replacement of any damaged property sidewalk, road surfaces, fences, utilities, lawn, landscaping, or private property damaged by the Contractor or by any of their subcontractors during the drilling process.
- B. Well Site Security: The Contractor will, at all times, be responsible for the security and safety of their operations at the site.

A.2 INSTALLATION

- A. Prior to drilling the Contractor shall place plastic sheeting, minimum two X 6 mil thickness sheets, below all equipment, and the sheeting shall be bermed on all sides to contain any potential fluid leaks or spills. Fluid leaks and spills shall be removed daily, or more often as required and disposed of in accordance with State and Federal regulations at the Contractor's expense.
- B. Excavate mud pit or provide aboveground structure, as required.
- C. Rotary drill boring for pilot hole and well.
- D. Take samples and prepare log of substrata formations at 10-foot intervals and at changes in formation throughout entire depth of the pilot hole.
- E. Furnish and install steel surface casing.
- F. Furnish and install blank casing and slotted screen.
- G. Install well centralizers a minimum of every 50 ft.
- H. Install sand/gravel pack around screen using tremie pipe.
- I. Place bentonite seal above screen using tremie pipe.
- J. Grout from bentonite seal to 4 ft. below surface grade using tremie pipe.
- K. Complete well head a min. of 18 in. above grade and install sanitary seal.
- L. Provide and install temporary submersible test pump, drop pipe, electric cable, portable power supply, flow control and flow meter for well development and test pumping.
- M. The well will be developed by surge block, bailing and pumping, or by other methods approved in advance by the ENGINEER. The CONTRACTOR shall have the capability to purge water from the borehole using a large capacity bailer on a wire-line. Development will continue until produced water is free of turbidity and of relatively constant temperature and conductivity. Development will be complete as determined by the ENGINEER. The CONTRACTOR shall control and divert the development water to prevent spills, and may discharge the development water at on-site locations that are acceptable to the ENGINEER.
- N. Test pumping. . The CONTRACTOR will coordinate discharge requirements and locations with the Owner's Representative. A flow step test shall be conducted for 2 hours for each of a minimum of 3 progressively higher flows, culminating in the minimum design flow of 20 gallons per minute. After completion of the flow step test a constant flow pump test shall be conducted for a minimum of 24 hours and until pH and conductivity readings from the discharged water stabilize and give constant readings for at least 60 minutes.
- O. Coordinate with Owner's Representative for timing and access to produced water for water quality test sample collection and transmittal to laboratory for testing.
- P. Disinfect well and pump well until a 1.0 ppm chlorine residual remains.
- Q. Upon completion of well development and disinfection, provide access to Owner's Representative to collect bacteriological and water quality samples, as identified in this specification, and in accordance with NMED Drinking Water Bureau and State standards, and submit to State of New



Mexico certified laboratory for analysis.

- R. The Contractor shall be responsible for disposing of all debris and waste produced by the project and in such a manner that is acceptable to the Owner and in accordance with all State and Federal regulations. All costs incurred in connection the collection, removal and disposal of produced debris and waste shall be considered incidental to the Contract and shall be included in the contract price.

#### A.3 FIELD QUALITY CONTROL

- A. Test Preparation: Clean water supply wells of foreign substances. Swab casings using alkalis, if necessary, to remove foreign substances. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. Plumbness and alignment testing: Comply with AWWAA100.
2. Furnish samples of water-bearing formation to ENGINEER or Owner's Representative for testing laboratory and well-screen manufacturer for mechanical sieve analysis.
3. Prepare logs and reports for static level of ground water, level of water for various pumping rates, and depth to water-bearing strata.
4. Performance Test Preparation: Start well pump and adjust controls and pressure setting. Replace damaged and malfunctioning controls and equipment.

C. Water Analysis Testing:

1. Upon completion of well development, disinfecting and purging, the CONTRACTOR will provide access to the ENGINEER or Owner's representative for collection of water quality testing samples adequate for analysis of the following water quality parameters in accordance with 20.7.10 NMAC and NMED Drinking Water Bureau regulations:
  - Alkalinity
  - Total Arsenic
  - Bicarbonate
  - Calcium
  - Carbonate
  - Chloride
  - Coliforms, fecal and total
  - Fluoride
  - Hardness
  - Iron
  - Magnesium
  - Manganese
  - Nitrite/Nitrate
  - pH
  - Potassium
  - Silica
  - Sodium
  - Sulphate
  - Total Dissolved Solids
  - Turbidity

- Total Uranium

2. The OWNER shall engage a New Mexico state certified laboratory for the analytical testing. bacteriological, primary and secondary drinking water standards testing.

A.4 DISINFECTION

A. Disinfect exploratory groundwater supply well according to AWWA A100 and AWWA C654 before testing collecting analytical samples. Limit to maximum 200 ppm chlorination and immediately pump out to obtain a maximum 1.0 ppm residual chlorination.

A.5 PROTECTION

- A. Water Quality Protection: Prevent well contamination, including undesirable physical and chemical characteristics.
- B. 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.
- C. Provide casings, seals, sterilizing agents, and other materials to eliminate contamination; shut off contaminated water.
- D. Exercise care to prevent breakdown or collapse of strata overlaying that from which water is to be drawn.
- E. Protect water supply wells to prevent tampering and introducing foreign matter. Retain temporary well cap until installation is complete.

A.6 WARRANTY

The Contractor guarantees all workmanship and products for a period of one year after receipt of Substantial Completion.

END OF SECTION 33 21 00