Addendum Number 1
California American Water (CAWC)
Construction of ASR Wells 5 and 6
Request for Proposal

Addendum No. 1 Issued October 9, 2018

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1. The proposal schedule of events is revised as follows:
    a. **RFP Pre-Proposal meeting October 30, 2018, 10:00 AM PST**
    b. **Written questions due November 6, 2018, 4:00 PM PST**
    c. **CAWC distributes answers to written questions November 9, 2018, 5:00 PM PST**
    d. **Project Proposals due November 15, 2018, 3:00 PM PST**

Addendum Number 2
California American Water (CAWC)
Construction of ASR Wells 5 and 6
Request for Proposal

Addendum No. 2 Issued October 21, 2018

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1. Insert the attached 51 pages after page BF-6 of Attachment C (page 200 of the RFP document).

CALIFORNIA AMERICAN WATER
FITCH PARK ASR-5 AND ASR-6 WELLS

SECTION 100
TECHNICAL PROVISIONS

SECTION 101 - INTENT OF AND PURPOSE OF CONTRACT DOCUMENTS

The Contract Documents are intended to provide California American Water (hereinafter referred to as OWNER) with two complete ASR wells as specified. The wells will be identified as the Fitch Park ASR-5 and ASR-6 Wells (FP ASR-5 and ASR-6). The design production capacity of each of the wells is 3,000 gallons per minute with an injection capacity of 1,500 (gpm).

SECTION 102 - LOCATION

The project site is OWNER's Fitch Park ASR Facility located on former Fort Ord in Seaside, California. A map showing the project site location is presented on **Figure 1**. The temporary work areas for the project are two polygonal easements situated in an open space area between a residential neighborhood and General Jim Moore Blvd. and are shown on **Figure 2**.

Access to the sites is from General Jim Moore Blvd. It will be the responsibility of the Contractor to inspect the drilling sites and make provisions for physically moving onto and off the sites with personnel, equipment, supplies, and materials.

SECTION 103 - LOCAL CONDITIONS AND GEOLOGY

The Fitch Park ASR Facility site overlies the Seaside Groundwater Basin (SGB). The hydrogeology and hydrostratigraphy of the SGB has been characterized through various studies performed by the USGS and for the Monterey Peninsula Water Management District (MPWMD). As described, the SGB consists of a sedimentary sequence of water bearing materials that overlie the non-water-bearing Monterey Shale. The sedimentary materials that will be encountered by drilling at the site are assigned to three stratigraphic units - the Aromas Sand/Older Dunes, the Paso Robles Formation, and the underlying Santa Margarita Sandstone.

The upper unit consists of older dune sands and the Aromas Sand of Pleistocene age. These deposits are of minor importance in the basin in terms of water supply and are largely unsaturated. The middle unit consists of "continental deposits" of the Plio-Pleistocene age Paso Robles Formation. This Paso Robles Formation consists of interbedded sand, gravel, and clay, and has been found to be as much as 600 feet thick in some places. The Miocene age Santa Margarita Sandstone is the third and deepest aquifer unit. The Santa Margarita Sandstone aquifer consists of well-sorted, fine-to-coarse marine sand, attains thicknesses of up to 350 feet in the project area. The upper 200 to 250 feet of the Santa Margarita Sandstone in the project area consists of very clean sand, with little clay content. Clay content generally increases with depth and proximity to the underlying Monterey Formation. The Monterey Formation consists of consolidated, siliceous shale of Miocene age and is considered to be the base of the freshwater-bearing materials in the area.

Wells completed in the Santa Margarita Sandstone aquifer typically have relatively high yields, with production rates of up to 3,000 gallons per minute (gpm) or more and specific capacities on the order of 50 gallons per minute per foot of drawdown (gpm/ft). The desired

yield and specific capacities of the FP ASR-5 and ASR-6 wells are intended to meet or exceed the well yields that prevail in the area.

Many groundwater production wells, as well as four high-capacity ASR wells, have been drilled and completed within the SGB. In addition, an exploratory hole was drilled and completed as a monitoring well (FP MW-1) at the Fitch Park ASR Facility site in 2011. The locations of the existing FP MW-1 wells and the proposed locations of FP ASR-5 and ASR-6 are shown on **Figure 2**. Lithologic logs, geophysical logs, and well completion data for FP MW-1 are included in **Appendix A**. Review of the lithologic and geophysical logs from the recent drilling suggests the following stratigraphic delineation beneath the Fitch Park ASR Facility site:

Table 1. Stratigraphic Delineation

Formation Name	Depth (ft., bgs)	Thickness (ft., bgs)
Older Dune Sand/Aromas Sand (Qar)	0 to 290	290
Paso Robles Formation (QTp)	290 to 755	465
Santa Margarita Sandstone (Tsm)	755 to 1,140	385
Monterey Shale (Tm)	1,140 to 1,250+*	NA

* - Total depth of pilot hole.
NA - Not applicable – formation thickness greatly exceeds thickness penetrated by pilot drilling.

The Contractor is advised of the potential presence of a hard evaporate layer(s) (some investigators describe as a “fresh water limestone”) in the upper portion of the Santa Margarita Sandstone. Where present, this layer(s) has typically found to be on the order of 10 to 20 feet thick.

SECTION 104 - QUALIFICATIONS OF THE CONTRACTOR

Contractor shall hold a valid Class C-57 California Contractor's License. The Contractor shall have successfully drilled and installed at least five water wells within the last ten years utilizing the reverse-circulation method and polymeric drilling fluids that are of similar scope, depth, and diameter as the subject wells. At least one of the five wells must be an ASR or injection well. Concurrent with the bid submittal, the contractor will submit a list of wells he has constructed that measure at least 750 feet in depth, are of similar diameter and design as the subject wells, and were drilled using the same method and with the same drilling fluid (or similar) as specified for the subject wells. The list shall include the construction dates of the wells.

The well will be drilled by the **reverse-rotary** drilling method with drilling equipment of sufficient capacity to drill the holes required by these specifications to a depth of approximately 1,500 feet. All drilling equipment including mast and drawworks, air compressors, drilling fluid pumps, drill pipe, etc., must be of requisite size, sufficient capacity, and suitable condition to drill and set casing to the anticipated depths.

The drill rig utilized must have the ability to fully lift and land the anticipated casing loads without the use of float plugs or other similar methods. All drill pipe must utilize threaded flush or upset tool joints, or equal, as approved by the Owner's Technical Representative (OTR).

SECTION 105 - CONSTRUCTION SCHEDULE

Construction activities are anticipated to start in **4th Quarter 2018** following approval of the project.

Drilling efficiency and rapid advance rates both for the pilot hole and reamed borehole are critical to the successful completion of hydraulically efficient wells. Accordingly, the Contractor shall conduct construction operations on a 24-hour per day, 7-day per week basis, and without significant delays, starting with the commencement of pilot hole drilling (after setting the surface conductor casing) and continuing until the initial mechanical development of the well (airlift swabbing) is completed. Work must begin within thirty (30) consecutive calendar days of notice to proceed and all work must be completed within one hundred eighty (180) calendar days from the commencement of work activities.

A construction schedule *must* be submitted with the bid in order for the bid to be considered responsive.

SECTION 106 - OVERVIEW OF WORK TO BE DONE

SECTION 106.1 - REQUIREMENTS OF WORK

Work includes the furnishing of all materials, labor, equipment, fuel, tools, transportation, and services for drilling, construction, development, testing, and completion of the well as described in these specifications.

While the final design of the wells may change, the general work required applicable to **each** of the project wells include:

1) The Contractor shall obtain the necessary well drilling permits from the County of Monterey Environmental Health Department.
2) Move equipment on (and off) of the site.
3) Furnish and install a temporary sound barrier. The sound barrier shall be a minimum 24 feet high, approximately 500 lineal feet, with minimum sound transmission class (STC) rating of 25.
4) Drill and install a 36-inch outside diameter, steel conductor (surface) casing to a total depth of 55 feet, below ground surface (bgs). The borehole for the conductor casing shall have a minimum diameter of 46 inches. Place a cement-grout annular seal in the space between the conductor casing and the borehole wall, from the bottom of the conductor casing to the ground surface.
5) Drill a pilot borehole to a total depth of 1,120 feet bgs (total footage of 1,065 feet, starting at the base of the conductor casing of 55 feet, bgs). Pilot borehole shall have

a maximum diameter of 18 inches. Collect drill cuttings, and maintain a detailed pipe tally, drilling time log, drilling fluid log, and drill cuttings log.

6) Provide for, and assist with, a geophysical borehole log of the pilot bore using spontaneous potential (SP), resistivity, and natural gamma surveys of the pilot hole.

7) Ream pilot bore to a diameter of 32 inches to a total depth of 1,120 feet (total ream footage of 1,065 feet).

8) Install well casing and screen, in accordance with the following schedule: 1) 760 feet of 22-inch diameter, stainless steel (Type 304) blank casing; 2) 300 feet of 20-inch diameter, stainless steel (Type 304) wire-wrapped well screen; 3) 20 feet of 20-inch diameter, stainless steel (Type 304) blank casing (20-ft separation between two screened sections) and 4) 20 feet of 20-inch diameter, stainless steel (Type 304) blank cellar pipe with a bullnose.

9) Install 3-inch diameter, stainless steel (Type 304) gravel feed and sounding tubes to depths of approximately 750 feet bgs and 760 feet bgs, respectively.

10) Install gravel pack from the bottom of the reamed hole up to a depth of approximately 735 feet below ground surface.

11) Place approximately 5 feet of 'transition' sand above the top of the gravel pack.

12) Place approximately 730 feet of cement grout sanitary seal.

13) Develop the well by air-lifting/swabbing and pumping.

14) Provide and install temporary discharge piping for conveying water produced during development and test pumping to a surface spreading location.

15) Install and remove test pump for final development and well performance aquifer testing.

16) Provide for, and assist with, conducting velocity (spinner) survey during step production testing.

17) Provide for, and assist with, conducting an alignment survey of the completed well.

18) Provide for, and assist with, conducting an acceptance video survey of the completed well.

19) Disinfect the well.

20) Provide wellhead completion, pump foundation and permanent pump assembly.

21) Provide temporary discharge piping and energy dissipater(s) for development and test pumping discharges.

22) Clean up the sites.

23) Contain and legally dispose drilling fluids and cuttings offsite.

24) Fulfill all well drilling permit requirements, including the preparation and filing of a Department of Water Resources Well Completion Report.

The tentative casing schedules for the FP ASR-5 and ASR-6 wells is as follows:

Interval (depth in ft below ground surface)	Material
0 to 760	22-inch diameter, ½-inch wall thickness, TYPE 304 STAINLESS STEEL blank casing
760 to 880	20-inch diameter, TYPE 304 STAINLESS STEEL wire-wrapped well screen, with 0.050-inch slots
880 to 900	20-inch diameter, 3/8 wall thickness, TYPE 304 STAINLESS STEEL blank casing
900 to 1080	20-inch diameter, TYPE 304 STAINLESS STEEL wire-wrapped well screen, with 0.050-inch slots
1080 to 1100	20-inch diameter, 3/8 wall thickness, TYPE 304 STAINLESS STEEL blank cellar with bullnose

A depiction of the proposed FP ASR-5 and ASR-6 wells is presented on **Figure 3**. The Contractor is advised that the proposed design of the wells presented above is based on information available at the time of development of these specifications. Although no significant changes are anticipated, the final designs of the wells may be altered based on the conditions at the site as determined through the pilot hole drilling and the new geophysical surveys.

SECTION 107 - OTHER WORK REQUIRED

In addition to the work described in Section 106, the Contractor will be responsible for other work that will be required during the construction of the well.

The Contractor shall contact Underground Services Alert (USA) at least 3 days prior to any drilling or excavation at the site.

The Contractor shall prepare the site in a manner as to provide adequate work space, safe working conditions, site ingress/egress and sufficient containment and storage of drilling cuttings and fluids. The Contractor shall also implement, install, and maintain Best Management Practices (BMPs) for the control of nuisance water and storm water. The BMPs shall be adequate to prevent erosion and runoff of sediment laden water from the work site. During construction, washing of concrete trucks, equipment, or similar activities shall occur only in areas where wash water can be contained on site.

The Fitch Park ASR sites contain numerous trees and shrubs that may need to be removed or trimmed in order to provide sufficient unobstructed space for equipment and materials. Prior to Contractor mobilization, OWNER will retain an arborist to trim or remove trees and/or shrubs, and to identify which plant species require protection during project activities. If required, OWNER will install protective fencing around sensitive plants or trees. It shall be the Contractor's responsibility to avoid protected areas and maintain the protective fencing during the course of the project.

The Contractor shall arrange for the containment and legal disposal of all drilling fluids including fluids displaced during well construction, and fluids produced during the initial stages of well development. The Contactor shall also arrange for the containment and legal disposal of all drill cuttings.

The Contractor shall convey all water produced from the well during well development and testing through closed pipe to a surface spreading location. Pedestrian and vehicle crossings shall be installed where appropriate, and as directed by the OTR.

The Contractor shall take all possible measures to reduce noise impacts to proximate residences as provided in more detail in Section 202.

SECTION 108 - SERVICES PROVIDED BY OWNER

Prior to Contractor mobilization, OWNER will perform preliminary site preparation activities, including the following:

- Delineate temporary construction easement boundaries
- Stake well locations
- Remove trees from the well construction work areas and provide protection for sensitive plants or trees remaining within the temporary construction easement boundaries
- Perform preliminary site grading and leveling of the well construction work areas

Upon completion of the geophysical survey, the OTR shall confirm the final well design for the Contractor. This shall include total casing depth and well screen placement, gravel pack placement, and the depth of the annular seal.

OWNER will conduct an active public information effort to keep neighbors informed of project status. Neighbors will be provided telephone numbers (24-hour) for contacting OWNER staff and/or the OTR during the course of the project, and OWNER will address neighborhood concerns.

SECTION 109 - WATER SUPPLY FOR CONSTRUCTION

Water supply for well drilling and construction will be available from OWNER-provided potable water connection located within approximately 500 feet of either well. It shall be the Contractor's responsibility to supply all hoses and fittings to convey water from the connection point to the point of use. The Contractor shall also install pedestrian crossings where hoses/or piping transect are laid across public sidewalks. **The Contractor shall obtain a temporary water supply construction meter from OWNER and be responsible for the costs of water supply for construction.**

SECTION 110 – STORM WATER POLLUTION PREVENTION PLAN

This item shall consist of preparation, implementation and compliance of a storm water pollution prevention plan (SWPPP). The work under this section covers full compliance of National Pollution Discharge Elimination System (NPDES) and implementing a Storm Water Pollution Prevention Plan (SWPPP) during the construction period of this project. The work covered in this section covers all labor, materials, tool, equipment and incidentals necessary to provide full compliance with the stated objectives

Contractor shall submit to the OTR a completed SWPPP prior to beginning construction. The SWPPP shall consist of a document identifying the storm water pollution control categories, and construction water monitoring, treatment and disposals methods that are applicable to the project, and the selected pollution control measures that will be utilized during construction activities, a pre- and post-storm action plan, and drawings and/or plans showing locations of all measures proposed to be taken to prevent or reduce storm water pollution.

The SWPPP shall utilize the California Stormwater Quality Association (CASQA) stormwater Best Management Practice Handbook: Construction (January 2003). The plan shall also utilize the practices recommended in the "Caltrans Storm Water Quality Handbook, Construction Site Best Management Practices Manual" (dated Nov. 2000). If construction will occur between November 1 and April 15 (considered as the rainy season), the Best Management Practices (BMPs) implemented shall include but not be limited to those appropriate for wet weather conditions.

All stormwater pollution prevention measures shall be in accordance with the submitted SWPPP. In the event circumstances during the course of construction require changes to the original SWPPP, a revised plan shall be promptly submitted to the OTR in each instance, and the SWPPP shall be amended to reflect the changes. The SWPPP, including amendments, shall be kept on site with the Contractor at all times.

No responsibility shall accrue to OWNER as a result of the plan or as a result of knowledge of the plan. The Contractor shall monitor, install and maintain temporary erosion and sediment control devices to prevent storm water pollution draining into natural streams and existing storm drain systems. Failure to install and maintain effective BMP's throughout the duration of the project will result in withholding payment and/or suspending all work on the project until effective BMP's are implemented. The Contractor specifically agrees that any penalties assessed to OWNER by regulatory agencies due to the Contractor's inability to meet storm water pollution permit requirements will be deducted from the contract.

All work installed by the Contractor in connection with the SWPPP, but not specified to become a permanent part of the project, shall be removed and the site restored in so far as practical to its original condition prior to completion of construction or when directed by the OTR.

SECTION 111 – TRAFFIC CONTROL

It is the Contractor's responsibility to meet all ordinances regarding traffic and traffic control during all drilling, testing, well installation, and development operations. The well sites are located on the east side of General Jim Moore Blvd., a well-travelled surface road. The Contractor will be responsible for coordinating with the Presidio of Monterey for any and all traffic control actions, including developing and obtaining approval of a Traffic Control Plan, that may be required as part of the drilling, testing, well installation, and development program. The Contractor will be required to provide any and all traffic control equipment and personnel necessary for meeting a preapproved Traffic Control Plan and managing traffic at its own cost.

CALIFORNIA AMERICAN WATER
FITCH PARK ASR-5 AND ASR-6 WELLS

SECTION 200
CONSTRUCTION MATERIALS AND METHODS

SECTION 201 - MOBILIZATION

201 - MOBILIZATION BID ITEM NO. 1

SCOPE OF WORK

Mobilization shall consist of all preparatory work and materials necessary for construction operations, including, but not limited to, those necessary for the movement of personnel, equipment, supplies, and incidentals to the project site; control of water; site leveling; and all other facilities necessary for work on the project and for all other work and operations which must be performed or cost incurred prior to beginning work on the various Contract items on the project site. The project location and the site layouts are shown on **Figures 1 and 2**, respectively.

The Contractor shall provide a complete drilling unit, all tools, accessories, power, fuel, materials, supplies, lighting, and other equipment and experienced personnel necessary to conduct efficient drilling operations. The drilling unit shall be in good condition and of such capacity as to drill the hole and complete a well as required by these Specifications to a depth of approximately 1,500 feet.

Lighting Control. The project site is located near a residential neighborhood. In order to limit lighting impacts to nearby residences during night-time operations, the Contractor shall take any and all measures necessary to prevent lighting from shining outside the sound barrier perimeter (sound barrier described in Section 202 – Noise Control).

Tracking of Dirt and Debris on City Roadways. The Contractor shall provide and install Type 1 Stabilized Construction Site Entrance / Exits for each site in accordance with California Department of Transportation, or approved equal, to prevent the tracking of dirt and debris onto City roadways.

PLACEMENT, TESTING, SUBMITTALS, AND MEASUREMENT

Not applicable.

PAYMENT

Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all work required for mobilization shall be included in the lump sum price bid for "Mobilization", Bid Item No. 1. **The bid price for mobilization shall not exceed 10% of the total bid amount.**

SECTION 202 - NOISE CONTROL

202- NOISE CONTROL, BID ITEM NO. 2

SCOPE OF WORK

The reduction of noise pollution shall consist of doing all work necessary to design, furnish, install, maintain, and remove a temporary sound attenuation barrier ("soundwall") for each well. The sound barriers shall be of a total length of approximately 500 feet and fully enclose each work area and protect adjacent residences from direct equipment noise impacts and be configured generally as shown on **Figure 2**. The final design and placement of the sound barrier shall be subject to the approval of the OTR.

The reduction of noise pollution shall also consist of providing construction equipment and performing construction activities in a manner that minimizes noise generation and conforms to these Specifications. It shall be the Contractor's responsibility to keep noise pollution due to construction activities as low as possible. Each internal combustion engine, used for any purpose on the job or related to the job, shall be equipped with a residential grade muffler to minimize noise emission. No internal combustion engine shall be operated on the project without said muffler. In no case shall noise levels produced by the Contractor exceed the following limits:

A) Individual piece of equipment 85 decibels (dBA) as measured within the soundwall and at a distance of 100 feet.

B) 60 decibels (dBA) as measured outside the soundwall and at a distance of 200 feet from the wellhead.

Night-Time Drilling Operations. Night-time drilling operations shall be conducted in a manner to reduce noise peaks and avoid rapid changes in noise levels to the extent practical. All drilling personnel shall be advised to avoid or minimize noise generation wherever possible. All deliveries of pipe and other materials and supplies, and all removal of debris, drilling cuttings, drilling fluids, equipment, materials, and supplies from the well site shall take place during day-time hours.

MATERIALS

The engineered soundwall shall utilize a sound absorption system with a minimum Sound Transmission Class rating (STC) of 25.

PLACEMENT

The contractor shall, prior to mobilization of drilling equipment on each site, construct an engineered temporary soundwall that shall enclose all drilling and construction equipment on all sides of the sites. The soundwall shall be self-supporting and at least 24 feet high and shall protect nearby residences from direct equipment noise. Soundwall components shall not be

driven into the ground by impact. The Contractor shall pothole the soundwall post hole locations prior to installation to ensure no underground utilities will be impacted. The soundwall shall be engineered to reduce noise levels to the maximum extent possible, and shall be designed in accordance with UBC standards to withstand seismic (Zone 4) and wind forces (Exposure C, Importance Factor 1.0). The total length of the sound barrier shall be approximately 500 feet and generally configured to protect nearby residences from direct equipment noise impacts. A reduced length may be allowed, subject to prior approval by the OTR, provided that the soundwall complies with all other requirements specified herein. A length of 500 feet for each site shall be used for bidding purposes. The barriers shall be in place and operational throughout drilling, well development, and well testing operations of each well. In addition to the soundwall, the Contractor shall plan to have available at all times during the project acoustical blankets or other sound control material for miscellaneous sound control as needed and as determined to be necessary by OWNER and/or the OTR. The Contractor shall comply with requests by OWNER and the OTR to implement any additional sound control measures deemed necessary.

TESTING

Sound level emissions will be measured in dBA. The OTR will take periodic sound level measurements during the construction process. A stop work order will be issued if noise measurement exceeds the levels specified above. The OTR shall make the final determination of the measured exceedances of noise requirements stated in these specifications.

SUBMITTALS

The soundwall shall be designed by a qualified, licensed structural or civil engineer and shall bear the stamp of a California Registered Civil or Structural Licensed Engineer who has performed or reviewed the structural aspects of the soundwall design (i.e., UBC seismic and wind load compliance per above). **The name and license number of this Engineer must be submitted with the bid.** Prior to soundwall installation, the Contractor shall submit for review by the Engineer the proposed soundwall layout, design, calculations, and installation plan. The design shall include STC rating of soundwall material to ensure that the requirements of these Specifications are met prior to the actual installation. The submittal shall also include structural plans and calculations signed and sealed by the California Registered Civil or Structural Engineer detailing the installation of the soundwall and demonstrating conformance to seismic and wind load requirements as specified under “Placement” above.

The Contractor shall be responsible for obtaining and submitting a building permit from the Presidio of Monterey for the temporary soundwall, if required

PAYMENT

Payment for the Contractor's materials, equipment, and labor for the reduction of noise pollution shall be included in the unit price bid per linear foot price for “Noise Control/Sound Barrier”, Bid Item No. 2.

SECTION 203 - CONDUCTOR (SURFACE) CASING

203 - CONDUCTOR (SURFACE) CASING, BID ITEM NO. 3

SCOPE

The Contractor shall furnish all equipment, material, and work necessary to install the surface conductor casing as shown on the Drawings and specified herein. Prior to drilling of the pilot hole, the Contractor shall bore a 42-inch-minimum-diameter hole from ground surface to a depth of 55 feet bgs, or as directed by the OTR, in which a surface conductor casing shall be installed.

MATERIALS

The conductor casing shall be a minimum 36 inches outside-diameter steel pipe having a wall thickness of not less than 0.375-inch (3/8-inch) and a below ground length of not less than 55 feet. Conductor casing shall be manufactured in accordance with ASTM Designation A-139, Grade B, without copper. All joints in the conductor casing shall be securely welded and shall be watertight.

Cement grout shall be composed of not more than 3 cubic feet of sand and 1 cubic foot (one sack) of Portland cement to 5 to 7 gallons (0.67 to 0.90 cubic feet) of clean water. This is typically considered to be a 10-sack Portland cement sand slurry mix when ordered from batching plants. Bentonite, to make the mix more fluid and reduce shrinkage, may be used to a total of 5 percent (5%) of the volume of the cement. If 5 percent bentonite is used, water content can be increased to 8.2 gallons per sack of cement.

PLACEMENT

Prior to drilling the conductor casing holes, the Contractor shall pothole the hole locations prior to installation to ensure no underground utilities will be impacted. During placement of the conductor casing, field joints shall be either collared or plain-end, and welded together. Centering guides shall be welded to the conductor casing with a minimum of two sets of guides (one near the bottom and one near the top). Each set will consist of three guides equally spaced circumferentially.

After the conductor casing has been installed, cement grout shall then be injected in the annular space between the inner casing and the borehole from bottom to top by means of a tremie pipe. Cement grout material shall be placed by the positive displacement pumping method in one continuous operation. Upon completion of cementing, concrete shall be visible above the surface of the ground outside the conductor casing. After cementing operations are completed, the concrete shall be left undisturbed for a period of not less than 12 hours before drilling is resumed.

MEASUREMENT AND PAYMENT

Full compensation for doing all work and furnishing all materials necessary to manufacture, deliver, and install the 36-inch surface conductor casing as specified shall be included in the unit bid price per linear foot for "Conductor (Surface) Casing" - Bid Item No. 3.

SECTION 204 - PILOT BORE DRILLING

204 - PILOT BORING DRILLING, BID ITEM NO. 4

SCOPE

The Contractor shall furnish and provide all work, equipment, and materials necessary to complete the drilling of a maximum 18-inch-diameter pilot bore at the well site to a depth of approximately 1,120 feet below ground surface.

MATERIALS

The Contractor must provide a description of the drilling method and fluids to be used concurrently with the submittal of his bid. The proposed drilling fluid program must include information regarding the types of fluid to be used, intended drilling fluid weights, viscosities, sand and solids contents, water loss control, and the name of the drilling fluid supplier. **Drilling with clear water alone will not be permitted**.

Fresh water shall be used to make up drilling fluids. The drilling fluid shall possess such characteristics as are required to adequately maintain the walls of the hole to prevent caving of the hole as drilling progresses and to permit recovery of representative samples of cuttings. The drilling fluid shall possess such characteristics that it can be readily removed from the hole during the placement of the gravel pack and during development of the well. The drilling fluid shall be a polymer system such as Poly-Bore, Aquapak, HEC, Drispack, Duel-Vis, and if necessary, linked with an adequate amount of bentonite to form an engineered fluid system, providing the properties specified below can be maintained to the satisfaction of the OTR. The Contractor is advised that excessive water loss can lead to swelling, loss of shear strength, substantial caving, and hole stability problems. The drilling fluid to be utilized shall contain properties to inhibit these conditions.

PLACEMENT

The well shall be drilled by the reverse-rotary drilling method. Prior to drilling the pilot hole, the borehole shall be ‘center-punched’ a minimum of 6 feet below the conductor casing with a stepped-bit reamer with a lead bit size of the pilot hole bit, and progressively larger diameter bits up to a 32-inch diameter.

Proper control of the drilling fluid must be maintained to the satisfaction of the OTR, and the Contractor may be required, at his own expense, to retain or employ an experienced, qualified Mud Engineer, acceptable to the OTR, who may be required by the OTR to be present on the job to supervise and maintain drilling fluid characteristics to the satisfaction of the OTR.

Excavation of pits on-site for drilling fluids will not be allowed, and surface containment (i.e., tanks and/or bins) of drilling fluids will be required. Contractor is advised that cuttings removed from tanks will need to be stored and contained on-site. Contactor may choose to

utilize “low-boy” bins for cuttings storage. Upon completion of drilling operations and well construction, all fluids and cuttings shall be removed from the site and disposed of as provided in Section 220.

For polymeric fluid systems without mechanical separation, the Contractor must have a minimum of two separate tanks connected in series and internally baffled to effectively settle and remove solids from the fluid prior to recirculation down the borehole. The tanks shall have a minimum combined capacity to provide adequate retention time of the fluid at the surface to allow effective settling of solids. The Contractor shall maintain tank capacity throughout the drilling process by routinely removing cuttings from the settling tanks. The Contractor shall submit for review and approval of the OTR the layout and configuration of the fluid system.

It is the Contractor’s sole responsibility to ensure that the sizing and configuration of the fluid system and settling tanks are adequate to meet the drilling fluid properties outlined below. If drilling fluid properties as outlined below are not met, the Contractor will be issued a warning of noncompliance by the OTR. Failure to meet the specified conditions may result in the suspension of further drilling until fluid properties are brought within specifications and tank capacity and configuration is corrected to the satisfaction of the OTR.

The methods and materials that the Contractor would utilize in the event of hole stability problems and/or loss of circulation must be approved by the OTR. Appropriate materials to address such contingencies shall be maintained on-site per recommendations of the Mud Engineer. In no case shall materials be added to the drilling fluid system or drill hole without prior approval of such materials by the OTR. Addition of unapproved materials to the drill hole or fluid system may be cause for rejection of the well.

The Contractor must provide at the drilling site at all times Standard API measurement devices in proper working order to determine the following drilling fluid properties:

1) Drilling fluid weight
2) Drilling fluid viscosity
3) Drilling fluid sand content
4) 30-minute water loss/filter cake (if bentonite added)

The above properties of the drilling fluid entering the mud pump or leaving the circulation tank must be recorded by the contractor at a minimum of 4-hour intervals. The OTR may also periodically measure drilling fluid properties. The drilling fluid shall have the following properties in accordance with API Code RP 13B (or recent modification) "Recommended Standard Procedures for Testing Drilling Fluids."

For **polymer-based** fluid systems, the following properties shall be maintained.

1. Weight - a maximum of 9.0 pounds per gallon during all aspects of drilling.
2. Marsh Funnel Viscosity – a minimum of 32 seconds during all aspects of drilling (no maximum).

3. Sand Content - a maximum of one percent by volume during all aspects of drilling.
4. Water Loss (if bentonite added) – maximum of 20 cc during pilot hole drilling and 15 cc during reaming. Wall cake thickness shall be no greater than 3/32-inch at all times.

The Contractor must keep records providing the following information during pilot hole drilling:

1. A log of drill bit, stabilizer, collar, and drill pipe lengths (i.e., a “pipe tally”)
2. A log of drilling bit types and depths at which drill bit changes are made.
3. A log of the cuttings, providing the depths and descriptions of the earth materials encountered during the pilot boring. The Contractor shall collect cutting samples at 10-foot intervals during the drilling of the pilot boring. Samples shall be placed in "zip-lock" plastic bags and labeled with well name, sample depth interval, and date.

All measurements for depths shall be referenced to existing ground surface at the well site. All drilling records shall be delivered to the OTR upon completion of the well.

Upon completion of the pilot bore, a geophysical log of the bore hole will be conducted. The geophysical log will be used to develop the final design elements of the well. The OTR may authorize additional pilot boring upon review of the geophysical log. The geophysical logging is described in Section 205.

SUBMITTALS

The Contractor shall provide a detailed description of the drilling method and fluids to be used concurrently with the submittal of his bid. This submittal must include information regarding the types of fluid to be used, intended drilling fluid weights, viscosities, sand and solids contents, water loss control, and the name of the supplier. **The name and qualifications of the Mud Engineer the Contractor intends to use, if required, must also be submitted with the bid.** Failure to submit this information may constitute grounds for rejection of the bid.

MEASUREMENT AND PAYMENT

Full compensation for doing all work and furnishing all labor, materials, and tools necessary to complete 1,065 feet of pilot bore drilling to a depth of 1,120 feet bgs as specified shall be included in the unit price bid per linear foot for “Pilot Bore Drilling” - Bid Item No. 4.

SECTION 205 - GEOPHYSICAL LOGGING

205 - GEOPHYSICAL LOGGING - BID ITEM NO. 5

SCOPE

The Contractor shall furnish all equipment, materials, and work necessary to perform geophysical logs in the pilot bores as specified herein. The geophysical logs to be performed include spontaneous potential, resistivity, point resistance, and natural gamma surveys.

MATERIALS

Not applicable.

PLACEMENT

The Contractor shall furnish services for geophysically logging the pilot hole. Borehole geophysical logs, consisting of spontaneous potential, 16- and 64-inch resistivity surveys, single point resistance, and a natural gamma survey, all in API format, shall be made of the pilot bore by the Contractor as directed by the OTR. Standby time will not be paid for additional cleaning and conditioning of the hole to that may be required to allow logging operations to proceed.

SUBMITTALS

The Contractor shall provide four field and six final copies of the geophysical log. In addition, the geophysical log shall be provided to the OTR via CD or portable memory drive in a Microsoft Excel compatible format and a digital image (PDF) format.

TESTING

If the logging probe fails to descend to the desired depth, the Contractor, at his own expense, shall condition the hole and permit the logging probe to descend to the bottom of the hole.

MEASUREMENT

Not applicable.

PAYMENT

Full compensation for all labor, tools, equipment and insurance, and doing all work necessary and incidental to complete the task of Geophysical Logging, including standby time as specified shall be included in the lump sum price for “Geophysical Logging” - Bid Item No. 5.

SECTION 206 - REAMING PILOT BORES

206 - REAMING PILOT BORE - BID ITEM NO. 6

SCOPE

The Contractor shall furnish all equipment, materials, and work necessary to ream the pilot bores as shown on the Drawings and as specified herein.

MATERIALS

Not applicable.

PLACEMENT

After completion of the geophysical log and final design by the OTR, the pilot bores will be reamed with a 32-inch-diameter bit to a depth determined by the OTR. In order to limit formation damage, reaming shall be initiated after a firm delivery date for the casing, screen, gravel pack, etc., has been established, and shall be timed (to the extent possible) so that reaming will be completed no sooner than all materials to construct the well have arrived on site. All drilling and drilling fluid requirements specified in Section 204 shall be maintained throughout pilot hole reaming. Upon completion of the pilot hole reaming, a caliper survey will be performed as specified in Section 207. The Contractor is also reminded that once initiated, reaming shall continue on a continuous 24-hour per day, 7-day per week basis without interruption.

TESTING

All drilling and drilling fluid requirements specified in Section 204 shall be tested and maintained throughout pilot hole reaming.

SUBMITTALS

Not applicable.

MEASUREMENT

For the purpose of payment for reaming the pilot hole to the specified diameters shall be made on a per linear-foot basis.

PAYMENT

Full compensation for all equipment, materials, and work necessary to ream 1,065 feet of pilot bore to a depth of 1,120 feet bgs as specified shall be included in the unit price bid per linear-foot for "Reaming Pilot Bore" - Bid Item No. 6.

SECTION 207 - CALIPER SURVEYS

207 - CALIPER SURVEY - BID ITEM NO. 7

SCOPE

Upon completion of the final reams, caliper surveys shall be performed to assess the condition of the boreholes and calculate the volumes of cement and gravel pack required for well completion.

MATERIALS

Not Applicable.

PLACEMENT

The Contractor shall furnish professional logging services for the caliper survey of the borehole. The caliper tool must be of sufficient arm capacity to have the ability to measure borehole diameters to 48 inches for the entire length of the reamed borehole.

SUBMITTALS

The Contractor shall provide four field and six final copies of the caliper survey log. In addition, the log shall be provided to the OTR via CD or portable memory drive in a Microsoft Excel compatible format and a digital image (PDF) format. The logging service shall also provide to the OTR calculations for the required volumes of gravel pack and cement based on the results of the caliper log.

TESTING

If the logging probe fails to descend to the desired depth, the Contractor, at his own expense, shall condition the hole and permit the logging probe to descend to the bottom of the hole. OWNER may reject the well if the caliper log indicates a zone of overbreakage or sloughing, which would result in placement of gravel pack at thicknesses greater than 12-inches within the screened interval.

MEASUREMENT AND PAYMENT

Full compensation of all labor, tools, equipment, and standby time to complete the task of Caliper Survey as specified shall be included in the lump sum price for "Caliper Survey" - Bid Item No. 7.

SECTION 208 - WELL CASINGS AND SCREENS

208 - WELL CASINGS AND SCREENS - BID ITEM NOS. 8.1 THROUGH 8.7

SCOPE

The Contractor shall furnish all materials and work necessary to manufacture, deliver, and install well casing, reducers, screens, cellar pipes and caps, tremie pipes and sounding pipes as shown on the drawings and in accordance with these Specifications.

Quantity (Linear Feet)	Item	Bid Item No.
760	22-INCH-DIAMETER, TYPE 304 STAINLESS STEEL BLANK CASING	8.1
300	20-INCH-DIAMETER, TYPE 304 STAINLESS STEEL WIRE-WRAP WELL SCREEN, 0.050-INCH SLOTS	8.2
20	20-INCH-DIAMETER, TYPE 304 STAINLESS STEEL BLANK CASING	8.3
20	20-INCH-DIAMETER, TYPE 304 STAINLESS STEEL BLANK CELLAR WITH BULLNOSE	8.4
750	3-INCH-DIAMETER, STAINLESS STEEL PERMANENT GRAVEL TUBE	8.5
760	3-INCH-DIAMETER, STAINLESS STEEL PERMANENT SOUNDING TUBE	8.6
3	3-INCH-DIAMETER, TYPE 304 STAINLESS STEEL CASING VENT PIPE	8.7

MATERIALS

22-Inch-Inside-Diameter Stainless Steel Blank Well Casing. The 22-inch diameter blank casing shall be of TYPE 304 stainless steel construction, in accordance with ASTM A-312 or A-778, with minimum 0.5-inch (1/2-inch) wall thickness.

20-Inch-Nominal-Diameter Stainless Steel Wire Wrapped Well Screen. Well screen shall be 20-inch-nominal-diameter stainless steel, TYPE 304. Screen opening width shall be 0.050-inch. The well screen shall be of the continuous slot, welded, wire-wrapped design, and of construction to provide sufficient tensile and collapse strength. Vertical rods shall be 0.25-inch diameter and consist of 84 rods circumferentially (minimum). For the No. 50 slot screen (0.050-inch), the minimum open area requirement is 155 square inches per linear foot. The tolerance for the final slot size selected shall be ±0.005 inches. It is the Contractor's sole

responsibility to ensure the well screen has sufficient tensile and collapse strength to be assembled, landed, and installed without damage to casing, screen, or borehole.

20-Inch-Nominal-Diameter Stainless Steel Blank Well Casing. The 20-inch diameter blank casing shall be of TYPE 304 stainless steel construction, in accordance with ASTM A-312 or A-778, with minimum 0.375-inch (3/8-inch) wall thickness.

20-Inch-Nominal Diameter Stainless Steel Cellar Pipe and Cap. The stainless steel cellar pipe shall be 20-inch-nominal-diameter in size and 20 feet in length, and manufactured of TYPE 304 stainless steel pipe in accordance with ASTM standard A-312 or A-778. The wall thickness shall be minimum 0.375-inches (3/8-inches). The bottom of the well casing shall be fitted with a bullnose plug welded in place.

3-Inch-Inside-Diameter Stainless Steel Gravel Feed Tube. A permanent gravel tremie pipe shall be installed. The tremie pipe will be manufactured of TYPE 304 stainless steel pipe in accordance with ASTM standard A-312 or A-778, and extend to a depth of approximately 750 feet bgs, as shown on Figure 3.

3-Inch-Inside-Diameter Stainless Steel Sounding Tube. The sounding tube shall consist of 3-inch-inside-diameter, TYPE 304 stainless steel pipe in accordance with ASTM standard A-312 or A-778 and extend to a depth of approximately 760 feet bgs, as shown on **Figure 3**.

3-Inch-Inside-Diameter Stainless Steel Chlorination Access Pipe. A permanent access pipe shall be installed. The access pipe will be constructed of 3-inch-inside-diameter, TYPE 304 stainless steel pipe in accordance with ASTM standard A-312 or A-778.

Upon completion of reaming the pilot bore, the Contractor shall install the well screen and casing at intervals as determined by the OTR. The proposed well design is shown on **Figure 3**. The final design will be established upon review of the pilot hole geophysical log.

The casing and screen shall be plumb and shall be centered in the hole. All field joints shall be properly lapwelded during installation with a minimum of two passes per circumference. Centralizers with 120-degree spacing, attached directly to the casing and screen by welding at intervals of not more than 60 feet within the screened casing and at intervals of not more than 80 feet within the blank casing shall be provided in order to center and hold the casing in the proper position until the gravel is in place. The centralizers shall be of the same material used in each casing or screen interval. Casing centralizers shall be placed up to a depth of approximately 80 feet below ground surface.

The casing shall be suspended in tension from the surface by means of an appropriate hanger or clamp. The bottom of the casing shall be at a sufficient distance above the bottom of the reamed hole to ensure that none of the casing will be supported from the bottom of the hole. The use of float plugs to land and set casing will not be permitted.

A construction tremie pipe will be installed to place the gravel pack and the cement grout in the annulus. Prior to final gravel packing operations, the permanent gravel tremie pipe will be installed. The remainder of the gravel will then be installed. The top of the permanent tremie pipe will extend a minimum of 20 inches above ground surface and be equipped with a screw-on cap. The gravel tube shall not be 'topped off' with gravel, but shall be left empty. The Contractor shall ensure that the permanent gravel tube is maintained free and clear through cementing operations by continuously running clear water through the permanent gravel tube during gravel packing and cementing operations.

A permanent sounding pipe will be connected to the casing at the approximate location shown on **Figure 3** and will be lowered simultaneously with the emplacement of the casing. The sounding pipe will be provided with a minimum 6-foot-long reinforced connection (entry box) to the steel casing, as shown on **Figure 4**. The bottom of the entry box shall be between 12 and 24 inches from the bottom of the blank casing joint to which it is attached. The inside joined surfaces of the entry box and casing shall be filled and ground smooth to the satisfaction of the OTR so as to not damage downhole wirelines and associated tools (e.g., video cameras, spinner tools, etc.,). Ground surface orientation of the gravel and sounding tubes shall be 90 degrees apart as shown on **Figure 5**. The top of the sounding pipe shall be terminated as shown on **Figure 5**.

A permanent casing vent pipe will be connected to the casing as shown on **Figure 5**.

The top of the casing will be provided with a welded cap at all times when personnel are not on the site.

All casing material shall be new.

If, for any reason, the casing cannot be landed in the correct position or at a depth acceptable to the OTR, or any of the casings should collapse prior to well completion, the Contractor shall construct another well immediately adjacent to the original location and complete this well in accordance with the specifications at no additional cost to OWNER. The abandoned hole shall be sealed in accordance with directions from OWNER and in accordance with any laws pertaining to proper well abandonment.

All work required to be repeated and all additional materials, labor, and equipment required, shall be furnished at the expense of the Contractor and no claim for additional compensation shall be made or be allowed, except as specifically provided herein.

All field welding shall be performed in accordance with American Welding Society Standards by a certified welder.

The following field welding procedures shall apply:

- A length shall be lowered into the well with the collar facing upward.

- The plain end of the following length shall be inserted in the collar. True contact of the two joints must be verified by observation through the inspection windows.

- Spot welds shall be placed through the three windows in order to hold the contact position.

- A filet type weld shall be made covering the top edge of the collar continuously for the entire circumference. Two passes or welds shall be applied to 5/16-inch and thicker wall material.

- The inspection windows on blank casing sections shall be seal-welded to assure a leak-proof connection.

The following electrodes shall be utilized for various casing and screen materials.

Mild Steel	E-6011 or E-7018
Copper Bearing Steel	E-6011 or E-7018
Low Alloy Steel (ASTM A242 or equivalent)	E-7018
Stainless Steel (Type 304)	E-308L-16

Depending on wall thickness, the following electrode sizes shall apply:

Wall Thickness	Electrode Size
1/8-inch	1/8-inch
3/16- to 1/4-inch	5/32- to 3/16-inch
over 1/4-inch	3/16- to 1/4-inch

TESTING

Not applicable.

SUBMITTALS

The Contractor shall supply the OTR with an affidavit of compliance stating the casing, screen, pipe and cap comply with the applicable requirements of ASTM Standards. Contractor shall also submit qualifications and evidence of current certification of the welder(s).

MEASUREMENTS

For the purposes of payment, measurements of casing, screen, and pipes, shall be per linear foot.

PAYMENT

Full compensation for doing all work and furnishing all materials necessary to manufacture, deliver, and install well casing and screens as shown on the drawings and as specified shall be included in the unit price bid per linear foot for: 22-Inch-Inside-Diameter

Stainless Steel Blank Casing - Bid Item No. 8.1; 20-Inch-Nominal-Diameter Stainless Steel Wire-Wrapped Well Screen - Bid Item No. 8.2; 20-Inch-Nominal-Diameter Stainless Steel Blank Casing - Bid Item No. 8.3; 20-Inch-Nominal-Diameter Stainless Steel Cellar and Bullnose - Bid Item No. 8.4; 3-Inch-Inside-Diameter Stainless Steel Gravel Tube - Bid Item No. 8.5; 3-Inch-Inside Diameter Stainless Steel Sounding Tube - Bid Item No. 8.6; and 3-Inch-Inside Diameter Stainless Steel Access Pipe - Bid Item No. 8.7.

SECTION 209 - GRAVEL PACK

209 - GRAVEL PACK - BID ITEM NO. 9

SCOPE

The Contractor shall furnish all equipment, material and work necessary to install gravel or coarse-grained sand, as shown on the Drawings and as specified by the OTR and herein.

MATERIALS

All gravel or coarse-grained sand for packing shall be hard, water worn, and washed clean of silt, fine sand, clay, and foreign matter. Crushed gravel will not be accepted. Gravel pack materials shall be rounded to well-rounded with a moderate to high sphericity and graded. Not more than three percent, by weight, of the gravel shall be flat or elongated. Gravel shall be Colorado Silica Sand, or approved equal, and subject to the approval of the OTR prior to delivery. Gravel pack materials shall meet AWWA-B100-89 standards, and the following specifications. An 8 x 16 gradation shall be used and the materials graded within the following limits:

U.S. STD. Sieve	Percent Passing
6	100
8	90 - 100
10	65 - 95
12	15 - 65
14	2 - 20
16	0 - 5

The gravel pack materials shall have a uniformity coefficient of less than 2 (determined in accordance with AWWA-B100-89 Section 1.2.4), and a specific gravity greater than 2.5. The gravel pack material shall have less than a 2 percent acid solubility (in accordance with test method AWWA-B100-89 Section 3.3.1). A description and sieve analysis of gravel packing materials to be delivered to the site shall be prepared by an approved testing laboratory and submitted with a 1/2-pint sample of the material to the OTR for approval at the pre-construction meeting. Prior to gravel placement, the OTR may have a certified testing laboratory perform a sieve analysis of the materials that are onsite to verify conformance with approved sample. Failure of the approved sample to meet gradation may be grounds for rejection. The gravel shall be delivered in ‘super sacks’, or approved equal containment and protection, and shall be kept free of all foreign matter.

PLACEMENT

Prior to placement of the gravel pack in the well, the drilling fluid shall be thinned to reduce weight and viscosity, and balanced throughout the fluid column. Gravel, as specified,

shall be installed in the annular space between the reamed hole and the well screen through a construction tremie pipe. The use of water and a gravel pump will be required. During placement of the gravel, disinfectant (e.g., sodium hypochlorite) shall be added to the gravel at a uniform rate and in accordance with Bulletin 74-81. **Fluids displaced from the well casing and annulus during gravel packing (and sealing) operations shall be controlled and disposed of as provided in Section 220.** Prior to the completion of gravel packing operations, the permanent gravel tube shall be installed to the desired depth. Once the permanent gravel tube is in place, it will be the Contractor's responsibility to verify the depth to the gravel pack in the annulus by using a sounding line, or some other acceptable method.

TESTING

Testing of the gravel pack shall be as specified in these Specifications.

SUBMITTALS

A description and sieve analysis of gravel packing materials to be delivered to the site must be submitted for approval to the OTR at the preconstruction meeting. The OTR may elect to have a certified testing laboratory perform a sieve analysis of the material to verify conformance with the approved submittal sample. Following the Caliper Survey (Section 207) the Contractor shall also submit his estimate of the volume of gravel to be installed. If a greater than 15 percent difference exists between the estimate and the final volume of gravel added, the discrepancy may be grounds for rejection of the well by OWNER.

MEASUREMENT

For the purpose of payment, the quantity of gravel shall be measured by the linear foot of installation.

PAYMENT

Full compensation for furnishing all labor, materials, tools, and equipment necessary to install the gravel pack envelope as shown on the Drawings and as specified by the OTR and herein shall be included in the unit price bid per linear-foot for "Gravel Pack" - Bid Item No. 9.

SECTION 210 - CEMENT GROUT

210 - CEMENT GROUT - BID ITEM NO. 10

SCOPE

This item shall consist of providing and installing cement grout annular seal for the well. As preliminarily designed, the annular seal will extend from the ground surface to a depth of approximately 730 feet, as shown on **Figure 3**. The actual depth will be determined upon review of the geophysical log.

CONSTRUCTION MATERIALS

Cement grout shall be composed of not more than 3 cubic feet of sand and 1 cubic foot (one sack) of Portland cement to 5 to 7 gallons (0.67 to 0.90 cubic feet) of clean water. This is typically considered to be a 10-sack Portland cement sand slurry mix when ordered from batching plants. Bentonite, to make the mix more fluid and reduce shrinkage, may be used to a total of 5 percent (5%) of the volume of the cement. If 5 percent bentonite is used, water content can be increased to 8.2 gallons per sack of cement.

PLACEMENT

After verifying the depth to the top of the gravel pack and prior to pumping the cement grout, the Contractor shall place 5 linear feet of fine-grained ”transition sand”, or approved equal, for separation of the cement grout and gravel pack. Cement grout shall then be injected in the annular space between the blank casing and the borehole from bottom to top by means of a tremie pipe. Cement grout material shall be placed by the positive displacement pumping method.

A grout pipe shall extend from the surface to the bottom of the zone to be grouted. Grout shall be placed from bottom to top in one continuous operation. The grout pipe may be slowly raised as the grout is placed, but the discharge end of the grout pipe must be submerged in the emplaced grout at all times until grouting is completed. The grout pipe shall be maintained full, to the surface, at all times until completion of the grouting of the entire specified zone. The fluid level in the casing shall be maintained at the ground surface during cementing operations. After cementing, no work will be undertaken for a period of 12 hours.

The Contractor is reminded that water shall be run through the gravel tube under pressure during the gravel packing and cementing operations.

The Contractor is also reminded that fluids displaced from the well casing and annulus during sealing operations shall be controlled and legally disposed of as provided in Section 220.

MEASUREMENT

Measurement for cement grout will be on a linear foot basis.

PAYMENT

Full compensation for furnishing all labor, materials, tools, and equipment necessary to install the cement grout as specified shall be included in the unit price bid for "Cement Grout" - Bid No. 10.

SECTION 211 - WELL DEVELOPMENT

211 - WELL DEVELOPMENT - BID ITEM NOS. 11.1 THROUGH 11.4

SCOPE

This item shall consist of line swabbing, air-lift pumping, and pumping and surging with a variable-speed turbine pump to remove drilling fluids and cuttings and develop the gravel pack and aquifer to maximize the yield and efficiency of the well.

MATERIALS

Nu-Well 220 (NW-220, manufactured by Johnson Screens), or AquaClear PFD (manufactured by Baroid Industrial Drilling Products), or approved equal, shall be used in a concentration of one gallon per 500 gallons of water in the screen sections (including the water in the gravel pack).

PLACEMENT

Mechanical Development Procedures. Initial development work shall consist of the removal of heavy drilling fluids and sediment from the well casing by "open-ended" airlifting from the bottom of the well using an eductor pipe until drilling fluids have been removed from the well. **Fluids displaced by initial airlifting shall be contained and legally disposed as provided in Section 220**. It is estimated that the volume of initial heavy development fluids will be approximately equal to one casing volume.

Following initial open-ended airlifting, line swabbing to stabilize and settle the gravel pack and provide for initial wall cake removal shall be performed. The swab shall be no less than 18 inches in diameter. Equipment utilized during swabbing operations shall be of a horsepower necessary to raise the bailer at a velocity of at least three feet per second. Each 20-foot screen section shall be swabbed for a period of up to 20 minutes. Swabbing shall proceed from top to bottom and the well shall be cleaned to the bottom upon completion. During swabbing operations, gravel pack will be topped off as necessary.

After initial swabbing, the well will be developed by air-lift pumping while swabbing. This procedure will be conducted utilizing a development tool similar to the one shown in Figure 15.16 of Groundwater and Wells (Driscoll, 2nd Edition, page 515). The tool will consist of a 10-foot length of perforated pipe with minimum 19-inch diameter flexible rubber wipers on both ends. The tool will be placed to the required depth on an eductor string of 6- to 8-inch-diameter eductor pipe. Into the eductor string a minimum 1.5-inch-diameter air pipe will be placed to a depth necessary to achieve required submergence to perform air-lift pumping. Alternatively, a submersible pump can be used for pumping in place of the airline. The air compressor (or pump) and necessary equipment used for dual-swab pumping shall be capable of intermittently pumping 500 gallons per minute (gpm) during development (depending on submergence). At the top of the string, a discharge head shall be configured to divert air/water mixture through a

flexible hose to a discharge tank. Air supply to the airline shall also be connected through a flexible hose. The entire assembly shall be suspended in the derrick in such a manner that allows the assembly to swab a minimum of 20 feet of screen while simultaneously air-lift pumping.

The above-described equipment shall be installed into the well to the top of the uppermost screen. The screen will be swabbed in 20-foot sections while simultaneous air-lift pumping. Each screen section will be worked until successive swabbing produces little change in color and discharge is relatively clear. Development will continue for approximately 2 hours for each 20-foot interval of screen. This period may be extended or shortened by the OTR based on condition of discharge water. Upon completion of a screen section, additional pipe will be added to both the eductor and airline, and the procedure repeated until all screen sections have been completed. On completion of development of all sections of the screen, the well shall be cleaned to bottom.

After reaching bottom, the development tools shall be utilized to inject NW-220, or approved equal, incrementally into the screen sections. The total amount of NW-220 introduced to the well shall be equal to the quantity necessary to achieve a NW-220 concentration of one gallon per 500 gallons of water in the screened sections (includes water in gravel pack). The NW-220 solution shall be prepared in the proper concentration in a tank or other vessel, subject to the approval of the OTR, prior to introduction into the well. Following each incremental introduction, the NW-220 solution shall be 'chased' with clear water in order to displace the solution into the screen and gravel pack. The NW-220 solution shall be swabbed into each progressively shallower screen section as piping is removed. Each 20-foot screen section shall be swabbed for a period of up to 20 minutes to assure distribution. Upon reaching the uppermost screen section, the solution would be left in the well for a minimum period of 12 hours. During this 12-hour period, the screen shall be 'dry swabbed' in two additional passes, with each 20-foot screen section swabbed for a period of up to 20 minutes per pass to provide additional agitation of the dispersant solution. After this period, the development procedure described in the third paragraph of this section would be repeated to bottom (second pass or airlift/swabbing). On completion of the second pass development the well shall be cleaned to bottom. Development tools would then be removed from well. It is estimated that total ***active*** (i.e., tool is either moving to swab, or moving airlifting water) mechanical development time will be approximately 85 hours.

Development fluids from the well will be directed to temporary holding tanks (e.g., Baker tanks) onsite to allow settlement of all solids prior to discharge of decanted water to the designated discharge location. It is recommended that the tanks be connected in series and internally baffled to maximize the settling of solids. The initial fluids displaced from the well during the first stages of development shall be legally disposed offsite, and the tanks shall be cleaned prior to initiating air-lifting. It is the Contractor's sole responsibility to ensure that the sizing and configuration of settling tanks is fully adequate to achieve water quality conditions suitable for discharge.

Pumping Development Procedures. Following the initial mechanical development, the Contractor shall install a deep well test pump. The minimum requirements for the development

are specified below; however, the Contractor should note that if the development pump is also to be utilized for production testing of the well (Section 213), the pump, installation and appurtenances must also meet the requirements specified in Section 213. The pump shall be capable of discharging up to 3,750 gpm at 700 feet of total dynamic head. Pump intake setting shall be approximately 650 feet (actual setting will depend on the final design of the well). The pump driver shall be equipped with suitable throttling devices to control discharges between 500 and 3,750 gpm.

Following the initial mechanical development, the Contractor shall install a deep well test pump. The test pump **shall not be equipped with a foot valve**, which would prevent backspin and interfere with surging operations. The discharge line shall be provided with suitable equipment for sand testing such as the Rossum Centrifugal Sand Sampler (refer to Journal of the American Water Works Association, vol. 46, No. 2, February 1954). The well shall be developed by intermittent pumping and surging, which shall be at an initial rate of 500 gpm and continued until the water is clear. Surging shall allow water to flow back through the bowls and free backspin and through the perforations of the screen. The pump shall then be started and stopped several times and then pumped at 500 gpm until the water is clear. The procedure shall be repeated at 250 gpm increments up to 4,000 gpm or as directed by the OTR. It is estimated that development pumping will consist of approximately 100 hours.

Discharge Water. The Contractor shall provide up to 500 feet of piping and materials to connect to a 16-inch-diameter (minimum) flange which shall allow all water produced from the well during the final stages of development and during the production testing to be conveyed through closed pipe to an offsite discharge location as shown on **Figure 6** and as provided in Section 221. The discharge location is a natural depression where the discharge water will be allowed to pond and percolate into the ground. The soils in the discharge areas are very sandy with high percolation rates. The intent is to allow the discharged water to spread out and percolate over a large area without impacting adjoining areas or nearby roads. The end of the discharge pipe shall be equipped with energy dissipation device(s) as required to prevent erosion at the point of discharge, subject to the approval of the OTR. The Contractor shall be responsible for ensuring that no damage by flooding or erosion is caused outside of the spreading area.

It will be OWNER's responsibility to make any necessary arrangements for the legal discharge of water. It shall be the Contractor's responsibility to comply with all requirements of the Regional General Waiver for Specific Types of Discharges (Resolution No. R3-2008-0010, Central Coast Regional Water Quality Control Board). The Contractor is responsible for meeting the following criteria for discharges as stated in the General Waiver:

- Discharges shall not migrate outside of the designated discharge area;
- Discharges shall not cause erosion within or outside of the discharge area;
- Discharges shall contain no residual chlorine;
- The pH of the discharges shall be within the range of 6.5 to 8.3.

Standby time will not be paid for failure to achieve discharge standards.

RECORDKEEPING

Development records shall be maintained on at least a ½-hour basis showing production rate, pumping level, drawdown, sand production, gravel pack level and all other pertinent information concerning well development. Development at each rate shall continue until the following conditions have been met.

- The specific capacity (gpm per foot of drawdown) shall have reached a relatively constant value ($\pm$10 percent) over a period of at least 6-continuous-hours, or as directed by the OTR.
- Sand content is no greater than 5 ppm measured 15 minutes after surging, or as directed by the OTR.

TESTING

Test conducted during well development shall be in accordance with these Specifications.

SUBMITTALS

Submit dimensional drawings and specifications for the development tool (air-lift pumping/swabbing) for approval by the OTR prior to development. Submit pump and motor performance curves for approval prior to development pumping. Maintain and submit all well development records prior to payment.

MEASUREMENT

Not applicable.

PAYMENT

Full compensation for furnishing all labor, materials, tools, and equipment necessary for mechanical well development shall be included in the hourly bid price for "Mechanical Well Development" - Bid Item No. 11.1. Full compensation for furnishing all labor, materials, tools, and equipment necessary for pumping well development shall be included in the hourly bid price for "Pumping Well Development" - Bid Item No. 11.2. Additional development time, if required, will be paid on an hourly basis and shall be included in “Additional Mechanical Development” and “Additional Pumping Development” – Bid Item Nos. 11.3 and 11.4, respectively.

SECTION 212 - TESTING OF WELL

212 - TESTING OF WELL - BID ITEM NO. 12

SCOPE

Testing of well includes the provision of all labor, equipment, and materials as to complete the well tests described herein.

MATERIALS

The Contractor shall provide the materials specified herein and any other miscellaneous piping, valving, fittings, supports, and other appurtenances required to provide a complete, safe, and fully functioning test system. Materials, which are specifically identified by manufacturer, model, and/or size are required as such because of the limitations of size and/or performance necessary for testing. Other required items may vary at the Contractors option based on Contractors inventory so long as the overall criteria of adequacy, accuracy, and safety are met. The OTR shall be the sole judge of the adequacy of materials and equipment for testing of the well.

1 each — Test pump, electric motor or engine drive, set to a depth of 650 feet capable of providing up to 3,750 gpm at 700 feet TDH.

2 each — 1-inch-inside-diameter (minimum) PVC or HDPE sounding tube, installed to a depth just above the bowl assembly (up to 650 feet)

1 each — Flow meter, propeller type, with direct flow rate and totalized flow readout. Meter installation shall include a minimum of 10 upstream and 5 downstream pipe diameters of straight piping without bends, valves, or fittings, and the provision of three ½-inch NPT ports for installation of sampling devices.

The Contractor shall furnish, install, and remove the necessary equipment capable of pumping 3,750 gpm at a minimum of 700 feet Total Dynamic Head (TDH). The equipment shall have satisfactory throttling devices so that the discharge may be reduced to 1,000 gpm. The pumping unit shall be complete with an ample power switching, controls, and appurtenances and shall be capable of being continuously operated without interruption for a period of 72 hours.

PLACEMENT

Step-Drawdown Test. Prior to starting the step-drawdown test water level measurements shall be made to assess the static water level. There will be a period of at least 8 hours of off conditions following development work prior to the start of the step-drawdown test.

The well shall be "step" tested at rates of approximately ½, ¾, 1, and 1¼ times the design capacity of 3,000 gpm. The complete step test for the well is estimated to require approximately 8 hours. The Contractor shall operate the pump and change the discharge rate as directed by the OTR. Discharge of the pump shall be controlled by gate valves. The discharge shall be controlled and maintained at approximately the desired discharge for each step with an accuracy of plus or minus 5 percent. Pump discharge shall be measured with a totalizing meter and stop-watch, or as approved by the OTR. An electric sounder shall be furnished by the Contractor. Sand content measurement shall be recorded at 15-minute intervals by the Contractor during the step-drawdown test.

Constant Discharge Test. After an 8-hour recovery period from the step test, a constant rate test shall be conducted by pumping the well at the design rate for a period of not less than 8 hours, or until the OTR terminates the test. A recovery period of 12 hours shall follow the termination of the constant discharge test. At this time, residual drawdown data will be collected by the OTR. During the constant discharge test the final sand content testing will be conducted by the Contractor.

The sand content shall be determined by averaging the results of samples collected at the following times during the final pumping test: 1) 5 minutes after start of the test; 2) after ¼ of the total planned test time has elapsed; 3) after ½ of the time has elapsed; 4) after ¾ of the time has elapsed; and 5) near the end of the pumping test. If the average sand content exceeds 2 ppm, the Contractor, shall do the necessary redevelopment work of the well until the sand content is less than 2 ppm, as directed by the OTR.

Aborted Test. Whenever continuous pumping at a uniform rate has been specified, failure of pumping operation for a period greater than 1 percent of the elapsed pumping time shall require suspension of the steps until the water level in the pumped well has recovered to its original level. Recovery shall be considered "complete" after the well has been allowed to rest for a period at least equal to the elapsed pumping time of the aborted test, except that if any three successive water level measurements spaced at least 20 minutes apart show no further rise in the water level in the pumped well the test may be resumed immediately. The OTR shall be the sole judge as to whether this latter condition exists. The Contractor will not be paid for any retesting done if the specified time or recovery requirements of the OTR for the aborted test are not first met. These tests are invalid and will not be construed as a test.

SUBMITTALS

The Contractor shall keep accurate records of the pumping test data and furnish copies of all records to the OTR or his representative upon completion of the test. The records shall also be available to the OTR or his representative for inspection at any time during the test.

The Contractor shall also keep records on the type of pumping equipment used including (as applicable) engines, motors, drive components, bowls, lines, and shafts. The Contractor will keep records of operation of equipment during the test including engine revolutions per minute (RPM) and horsepower, fuel use, and other essential information that will be useful in designing a pump system.

MEASUREMENT

For the purposes of payment, well testing will be made at the hourly rate. The bid quantity for step testing is 8 hours (2 hours per step). The bid quantity for the constant discharge test is 8 hours.

PAYMENT

Full compensation for doing all work and furnishing all materials necessary to test the well as specified shall be included in a unit price bid for "Testing of Well" - Bid Item No. 12.

SECTION 213 - DISINFECTION OF WELL

213 - DISINFECTION OF WELL - BID ITEM NO. 13

SCOPE

This item shall consist of doing all work and furnishing all materials necessary to disinfect the well against bacteria.

MATERIAL

Disinfectants. Chlorine approved by state and local regulatory agencies shall be used as disinfectant. The disinfectant shall be delivered to the work site in original closed containers bearing the original label indicating the percentage of available chlorine. Liquid 12.5 percent sodium hypochlorite is considered an acceptable disinfectant (or approved equal). The disinfectant shall be recently purchased (shall not be stored for more than 1 year). During storage, disinfectants shall not be exposed to the atmosphere or to direct sunlight. Unless superseded by governmental regulation, the quantity of chlorine compounds used for disinfection shall be sufficient to produce a minimum of 100 ppm available chlorine in solution when mixed with the total volume of water in the well.

PLACEMENT

Well Disinfection. The disinfecting agent shall be uniformly applied throughout the entire water depth of the well by pumping the chlorine solution into the well. The dispersion of the disinfectant shall be assisted by pouring into the well a volume of water equal to the volume of water contained in the well, after the disinfectant has been emplaced. This will cause the disinfectant to flow out of the well into the area adjacent to the screen. All accessible portions of the well above the water level shall be maintained in a damp condition with water containing the required concentration of disinfecting agent for a period of not less than 20 minutes. The disinfecting agent shall be left in the well for a period of at least 12 hours.

Well Flushing. After disinfection of the well, the well shall be pumped to waste until the produced water is free of chlorine. Contractor shall measure the free chlorine residual with a DPD test kit to verify that the well has been completely flushed. Complete flushing shall be evidenced by a free chlorine residual of less than 0.02 ppm chlorine.

Contractor shall not discharge chlorinated waters. The Contractor shall route flush waters to the temporary holding tanks (e.g., Baker Tanks) and shall apply a dechlorinating agent such as sodium thiosulfate to the water to remove residual chlorine. Contractor shall verify and record the absence of chlorine residual by sampling the discharge at minimum 1-hour intervals. Free chlorine shall be below 0.02 ppm. Standby time will not be paid for failure to achieve discharge standards.

TESTING

After disinfection and flushing of the well, the OTR shall sample the well water for coliform bacteria in accordance with Standard Method 908C. If testing indicates the presence of coliform bacteria, Contractor shall repeat the disinfection and flushing procedure at no cost to OWNER until satisfactory results (i.e., no coliform bacteria present) are achieved.

SUBMITTALS AND MEASUREMENT

Not applicable.

PAYMENT

Full compensation for doing all work and furnishing all materials for the disinfection of the well as specified shall be included in the lump sum price bid for “Disinfection of Well” - Bid Item No. 13, only after satisfactory test results are obtained in accordance with these specifications.

SECTION 214 – WELLHEAD AND PUMP

214 – WELLHEAD AND PUMP - BID ITEM NO. 14

SCOPE

The Contractor shall furnish all materials, equipment, and work necessary to construct a wellhead and pump foundation, and provide and install the permanent pump and downhole flow control assemblies. All materials utilized shall comply with SWRCB Division of Drinking Water (DDW) standards for municipal supply wells, where applicable.

MATERIALS

Structural Concrete Foundation. Structural concrete shall be in conformance with Sections 51, 52, and 90 of the State Specifications except as herein provided for.

The 28-day compressive strength of structural concrete shall be greater than or equal to 2,500 pounds per square inch (psi). Concrete with lesser strength will be rejected. Concrete work that is rejected shall be completely removed and reconstructed at the Contractor's expense in accordance with the Drawings and as specified herein.

Reinforcing bars used with Class "B" or "C" concrete shall be Grade 40 deformed billet steel bars for concrete reinforcement conforming to Section 52-1.02 of the State Specifications. Design of the well head and foundation is shown on **Figure 5**.

Pump and Motor Assembly. Pump and motor shall be specified by the Engineer after the completion of well testing. The Engineer shall specify the exact manufacturer, model, materials, and performance specifications for the pump and motor assembly; no substitutions will be allowed. The Engineer shall determine both required performance specifications and equivalency of materials and equipment. The pump assembly shall be rated for approximately 3,000 gpm, manufactured by Peerless, Aurora, Ingersol Rand, or approved equal. The pump shall be an enclosed tube and shaft water-lubricated, line-shaft turbine unit with fabricated steel discharge head. The motor shall be a vertical hollow shaft unit of approximately 500 to 600 HP and shall be manufactured by U.S. Motors or General Electric.

Downhole Flow Control Valve Assembly. The downhole flow control valve (FCV) shall also be specified by the Engineer after the completion of well testing. The FCV will be 10 or 12-inch size, and be located approximately 50 feet above the pump bowls. The Engineer shall specify the exact manufacturer, model, materials, and performance specifications for the FCV; no substitutions will be allowed. The Engineer shall determine both required performance specifications and equivalency of materials and equipment.

PLACEMENT

Well foundation shall be constructed generally as shown on **Figure 5**. Specific details of pump anchor locations and minor dimensional details shall be provided after pump selection. Well pump and motor assembly shall be installed as directed by the OTR in the field. The pump bowls shall be set at approximately 550 feet below ground surface, or as directed by the Engineer.

SUBMITTALS

Contractor shall submit shop drawings, performance curves, and other details as requested by the OTR to confirm pump and motor performance. The Contractor also shall be required to submit the manufacturer's invoiced cost for the pump and motor assembly to confirm appropriate pay amounts (see Payment section).

TESTING

Not applicable.

MEASUREMENT

Not applicable.

PAYMENT

Full compensation for all labor, tools, equipment, and insurance, and doing all work necessary and incidental to complete the task of wellhead foundation construction and pump installation shall be included in the lump sum bid price for Wellhead and Pump, Bid Item No. 14.

Compensation for purchase of the well pump and motor assembly and the FCV has been estimated by the OTR and entered in Well Pump/Motor and FCV Assembly - Bid Item No. 14.A. Contractor shall not alter this amount, and must include it in his/her total bid price.

Contractor's percent markup over invoiced cost for well pump and motor assembly (Bid Item No. 15.A) shall be stated in Bid Item No. 14.B – Percent Markup Over Invoiced Cost. For bidding purposes, Contractor's percent markup over invoiced cost of the estimated amount entered in Bid Item No. 14.A shall be entered in Bid Item No. 14.C. Contractor's actual payment for Bid Item No. 14.A will be based upon the manufacturer's invoiced cost plus the percent markup quoted in Bid Item No. 14.B.

SECTION 215 - DOWNHOLE VELOCITY SURVEYS

215 - DOWNHOLE VELOCITY SURVEY - BID ITEM NO. 15

SCOPE

The Contractor shall furnish all equipment, materials, and work necessary to perform a downhole velocity (spinner) survey of the well. The velocity survey shall be performed during step drawdown production testing (Section 212).

MATERIALS

Not Applicable

PLACEMENT

The Contractor shall furnish professional logging services for the downhole velocity (spinner log) surveys of the well to be performed during the step production testing of the well. The step testing will be performed at four rates, with step durations of approximately two hours.

TESTING

Not Applicable.

SUBMITTALS AND MEASUREMENT

The Contractor shall provide four field and six final copies of the velocity survey logs. The velocity logs shall also be provided to the OTR via CD or portable memory drive in a Microsoft Excel compatible format and a digital image (PDF) format.

PAYMENT

Full compensation for furnishing all labor, tools, equipment and insurance, and doing all work necessary and incidental to complete the task of Downhole Velocity Surveys as specified shall be included in the lump sum price for “Downhole Velocity Survey” - Bid Item No. 15.

SECTION 216 - VIDEO SURVEYS

216 - VIDEO SURVEY - BID ITEM NO. 16

SCOPE

This item shall include the performance of an acceptance video surveys of the completed wells.

MATERIALS

Video shall be in color, with side scan capabilities, and provided in DVD format. If recorded on VHS, the video shall be recorded at standard speed, not in EP mode.

PLACEMENT

The Contractor shall furnish and provide assistance for the video surveying of the completed well prior to acceptance of the well by OWNER. The OTR shall witness the video survey.

TESTING

The video survey shall verify that the well is free of structural defects and clear of all debris throughout the entire depth of the well prior to acceptance of the well by OWNER. If any defects or debris are found, the Contractor shall make repairs to, or remove debris from, the well as necessary, at no cost to OWNER.

SUBMITTALS AND MEASUREMENT

Two (2) copies of the video survey shall be delivered to the OTR upon completion of the survey.

PAYMENT

Full compensation for furnishing all labor, tools, equipment and insurance, and doing all work necessary and incidental to complete the task of Video Survey as specified shall be included in the lump sum price for “Video Surveys” - Bid Item No. 16.

SECTION 217 – PLUMBNESS AND ALIGNMENT

217 – PLUMBNESS AND ALIGNMENT - BID ITEM NO. 17

SCOPE

This item of work shall consist of testing to determine the plumbness and alignment of the completed wells. The Contractor is solely responsible for meeting the requirements for plumbness and alignment of the completed wells as specified herein. The Contractor may, at his discretion, perform periodic deviation surveys of the borehole during the drilling of the pilot holes, and take corrective actions as necessary, to ensure proper plumbness and alignment of the completed wells. The final acceptance plumbness and alignment tests may be performed at any time subsequent to cementing operations.

MATERIALS

Not Applicable.

PLACEMENT AND TESTING

Tests to determine the plumbness and alignment of the 22-inch-diameter blank casing shall be made by the Contractor after the well has been completed and before its acceptance. The Contractor shall furnish professional logging services for the deviation and directional survey and be of the type provided by Welenco, Newman Surveys, or approved equal, and shall comply with AWWA A-100 standards.

The completed well shall be sufficiently plumb and straight so that there will be no interference with installation, alignment, operation or future removal of the pumping equipment. The maximum allowable horizontal deviation (drift) of the well from the vertical shall not exceed two thirds of the smallest inside diameter of that part of well being tested per 100 feet of depth. OWNER may reject the well if the above tolerances are exceeded.

SUBMITTALS

Records of deflection shall be submitted to the OTR.

MEASUREMENT

Not applicable.

PAYMENT

Full compensation for doing all work and furnishing all materials to determine to well alignment as shown on the drawings and as specified shall be included in the lump sum price bid for "Plumbness and Alignment" - Bid Item No. 17.

SECTION 218 – STANDBY TIME

218 - STANDBY TIME - BID ITEM NO. 18

During the progress of drilling operations, it may be necessary for the OTR to perform work that will require the drilling crew and equipment to stand idle. In such event, the OTR shall request the Contractor in writing to cease operations and shall state the anticipated extent or duration thereof. The Contractor shall promptly furnish such assistance, and cease operations.

Payment for standby time will be paid on an hourly rate for Bid Item 18 in accordance with the actual hours approved by the OTR. In no case shall standby time be approved for Contractor equipment failures or delays caused by waiting for Contractor's equipment or materials deliveries.

SECTION 219 - SITE CLEANUP

219 - SITE CLEANUP - BID ITEM NO. 19

SCOPE

This item shall consist of doing all work and furnishing all materials necessary to maintaining the well site in a professional manner during drilling, construction, and testing and restoring each site to predrilling conditions after work is completed.

CLEANUP METHODS

The Contractor shall keep the premises free from accumulations of waste materials, rubbish, and other debris resulting from the work. At completion of the work the Contractor shall remove all waste materials, rubbish and debris from and about the well site as well as all tools, construction equipment, fuel tanks, and machinery and surplus materials. The Contractor shall leave the site clean and ready for use by OWNER and shall restore to their original condition all temporary work areas. The Contractor is responsible for any damages to properties adjacent to the well caused by drilling, construction, or well testing activities associated with the work described herein. This includes the tracking mud, dirt, and debris from the site onto City streets.

MATERIALS, PLACEMENT, TESTING, SUBMITTALS, AND MEASUREMENT.

Not applicable.

PAYMENT

Full compensation for site cleanup as specified shall be included in the lump sum price for "Site Cleanup" - Bid Item No. 19.

SECTION 220 – FLUIDS AND CUTTINGS CONTAINMENT AND DISPOSAL

220 - FLUIDS AND CUTTINGS CONTAINMENT AND DISPOSAL - BID ITEM NO. 20

SCOPE

During drilling, reaming, well construction, and well development, the Contractor shall provide for the temporary containment and storage of drilling fluids and drill cuttings. Drilling fluids, including the fluids displaced from the hole during casing, gravel packing, cementing operations, and initial development shall be contained and legally disposed offsite by the Contractor. Drilling cuttings shall also be contained and legally disposed offsite by the Contractor.

MATERIALS AND METHODS

Portable, temporary, leak proof containment vessels shall be used to contain drilling fluids and fluids displaced from the hole during casing, gravel packing, cementing operations, and initial development. These fluids shall be removed from containment vessels and legally disposed offsite by the Contractor prior to initiating well development operations (Section 211). Temporary containment of cuttings within the work areas will be allowed. Drill cuttings and fluids shall be legally disposed of offsite.

SUBMITTALS, TESTING, AND MEASUREMENT

Not applicable.

PAYMENT

Full compensation of all labor, tools, equipment, and other costs required to complete the task of Fluid and Cuttings Containment and Disposal as specified shall be included in the lump sum price for "Fluid and Cuttings Containment and Disposal" - Bid Item No. 20.

SECTION 221 – TEMPORARY DISCHARGE PIPELINE

221 – TEMORARY DISCHARGE PIPELINE - BID ITEM NO. 21

SCOPE

The Contractor shall furnish all materials, equipment, and work necessary to construct temporary discharge piping for conveying water produced during well development and test pumping to an offsite percolation area as directed by the OTR. The discharge location is shown on **Figure 6** and is a natural depression where discharge water will be allowed percolate into the ground. The soils in the discharge areas are very sandy with high percolation rates. The intent is to allow the discharged water to spread out and percolate over a large area without impacting adjoining areas or nearby roads. The end of the discharge pipe shall be equipped with energy dissipation devices, subject to the approval of the OTR, to prevent erosion at the point of discharge. The Contractor shall be responsible for ensuring that no damage by flooding or erosion is caused outside of the spreading area.

It will be OWNER's responsibility to make any necessary arrangements for the legal discharge of water.

MATERIALS

Discharge piping shall consist of approximately 1,500 feet of 16- to 24-inch-diameter temporary above-ground piping with leak-proof joints (e.g., aluminum pipe with Victaulic fittings, HDPE, or approved equal). The discharge piping system shall include a 20-feet wide (minimum) traffic-rated vehicle crossing such as provided by Rain-for-Rent (or approved equal) placed across the driveway of the Santa Margarita ASR facility.

PLACEMENT

Discharge piping shall extend from an existing 18-inch-diameter flange piping connection adjacent the existing SM ASR-1 well along the approximate route to the discharge area as shown on **Figure 6**. There is existing connective piping between the Fitch Park ASR site and SM ASR-1. Connective piping between the FP ASR-5 and ASR-6 wells and the existing connective piping between the Fitch Park site and SM ASR-1 shall be installed by the Contractor as provided in Section 211.

SUBMITTALS

Contractor shall submit shop drawings and other details for the discharge piping as requested by the OTR or Engineer.

TESTING

Not applicable.

MEASUREMENT

Not applicable.

PAYMENT

Full compensation for doing all work and furnishing all materials to provide and install temporary pipeline as specified shall be included in the lump sum price bid for "Temporary Discharge Pipeline" - Bid Item No. 21.

FIGURES

APPENDIX A
FITCH PARK MW-1 LOGS AND AS-BUILT COMPLETION

Aquifer Storage & Recovery Wells 5 & 6
Well Design & Development
Bid Addendum 3

1. SECTIONS 106.1.7, 206, and Figure 3. Contractors shall note the discrepancy between the reamed borehole size mentioned in the cited specification sections, and Figure 3. The correct reamed borehole is 32-inch diameter. Therefore, contractor shall now use the revised Figure 3 (11/1/18), which illustrates a 32-inch diameter reamed borehole. A copy of the revised Figure 3 is attached.

2. Revised Bid Form (11/1/18): contractor shall delete prior BID FORM, and replace with the updated BID FORM (Rev. 11/1/18) for the bid proposal. Note the changes that have been made to the original bid form include changes to line items 14.A, 14.B, and 14.C. In addition, please note the additional items 23, 24, and 25.

3. CAL AM reiteration of contractor compliance with SECTION 104, Qualifications of the Contractor. The conflict between Agenda item note and SECTION 104 was clarified at the pre-bid meeting. As described at the pre-bid meeting, SECTION 104 supersedes any Agenda item describing required contractor qualifications for well drilling and development proposal.

4. Question from Contractor: Can the casing material be pre-ordered since there is a monitoring well on one of the sites?

   CAWC Response: at this time, Contractor shall assume no pre-purchase of the casing piping by CAWC.

5. **Question from Contractor:** If not (sic. Pre-ordered), what is the well design wait time after the pilot hole is completed?

   CAWC Response: 24 HRS

6. **Question from Contractor** Since the drilling will not start until 8/2019 and steel prices are on a constant rise, will there be a change order on the material cost at the time of the NTP?

   CAWC Response: Price Escalation Index is provided in the bid documents to accommodate price changes for labor. In addition, **The Producer Price Index for materials including stainless steel will be used as an index for adjustment of material prices.**

7. **Question from Contractor:** Per the site walk, it was discussed that only ONE borehole volume be hauled off to a legal site, can you confirm that after the one hole volume is hauled off, the remaining fluid can be discharge to the pipe line no matter how dirty?

   CAWC Response: No. All drilling fluids, fluids displaced from the hole during construction, and the initial heavy development fluids (one casing volume) shall be hauled off to a legal site in accordance with SECTION 220 – FLUIDS AND CUTTINGS CONTAINMENT AND DISPOSAL. the remaining development fluids can be discharged to the pipeline; however, prior to discharge to

the pipeline, development fluids are to be routed through temporary settling tanks, internally baffled and connected in series, and the decant water discharged to the pipeline in accordance with SECTION 211 – WELL DEVELOPMENT.

8. **Question from Contractor:** Can the test pump be oil lubed?

   CAWC Response: yes

9. **Question from Contractor:** If gravel is brought to the site for rig stability, can it remain onsite or will it need to be hauled off?

   CAWC Response: all soils and other materials are to be removed from the site after completion of the work.

10. **Question from Contractor:** Can the company that performs the dirt work/grubbing create ingress/egress for the drilling rig?

    CAWC Response: yes. This is part of the DB firm's scope of work. During the DB process, the selected drilling contractor will need to coordinate their needs for site preparation with the DB firm

11. **Question from Contractor:** What is the engineers estimate?

    CAWC Response: a range for the project cost is three to four million.

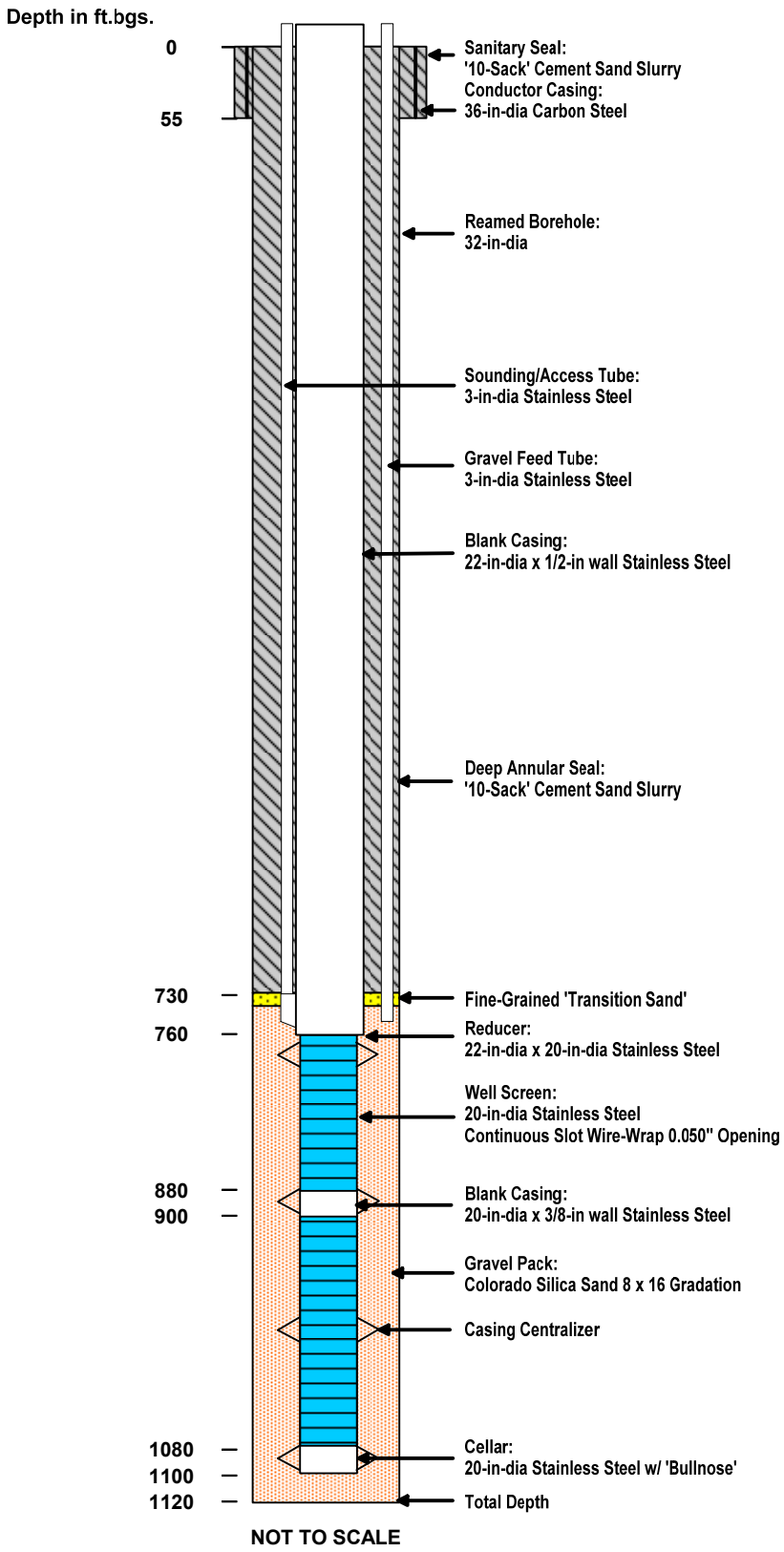
12. **Question from Contractor:** What is the job duration for the drilling, testing, and permanent pump?

    CAWC Response: per section 105 – construction schedule, work must begin within 30 days of NTP and be completed within 180 days of commencement of work; however, it is acknowledged that the permanent pump has not yet been selected, and depending on the pump selection, the lead times for the permanent pump may extend beyond the 180 day construction period. if this occurs, a reasonable time extension may be granted.

13. **Question from Contractor:** Can an electromagnetic flow meter be used in the discharge line during development and production testing instead of a propeller?
    CAWC Response: Yes

14. **Question from Contractor:** Since the site walk was less than 30 days from bid opening, the contractor did not have adequate time to post solicitations for bids in local newspapers, can said contractor still be eligible for bid?

    CAWC Response: If contractor is one of the bidders who received an invitation to bid, the contractor is eligible to bid assuming that the qualifications in the bid documents are met by the contractor. If more time is requested for preparation of the bid, in order to obtain bids from local suppliers, please make this request by November 12, 2018.



PUEBLO water resources

FIGURE 3. PRELIMINARY WELL DESIGN SCHEMATIC
Fitch Park ASR-5 and ASR-6 Project
California American Water

BID SHEET for FITCH PARK ASR-5 AND ASR-6 CONSTRUCTION

BID ADDENDUM NO. 3

Item	Title	Unit	Estimated Quantity (per well)	Unit Price	Subtotal (per well)	Total (both wells)
1	Mobilization	Lump Sum	Lump Sum	$	$	$
2	Noise Control / Sound Barrier	Linear Feet	500	$	$	$
3	36-Inch Diameter Carbon Steel Conductor Casing	Linear Feet	55	$	$	$
4	Pilot Bore Drilling	Linear Feet	1065	$	$	$
5	Geophysical Logging	Lump Sum	Lump Sum	$	$	$
6	Pilot Bore Reaming	Linear Feet	1065	$	$	$
7	Caliper Survey	Lump Sum	Lump Sum	$	$	$
8.1	22-inch Diameter Stainless Steel Blank Casing	Linear Feet	760	$	$	$
8.2	20-inch Diameter Stainless Steel Wire Wrapped Screen	Linear Feet	300	$	$	$
8.3	20-inch Diameter Stainless Steel Blank Casing	Linear Feet	20	$	$	$
8.4	20-inch Diameter Stainless Steel Cellar with Bullnose	Lump Sum	20	$	$	$
8.5	3-inch Diameter Stainless Steel Gravel Tremie Pipe	Linear Feet	750	$	$	$
8.6	3-inch Diameter Stainless Steel Sounding Pipe	Linear Feet	760	$	$	$
8.7	3-inch Diameter Stainless Steel Casing Vent Pipe	Lump Sum	Lump Sum	$	$	$
9	Gravel Pack	Linear Feet	390	$	$	$
10	Cement Grout	Linear Feet	730	$	$	$
11.1	Mechanical Development	Hours	85	$	$	$
11.2	Pumping Development	Hours	100	$	$	$
11.3	Additional Mechanical Development	Hours	XX Hours	$	XXXX	XXXX
11.4	Additional Pumping Development	Hours	XX Hours	$	XXXX	XXXX

Item	Title	Unit	Estimated Quantity (per well)	Unit Price	Subtotal (per well)	Total (both wells)
12	Production Testing	Hours	16	$	$	$
13	Disinfection of Well	Lump Sum	Lump Sum	$	$	$
14	Wellhead Completion and Installation of Pump/Motor and FCV Assembly	Lump Sum	Lump Sum	$	$	$
14.A	Well Pump/Motor and FCV Assembly	Allowance	Allowance	$300,000	$300,000	$600,000
14.B	Percent Markup Over Invoiced Cost for Well Pump/Motor and FCV Assembly	Percent	Percent	%	%	%
14.C	Markup Amount (amount entered in 14.A times percent entered in 14.B)	Lump Sum	Lump Sum	$	$	$
15	Downhole Velocity Surveys	Lump Sum	Lump Sum	$	$	$
16	Acceptance Video Surveys	Lump Sum	Lump Sum	$	$	$
17	Plumbness and Alignment	Lump Sum	Lump Sum	$	$	$
18	Standby Time	Hours	XX Hours	$	XXXX	XXXX
19	Site Cleanup	Lump Sum	Lump Sum	$	$	$
20	Fluid and Cuttings Containment and Disposal	Lump Sum	Lump Sum	$	$	$
21	Temporary Discharge Pipeline	Lump Sum	Lump Sum	$	XXXX	$
22	Traffic Control Plan	Lump Sum	Lump Sum	$	$	$
23	Connect pipe extension & valves to Temporary Water Supply, and construction water consumption	Allowance	Allowance	$	$10,000	$20,000
24	Temporary 7' height Perimeter Site Security, Chain Link Fencing & Double Leaf Gates, lockable	Lump Sum	Lump Sum	$	$	$
25	Community Outreach Plan & Attend Meetings	Allowance	Allowance	$	$3000	$6000
26	Prepare & implement BMP's and Storm Water Pollution Prevention Plan (SWPPP)	Lump Sum	Lump Sum	$	$	$
				Total Amount Bid:	$	$

Item	Title	Unit	Estimated Quantity (per well)	Unit Price	Subtotal (per well)	Total (both wells)
Total In Words:						

Aquifer Storage & Recovery Wells 5 & 6
Well Design & Development
Bid Addendum 4

1. **<u>Change to Bid Proposal Due Date</u>: The bid proposal due date has been changed to November 30, 201**8. Bids are due by 5 pm Local Time.