

SECTION 02734.1

WATER WELL DRILLING, CASING & TESTING (SHALLOW WELLS)

1.01 SCOPE

This Custom supplement to Detailed Provision Section 02734 - Water Well Drilling, Casing & Testing, summarizes Contract-specific requirements referenced by each sub-section in the original provision. Sub-sections with no Contract-specific changes or additions are so indicated.

Requirements specified here shall be used in conjunction with those specified in Sheet C-22 Drawing D-57048 to Section P – Contract Drawings of Specifications No. 1361W. This specification is for the Mountain Avenue West Replenishment Basin Project groundwater monitoring shallow, single completion wells.

In accordance with the Scope of Work presented in the Special Conditions, this supplement defines requirements for each shallow monitoring well. Sheet C-2 Drawing D-56999 to Section P – Contract Drawings shows the shallow monitoring well locations, while Sheet C-22 Drawing D-57048 to Section P – Contract Drawings show shallow monitoring well construction schematics for the shallow monitoring wells.

Work items completed at the option of the District are indicated below.

A. DESCRIPTION

Provide all labor, equipment, materials, and forces necessary to provide the District with eight new, complete and fully developed groundwater monitoring wells at the locations shown in Sheet C-2 Drawing D-56999 to Section P – Contract Drawings. The monitoring wells shall be drilled using a hollow stem auger (or equivalent) drilling method in which the uncased wall of the drill borehole is held in place at all times with the drilling flight or augers. For bidding purposes, the wells shall be constructed as shown in Sheet C-22 Drawing D-57048 to Section P – Contract Drawings. However, the final well design will be prepared and submitted to the Contractor by the District upon review of the borehole lithologic log, sieve analyses, and continuous core from the borehole.

B. WELL CONSTRUCTION STANDARDS

The new wells shall be constructed in compliance with (1) the latest edition or supplement(s) of: *State of California Water Well Standards, Bulletin 74-81* dated December 1981 and *Bulletin No. 74-90* dated June 1991, (2) local modifications to these Standards, (3) Sections 13800 through 13806 of the California Water Code, and (4) American Water Works Association (AWWA) Standard for Water Wells (AWWA A100-87 or later).

C. WELL CONSTRUCTION SUMMARY

Except as noted in the provision supplement(s), the general work required for well construction, development, and testing shall include, but may not be limited to the following:

1. Move on and off the well sites and complete permit application prior to start of work.
2. Setup and maintain a temporary field office, electrical, and telephone (cellular is acceptable) service and sanitary facilities.
3. Provide at least two temporary tanks for settlement of solids from development water prior to discharge to the point of discharge.
4. Provide temporary pipeline and appurtenances required to convey well development water to the point of discharge.
5. This line left intentionally blank
6. Remove and replace Class II aggregate base around well pad to match existing grade.
7. Continuous core all eight wells while drilling.
8. This line left intentionally blank.
9. Install blank and screened well casing, gravel pack, annular seals, and annular grout seal in accordance with the Plans and Specifications and final well design specified by the District.
10. Complete initial well development by air-lift swabbing (mechanical development).
11. This line left intentionally blank
12. Conduct a well alignment test by gyroscopic methods.
13. Construct the well pad with standpipe to protect well and bollards around pad per specifications.
14. Complete final site cleanup and restoration to the satisfaction of the District.

15. Provide all records required by the specifications and requested by the District.

D. CONTRACTOR EQUIPMENT

1. General

The contractor shall supply all equipment, tools, supplies, materials, power and personnel required to complete the work.

The Contractor shall supply provide a temporary field office and sanitary facilities as described in the Special Conditions.

2. Drilling Equipment

The single completion, shallow monitoring wells shall be drilled using hollow stem auger drilling methods (or equivalent) in which the uncased wall of the borehole is held in place by the auger flight at all times. The well will be constructed from bottom to top using Contractor supplied tremie pipe to insert gravel pack, sand pack, annular seal, and bentonite/grout seal. The Contractor will provide a complete drilling unit, all tools, accessories, power, lighting, water, and other equipment and experienced personnel necessary to conduct efficient drilling operations at the site.

The drilling equipment shall be in good condition and of sufficient mast capacity to drill the boreholes required by these specifications to a depth specified in Sheet C-22 Drawing D-57048 to Section P – Contract Drawings. All drilling equipment including mast, draw-works, air compressors, augers, bits, drilling fluid pumps, drill pipe, etc., must be of requisite size, sufficient capacity and in suitable condition to drill and set casing to the anticipated depths in the well (as specified for depth requirements). The mast and all running gear (hoists, cables, etc.) shall have sufficient and demonstrated capacity to lift two (2) times the buoyant weight of either the drill rig string or the blank and screened well casing assembly or auger flights (whichever is greater). The drill rig utilized must have the ability to fully lift and land the anticipated casing loads without the use of cranes, float plugs, or other similar devices.

The contractor shall submit, upon request, detailed information documenting the capacity of the various components of the rig used including, but not limited to: derrick/mast capacity, drill pipe type and rating, all line and hook load capacities, air compressor rating, mud pump capacity, etc. All drill pipes must utilize threaded flush or upset tool joints, or equal, as approved by the District.

Drilling equipment shall be disinfected on site prior to use and between wells. The methods, chemicals, and dosages employed shall be approved by the District.

3. Mud Tanks

No drilling mud is anticipated for the Hollow Stem Auger boreholes at the eight shallow monitoring wells.

4. Storage Tanks

The Contractor shall provide sufficient water storage capacity ("Baker Tanks" or equivalent) for retention of fluids generated during the course of the work, prior to their disposal. The tanks shall be joined in series such that water flows between the tanks to maximize settling time and minimize disturbance of settled materials. Water storage and clarification facilities utilized shall be sufficient to meet water discharge requirements of the District's NPDES permit (Section H). Pipelines or hoses used to link the water storage tanks and convey clarified water to the point of discharge shall be of a capacity sufficient to handle the maximum quantity of water that can be produced from the well during mechanical and pumping development as required.

5. Discharge Piping

The Contractor shall provide temporary discharge piping of adequate capacity and length to convey water pumped during well development to the point of water discharge specified in the Special Conditions.

E. CONTRACTOR RESPONSIBILITIES

1. The Contractor is solely responsible for making all necessary provisions for mobilizing onto and demobilizing from the well site with their equipment, tools, supplies, materials, and personnel.
2. The Contractor shall spread drill cuttings on the well site area at the direction of the District.
3. The Contractor shall convey all water discharged during development in a closed pipe to a suitable discharge point specified by the District representative. All water discharged shall meet the requirements in the District's NPDES permit (Section H).
4. The Contractor will submit all required reports and data to the District and other appropriate agencies.
5. The Contractor is responsible to have inspected the well site prior to submitting a bid and commencing construction activities (Note Mandatory Pre Bid Meeting Attendance requirement).
6. The Contractor shall keep the District and the District's Representative continuously informed of the on-site work schedule so that drilling, construction, and testing activities can be monitored as required by the District.

7. The Contractor is responsible for any damage to properties adjacent to the well site caused by the Contractor activities associated with the work described herein and shall restore these properties to their original condition.

F. QUALIFICATIONS AND QUALITY ASSURANCE

The Contractor shall have been engaged in the business of well construction using the hollow stem auger drilling methods, well completion with a depth, diameter, and capacity equivalent to those anticipated for the new well for a period of at least fifteen (15) years.

The Contractor shall submit a list of the last three (3) monitoring well owners for whom the Contractor has drilled equivalent monitoring wells. The list of references shall include (as applicable) the owner's name and address, casing diameter, type, depth, monitoring well depth, installed equipment (transducers, dedicated pumps, etc.), sanitary seal, screen interval, and other relevant data including drilling methods.

G. RECORDS

The Contractor shall keep a daily log and progress record at the site readily available for inspection during drilling of the pilot borehole, reaming, continuous coring, well construction, and development of the new well. Scans of the daily reports should be transmitted to the District representative at the end of each days work.

Specific records associated with each on-site activity are listed in Section 1.02 – Construction (Technical Provisions) of this detailed provision. In general, the Contractor shall keep records providing the following information:

1. Drillers description of formation materials penetrated at 10-foot intervals and at each major change of formation Description of any continuous core materials collected and disposition of the cores.
2. A log of drill bit types, diameters, and changes to drilling equipment, and drill rate.
3. Collection of continuous core from the 5-feet below ground surface to total depth. Two (2) sieve analysis samples will be collected from the screen interval for each borehole. The method of sample collection shall be approved by the District. Samples shall be preserved in one-gallon size, heavy (freezer) weight, zip-lock type, plastic bags labeled with the well name, date, time, and depth interval.
4. Results of sieve analysis of formation samples requested by the District and completed by the Contractor.
5. Results of continuous coring advancement, including blow counts and non-recovery.

6. Results of sieve analyses completed by the Contractor of representative samples of gravel pack materials delivered onsite prior to screen and casing installation. See Section 02734.1 1.02.D for number of samples.
7. Well construction activities including final schedule and diagram of installed blank and screened well casing, gravel pack, fine sand, and annular seals, and sanitary seal.
8. Cross-sectional diagram illustrating the as built well construction.
9. Records of well development for the screened interval including development method (swabbing, air lift pumping, added water, jetting, surging) and development through pumping methods. Records shall include a development log showing static water level, added water volume (calculated), pumping rates, drawdown, volume pumped, and water quality parameters (pH, conductivity, turbidity, temperature) and other information requested by the District.
10. Setup and results of well alignment and deviation surveys.
11. Schedule of well destruction if applicable.
12. Final as built of well including screen intervals, gravel pack, sand pack, annular seal, riser interval, sanitary seal, and surface completion including well head completion.

H. SUBMITTALS

All submittals shall be delivered to the District in both hard copy and District approved electronic format. All records shall be legible, typed as appropriate, and submitted to the District on 8.5" x 11" paper. Required submittal schedules are summarized in Table 02734.1.

I. GUARANTEE

1. General

For a period of three (3) years after acceptance of the well by the District, the Contractor shall make the following guarantees and accept the following responsibilities concerning their work:

- a. The well casing and screen shall remain intact throughout its entire length.
- b. Plumbness and alignment of the well shall remain within the tolerances set forth in these specifications.

2. Demonstration of Compliance

- a. To demonstrate compliance with the above, the Contractor shall perform one yearly inspection of the well under the Districts supervision.
- b. Should the sampling program indicate an issue with the well the drillers will budget for one gyroscopic inspection of the well under the Districts oversight. A report of the finding will be submitted to the District.

J. SUPERVISION AND COOPERATION

The Contractor shall provide a qualified and experienced foreman and drilling superintendent, one of who shall be constantly in attendance throughout drilling and construction of the new well.

In addition to directing all well drilling and construction (including down hole testing), the foreman shall be capable of coordinating the work with all personnel, subcontractors, and the District so that the overall project is safely and successfully executed and completed without undue conflicts or delays.

1.02 CONSTRUCTION (TECHNICAL PROVISIONS)

General requirements, materials, and execution for construction of District monitoring wells are presented in the following sections. Contract-specific requirements are presented in the provision supplements. Well locations, standard and construction drawings, figures, and tables are shown in and Sheet C-2 Drawing D-56999 and Sheet C-22 Drawing D-57048 to Section P – Contract Drawings.

A. MOBILIZATION

1. General

a. Description

Mobilization will include: 1) preparatory utility clearance of each site, pre-project video of site, and sign off on the respective permit documents; 2) transportation of personnel, equipment, and operating supplies to and from the well site; 3) as needed, establishment of temporary fencing, field office, power and telephone service (cell is acceptable), and portable sanitary facilities, 4) obtaining an adequate source of fresh water from the District; 5) setup of temporary water storage tanks, discharge line and appurtenances, and 6) other preparatory work required to complete construction of a new well including equipment, cleanup and return of site to match original surrounding grade and materials, and well head completion.

- b. Related Work Specified Elsewhere
 - (1) General Conditions, Section F-42, Measurement and Payment
 - (2) Mandatory Pre-Bid Walk Through – Special Conditions
 - (3) Pre-construction Conference – Special Conditions
 - c. Submittals
Well Drillers Permit from Riverside County Department of Environmental Health Services.
 - d. Measurement and Payment
A specific lump sum line-item is provided for mobilization/demobilization. The contractor shall incorporate the costs for mobilization/demobilization into the each well cost as specified.
2. Materials
Requirements for Contractor equipment are specified in Section 1.01D.
3. Execution
- a. Temporary water service for construction services will be supplied by the District in accordance with the procedures described in the Special Conditions and established at the Mandatory Pre-bid Walk Through.
 - b. The Contractor shall provide a work station and portable sanitary facilities for use by all personnel connected with this well project.
 - c. The Contractor shall keep the well site 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, drums, machinery, temporary structures, and surplus materials. The Contractor shall leave the site clean and ready for use by the District with access to the well head for future sampling and data downloads. The Contractor shall restore all temporary work areas at the site to their original condition.
 - d. The Contractor shall prevent damage to the well site, adjacent facilities and properties associated with pumping water during drilling and development, or due to interruption or diversion of storm or wastewater during execution of the work (proper BMP will be employed to address storm-water at the site).

- e. Dirt and sediment shall be kept out of water disposal/drain lines at all times. The Contractor shall properly dispose of all drilling, waste, and nuisance water.
- f. Well development and testing water shall be conveyed to the discharge location specified in the Special Conditions (Section 00100)). Water discharges shall be conducted under and in compliance with the District's NPDES permit (Section H).
- g. Drill cuttings and drilling fluids shall be dried and spread on site as directed by EMWD representative.

B. NOISE CONTROL

1. General

- a. Description
This section covers the installation of noise control barrier walls and other measures required to meet specified noise limits. Project-specific requirements are summarized in the provision supplement(s) and will be discussed at the Pre-bid Walk Through.
- b. Measurement and Payment
Payment for installation and removal of noise control barrier walls shall be at the price per linear foot bid.

2. Materials and Equipment

- a. Equipment and materials employed for noise suppression shall include, but are not limited to, equipping all internal combustion engines with critical residential silencers (mufflers), installing sound blankets over equipment (or equivalent barriers), shielding noise-producing equipment and installing noise control barrier walls.
- b. If required, barrier walls installed shall consist of fiberglass-filled curtains and shall have adequate transmission loss and a minimum wall height of 20 feet. Noise control barrier walls shall be designed by a registered civil engineer. The design shall preclude structural failure due to such factors as winds, shear, shallow soil failure, earthquakes, and erosion. The length, height, and location of noise control barrier walls shall be adequate to assure proper acoustical performance.

3. Execution

- a. Noise suppression shall be practiced at all times to minimize disturbance to persons living or working nearby, and to the general public. Noise control measures shall be installed to direct the greatest noise emissions away from these receptors. Operations shall be conducted in a manner to minimize noise generation consistent with the execution of the contract in a timely and economic manner.
- b. Noise control barrier walls and equipment shall be installed as needed to achieve a noise level of 65 db or less at the property lines. Noise levels in excess of 65 db shall be allowed only during critical operations for brief periods of time. Contractor shall make every reasonable effort to minimize noise levels during nighttime operations.

C. BOREHOLE, CASING AND SANITARY SEAL

1. General

a. Description

No conductor casing will be required for the eight single completion, shallow monitoring well locations.

The sanitary seal during well installation shall meet the requirements of California Department of Water Resources Bulletins 74-81 and 74-90 and all requirements of the County of Riverside Department of Environmental Health Services (DOHS).

b. Submittals and Notifications

- (1) Certified test reports to show compliance with both the physical and chemical properties of the seal.
- (2) Cement weigh or batch tickets
- (3) The Contractor shall notify the District at least 24 hours in advance of commencing drilling. The Contractor shall notify the District and Riverside County DOHS at least 48 hours in advance of setting the conductor casing and cement grout sanitary seal around the conductor casing. Unless pre-approved, installation shall not proceed without District and DOHS inspectors on site.

c. Measurement and Payment

- (1) Payment for this work item will be based on the unit price bid for the vertical feet of continuous grout seal placed adjacent to the conductor casing measured from the ground surface, excluding any lower portions of the annulus backfilled with non-grout materials.

Payment shall include all materials, labor, tools, and equipment required to drill the conductor borehole, collect formation samples, protect the borehole from collapse, supply and install the conductor casing, and supply and install the cement grout sanitary seal.

- (2) **A Conductor casing and sanitary seal installed to a depth less than the minimum specified in the bid schedule will not be accepted for payment and shall be replaced by the Contractor at the Contractor's expense.**

2. MATERIALS

a. Sand-Cement Grout

- (1) The grout used to fill the annulus between the conductor borehole and the conductor casing shall be sand-cement mix specified in the provision supplement. The mix shall not be more than two parts sand (by weight) to one part cement (by weight). The water cement ratio shall be about 7 gallons per 94 pound sack of cement (standard brand Portland cement, ASTM C150, Type II).
- (2) Water used for cement and grout mixtures shall be clean and of potable quality.
- (3) Materials used as additives for Portland cement mixtures in the field shall meet the requirements and latest revisions thereof, ASTM-C494, Standard Specifications for Chemical Admixtures for Concrete.
- (4) Special quick-setting cement, retardants to setting, and other additives, including hydrated lime to make the mix fluid (up to 10 percent of the volume of cement), and bentonite (up to 5 percent) to make the mix more fluid and to reduce shrinkage, may be used.

3. Execution

a. Borehole

- (1) The borehole shall be drilled at a location confirmed in the field with the District. Drilling shall not commence without the District or District's Representative on-site unless previously agreed by the District.
- (2) **During drilling, the Contractor shall collect and preserve representative samples of formation materials at 10-foot intervals and each major change in formation, in accordance with sampling procedures specified in Section 1.02.D - Pilot Borehole.**

- (3) Upon completion of drilling, the Contractor shall condition the borehole and take whatever steps are necessary to maintain and prevent collapse of the borehole prior to and during placement of the conductor casing and cement grout sanitary seal.

b. Installation of the Grout Seal

The grout seal at each well shall be constructed to a minimum depth of 25 feet.

- (1) After the conductor casing is installed and aligned, the annular space between the conductor casing and the conductor casing borehole shall be filled with cement grout from the bottom of the borehole to the ground surface. **The MINIMUM depth of the grout seal shall be as specified in the provision supplement(s).** Prior to grouting, the Contractor shall fill the inside of the conductor casing with water to balance the hydrostatic pressure between the inside and outside of the casing during placement of the grout.

- (2) The grout shall be pumped into the annular space through a tremie pipe installed to the bottom of the borehole. The bottom of the tremie pipe shall remain submerged in the grout throughout the placement of the grout. The placement procedure shall be approved by the District prior to installation of the grout seal. The Contractor shall take all precautions to prevent the collapse of the conductor casing and borehole during placement of the grout.

- (3) The grout seal shall be placed in one continuous pour.

- (4) **The Contractor shall not operate any equipment on-site during the 24-hour period immediately after the grout has been placed.**

- (5) In the event the borehole or part of the borehole collapses prior to completion of grouting, the Contractor shall take whatever steps are necessary to reopen the borehole, reset the casing and place the grout as required. Any such remedial action shall be conducted at the Contractor's expense.

D. BOREHOLE Drilling

1. General

a. Description

At the drillers discretion they may drill a pilot borehole initially. If this is done the continuous coring requirements shall be completed during the pilot borehole.

- b. Related Work Specified Elsewhere
No other requirements
 - c. Submittals
 - (1) 1. Daily activity report.
 - (2) 2. Continuous Core of formation materials.
 - (3) 3. Results of sieve analysis of formation samples.
 - (4) 4. Lithologic log.
 - (5) 5. Drilling rate log.
 - d. Measurement and Payment
Payment for borehole drilling for the hollow stem auger boreholes will be included in the drilling rate. Payment shall include all materials, labor, tools, and equipment required to drill the pilot borehole, collect formation samples, conduct sieve analysis of formation samples, maintain circulation, and protect the pilot borehole from collapse.
2. Materials
- a. Fluid
Not Applicable for Hollow Stem Auger
 - b. Borehole
 - (1) Minimum 12-inch diameter
 - (2) Depth: 205 ft (or as specified by the District)
3. Execution
- a. Borehole Drilling
 - (1) Borehole shall be drilled from the bottom of the hand augered boring to the specified depth and diameter (Section 02734.1). The final depth of the pilot borehole will be determined by the District as drilling proceeds. The Contractor shall drill below the specified depth only if requested to do so in writing by the District. The Contractor shall take all measures necessary to protect the borehole from caving or raveling.
 - (2) The Contractor shall maintain a record showing any variation in the drill rate or evidence of heaving sands during drilling. The depths at which such changes are required shall be shown in the daily reports.

b. Formation Sampling

- (1) The Contractor shall collect continuous core for the entire borehole length. Zones with no recovery shall be noted in the daily log. Core boxes will be provided to store the core and maintain its relative position in the borehole log. Each core box will be labeled to indicate the depth interval, borehole ID, and date. Sieve samples from two intervals within the screened zone will be collected and be placed in one-gallon size, heavy (freezer) weight, zip-lock type, plastic bags and shall be labeled to indicate the well name, date, time and depth interval. Collected samples shall be stored in a manner to prevent breakage or loss.
- (2) Upon completion of the pilot borehole the borehole can be reamed to the diameter required in the final well design.

c. Sieve Analysis

- (1) The Contractor shall conduct sieve analysis of samples of formation materials selected by the District. The numbers of analyses required are specified in the provision supplement(s).
- (2) Sieve analysis shall be conducted by a firm acceptable to the District using a set of sieve sizes previously approved by the District.
- (3) Up to two (2) samples per well borehole (selected by the District)

E. DRILLING FLUID

1. General

- a. Description
Not Applicable
- b. Submittals
Not required.
- c. Measurement and Payment
Not required.

2. Materials

- a. Drilling Fluid
Not required.

3. Execution
Not Required.

F. DOWNHOLE GEOPHYSICAL SURVEYS

1. General
Not Required.

G. BOREHOLE SEAL

1. General

- a. Description

- (1) This work item includes installing a grout seal, at the District's option in the lower (bottom) portion of the borehole.
- (2) **Requirements will vary by Contract. The work item status and tentative seal depth are specified in the provision supplement(s).** The final seal depth and thickness will be specified in the final well design submitted to the Contractor by the District after evaluation of the lithologic log and continuous core results, as applicable.

Requirements:

- (a) One (1) seal at top or bottom of each borehole (District option)
- (b) Seal depth to be specified by the District in the final well design.

- b. Submittals

- (1) Daily activity logs.
- (2) Cement weigh tickets.
- (3) Record of actual depth and thickness of seal installed.

2. Materials

- a. Seal

Cement grout used for the borehole seal shall be a non-shrinking cement mixture approved by the District. The grout shall be supplied by a qualified subcontractor.

3. Execution

- a. The borehole seal may be installed in the pilot borehole or following completion of reaming operations. If installed after reaming, the Contractor shall re-enter the borehole with the pilot hole bit to clean out that portion of the borehole to be sealed.
- b. Cement grout shall be pumped in the borehole using a tremie pipe. The bottom of the tremie pipe shall remain submerged during the entire grouting operation.

H. FINAL REAMED BOREHOLE

1. General

a. Description

This item includes reaming the pilot borehole to the final borehole diameter(s) and depth(s) specified by the District in the final well design. The reaming of the borehole will be at the drillers option and will be included in the hollow stem auger rate.

Requirements:

Not Required

b. Related Work Specified Elsewhere

Not Required

c. Submittals

Not Required

d. Measurement and Payment

If reaming is conducted by the driller, the cost will be incorporated within the drilling rate for the well. No additional fee will be paid for reaming unless requested by the District in writing.

2. Materials

None Required.

3. Execution

Not required.

I. CALIPER SURVEY

1. PART 1 - GENERAL
Not required.

J. WELL CASING

1. General

- a. Description

- (1) This item includes the supply and installation of blank and screened well casing and end cap required by the final well design. Well construction materials are specified in the provision supplement(s). For bidding purposes, tentative schedules of completion for Contract wells are provided in the provision supplement(s), and shown on Sheet C-22 Drawing D-57048 to Section P – Contract Drawings.
 - (2) Upon receipt of sieve analysis, the District will require an evaluation period of up to 24 hours not including weekends and holidays. No standby time shall accrue during this period.
 - (3) A final schedule of well casing will be prepared by the District and submitted to the Contractor upon completion of analyses of a lithologic log and sieve analyses of drill cuttings, and review of the continuous core.

- b. Submittals

The Contractor shall submit certified test reports and other documentation necessary to demonstrate compliance with (1) the physical and chemical properties of the PVC used in the manufacture of blank and screened well casing delivered on-site, and (2) diameter, wall thickness and slot dimensions (as applicable) of blank and screened well casing (PVC) specified in the final well design.

- c. Measurement and Payment

- (1) Payment for installation blank well casing will be based on measurement of the vertical feet of well casing installed, complete and in place, exclusive of casing and screened well casing (see Bidding Sheets)
 - (2) Payment for installation of screened well casing will be based on measurement of the vertical feet of screened well casing installed, complete and in place, exclusive of the other blank well casing (see Bidding Sheets).

- (3) Payment for the blank and screened well casing, shall include supply and installation of centralizers, end caps, and all equipment, materials and labor required for successful installation at the specified depths.

2. Materials

a. Blank Well Casing

- (1) The single completion, shallow wells will be constructed using Schedule 80, 4-inch I.D., PVC flush threaded casing.
- (2) All casing materials shall be new.
- (3) The blank well casing shall have the same I.D., thickness, physical and chemical properties as the screened well casing.

b. Screened Well Casing

- (1) Schedule 80, 0.040-inch slot, 4-inch I.D., flush threaded PVC screen.
- (2) All well screen materials shall be new.
- (3) For bidding purposes, the aperture size of the well screen is specified in the provision supplement(s). **The final aperture size will be selected after examination of the lithologic log and sieve analyses of drill cuttings and the down hole geophysical surveys and will be specified in the final well design prepared by the District.**
- (4) The well screen shall be factory assembled in 10-foot, 20-foot or 40-foot lengths as specified by the District.

c. Casing Centralizers and Bottom End Cap

Centralizers will be provided every 40 feet such that the wells riser and screen are centered in the borehole to the ground surface. Casing centralizers and bottom end cap shall be provided as shown on the plans. The centralizers and bottom end cap shall be of the same physical and chemical properties as the well casing.

d. Sounding Tube(s)

Not required

e. Air Vent Tube

Not Required

f. Permanent Gravel Feed Tube

Not Required

- g. Welding Electrodes
No welded casing all joints will be flush threaded.

3. Execution

a. General

Installation of well casing and screen shall commence upon completion of continuous core and District-approved final well design, and after all well construction materials delivered on site have been examined and approved by the District for compliance with the final well design.

The final arrangement of the temporary tremie pipe around the well casing shall be approved by the District prior to installation of well casing.

b. Joints

All risers and screen will be designed as flush threaded couplings. No welded joints will be required.

c. Centralizers

The centralizers will be placed on the screen and risers at 40 foot intervals and will be situated such that they space the well evenly within the borehole. The centralizers will be located at 40 foot intervals starting at 20 feet from the bottom of the well and progressing to the surface.

d. Construction Tremie Pipe

A temporary construction tremie pipe shall be installed in the borehole (within the auger) prior to installation of well casing. The tremie pipe shall be used to install gravel pack, and annular seal materials in the annulus between the well casing and borehole/auger wall. The tremie pipe shall be completely removed after placement of the upper annular seal.

e. Blank and Screened Well Casing

- (1) Prior to casing installation, the Contractor shall inspect for and remove any tags, labels or other deleterious material attached to the interior or exterior of the blank and screened well casing.
- (2) The well casing string assembled shall be suspended in tension from the surface by means of an appropriate hanger or clamp. The use of float plugs to land and set casing will not be permitted. The casing

string shall be plumb and centered in the borehole. The bottom of the casing shall not rest on the bottom of the borehole.

- (3) If for any reason the casing cannot be landed in the correct position, or at a depth acceptable to the District, the Contractor shall rectify the situation by either removing the casing, re-reaming the borehole and re-installing the casing, or constructing another well in accordance with the specifications, plans and final well design at a location immediately adjacent to the original well. All such remedial work shall be at no additional cost to the District. The borehole of the abandoned well shall be properly destroyed at the Contractor's expense in accordance with Section 1.02.S.
- (4) If any of the casings should collapse or be damaged prior to well completion, they shall be withdrawn and replaced at the Contractor's expense.
- (5) 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 therefore, except as specifically provided herein.
- (6) The top of the well casing string shall extend approximately 18-24 inches above the ground surface.
- (7) The well will be constructed so that there is adequate room in the protective standpipe for the cables, bladder pump discharge lines and airlines, and data logger materials.
- (8) Following casing installation, the top of the well casing shall be covered with a protective steel plate at all times when personnel are not on the site.

K. GRAVEL PACK

1. General

a. Description

This item covers the supply and installation of gravel pack materials in the annulus adjacent to the blank and screened well casing.

b. Submittals

- (1) Initial description and recent certified sieve analysis of gravel pack materials to be used for well construction. The sieve analysis shall be submitted to the District for approval at least three (3) days prior to the anticipated date of gravel shipment from the supplier.

- (2) Copies of weigh tickets for gravel delivered on-site.
- (3) Measurement of the total volume of gravel installed in the well annulus.

2. Materials

a. Gravel Pack

- (1) For bidding purposes assume 8 x 16 gradations, TACNA or District approved equal. The final gravel gradation will be specified in the final well design provided by the District after evaluation of the lithologic log and borehole samples.
- (2) Gravel shall be delivered to and contained on-site in appropriate size bags ("super sacks").
- (3) At the District's request, Contractor shall complete up to three (3) sieve analyses of gravel pack materials delivered on-site. Gravel re-delivered or re-mixed to replace any rejected material shall be sampled and tested at the District's request and Contractor's expense.
- (4) All gravel or coarse-grained sand for packing shall be hard, water-worn, and washed clean of silt, fine sand, dirt, and foreign matter. Crushed gravel will not be accepted. The gravel shall be well-rounded and graded, and subject to the approval of the District.
- (5) **The gravel shall be delivered on-site as specified in Section 02734.1. and shall be protected and kept free of all foreign matter.**

3. Execution

- a. Prior to placement of the gravel pack, the tremie pipe will be flushed with clean water (fresh water down the tremie pipe).
- b. Muddy borehole fluid displaced during gravel packing shall be conveyed to the on-site Baker Tanks (or equivalent) for clarification prior to discharge.
- c. Baker Tanks (or equivalent) used for fluid clarification shall be setup prior to commencing well construction.
- d. Contractor shall provide gravel tremie pipe in lengths sufficient to ensure the drop during placement of the gravel is acceptable to the District. Five and ten foot lengths of pipe shall be available as needed.
- e. The gravel pack shall be installed in the annular space between the auger flight and borehole wall and the well casing through a construction tremie pipe from the bottom of the borehole.

A circulating system with one or more positive displacement pumps utilizing fresh water shall be used for the purpose of introducing the gravel into the annulus. Under no circumstances will the gravel pack be allowed to "free-fall" down into the annular space.

- f. A device approved by the District shall be used to sound the level of the gravel during its placement.
- g. **During placement, the gravel quantities will be monitored as specified in the provision supplement(s). Gravel pack shall include a 5-foot thick fine sand layer at the top of the gravel pack.**
- h. After the gravel pack has been placed to the depth specified by the District, all rock, sand, gravel, and foreign materials shall be removed from the casing by bailing and/or pumping.
- i. **The Contractor shall record the volume of gravel installed.** The volume shall not be less than the calculated volume of the annular space between the casing and the borehole wall based on the final hollow stem auger diameter. A significant discrepancy may be grounds for rejection of the well by the District.
- j. After installation of the gravel pack, an upper annular grout seal shall be installed as specified in the final well design and specification 02734.1 102.M.

L. ANNULAR SEALS

1. General

- a. Description
 - (1) Number of seals: 1 seal at top of well screen (District option)
 - (2) Length of seal: Specified in final well design but plan for 10 feet
 - (3) Seal depth: Specified in final well design
 - (4) This item includes placement of annular seals adjacent to blank sections of the well casing. Seals will be installed at the option of the District as specified in the final well design.
 - (5) For bidding purposes, tentative seal requirements are specified in the provision supplement(s).
- b. Submittals
 - (1) Daily activity logs.
 - (2) Material certification reports.

- (3) Record of actual depth(s) of placement and volume(s) of annular seal materials placed in the annulus.
 2. Materials

Annular seals shall consist of a mixture of 1/8 to 1/4-inch bentonite chips (Baroid Benseal or approved equal) and gravel. The gravel used in the mixture shall be the same gravel specified for the gravel pack or other approved material. Bentonite chips and gravel shall be pre-mixed dry prior to tremie placement in the annulus.
 3. Execution
 - a. A seal shall be installed by pumping the seal mixture through a tremie pipe. The pipe shall extend from the ground surface to the bottom of the interval to be sealed. The seal shall be pumped in place from the bottom of the interval to the top in a continuous operation.

The Contractor shall sound the annulus to verify the starting and ending depths of a seal after each load of seal mixture has been pumped.
 - b. The Contractor shall keep a record of the volume of seal mixture used. The volume shall not be less than the calculated volume of the annular space between the reamed borehole and the well casing.

M. UPPER ANNULAR GROUT SEAL

1. General
 - a. Description
 - (1) This item includes placement of annular seals adjacent to blank sections of the well casing. Seals will be installed at the option of the District as specified in the final well design. An upper annular seal from 20 ft bgs to ground surface will be required for each borehole.
 - (2) For bidding purposes, tentative seal requirements are specified in the provision supplement(s).
 - b. Submittals
 - (1) Daily activity logs
 - (2) Material certification reports.
 - (3) Record of actual depth(s) of placement and volume(s) of annular seal materials placed in the annulus.
2. Materials
 - a. Cement used for the seal shall be a standard brand Portland cement (or equivalent) conforming to ASTM C150, Type II.

- b. The grout shall be a sack sand-cement mix. There shall be not more than two parts by weight of sand to one part by weight of cement. The water-cement ratio shall be about 7 gallons per sack of cement (94 pounds). All on-site water additions shall be metered. Up to 5 percent bentonite gel may be added.
- c. Clean medium-grained sand shall be used to separate the gravel pack from the annular seal.

3. Execution

- a. A seal shall be installed by pumping the seal mixture through a tremie pipe. The pipe shall extend from the ground surface to the bottom of the interval to be sealed. The seal shall be pumped in place from the bottom of the interval to the top in a continuous operation.

The Contractor shall sound the annulus to verify the starting and ending depths of a seal after each load of seal mixture has been pumped.

- b. The Contractor shall keep a record of the volume of seal mixture used. The volume shall not be less than the calculated volume of the annular space between the reamed borehole and the well casing.
- c. The Contractor shall provide grout (tremie) pipe sections in incremental lengths sufficient to ensure the discharge end of the pipe remains continuously submerged in the grout at all depths during placement as required by the Riverside County Department of Environmental Services.
- d. The Contractor shall be responsible for determining the collapse potential of the well casing during grouting and shall take whatever precautions are necessary to prevent casing collapse. In the event the casing collapses prior to completion of seal installation, the Contractor shall take whatever steps are necessary to reopen the well and place the seal as required by the final well design. Any such remedial action shall be conducted at the Contractor's expense.
- e. The Contractor shall keep a record of the actual depth and volume of grout installed. The volume shall not be less than the calculated volume of the annular space between the well casing and the reamed borehole.
- f. The Contractor shall not operate any heavy equipment on-site during a 24-hour period immediately following placement of the seal.

N. MECHANICAL WELL DEVELOPMENT

1. General

- a. Description
Mechanical development shall proceed until purged water turbidity value of 10 NTU is reached and District concurs that the well is sufficiently developed as specified in this Section and Section 02734.1 Item 2.16.

 - b. Submittals
The Contractor shall maintain a **daily** record of development activities. The record shall include: (1) depth interval and time developed, (2) volume of sediment bailed from the bottom of the well, (3) static water level, (4) approximate well discharge during air-lifting, and total hours developed daily.

 - c. Measurement and Payment
 - (1) The time required for well development will be recorded by the hour with 15-minute intervals as the smallest unit of recorded time. The time recorded for payment shall commence when the equipment installed in the well is placed in operation and shall end when development is stopped at the direction of the District. No additional payment will be made running equipment into or out of the well. The time required to run equipment into and out of the well shall be anticipated by the Contractor and included in the hourly rates bid for well development.
 - (2) No payment will be made for delays resulting from: (a) equipment stuck in the borehole, (b) equipment breakdown, (c) arranging major drilling, pumping or testing apparatus, or (d) failure to conduct the operations in a diligent and workmanlike manner by which the desired results could ordinarily be expected.
 - (3) No additional payment shall be made for gravel added to the annulus as the gravel pack settles.
2. Materials
- a. Swab
Swabbing of the well shall be done with close fitting single and double swabs whose outside diameter of the surge blocks shall not be more than 1/8-inch smaller than the inside diameter of the screen section, unless approved otherwise by the District.

- b. **Water Storage Tanks and Discharge Piping**
The Contractor shall provide storage tanks (described in Section 1.01.D) for clarification of development water prior to discharge to the point specified in the Special Conditions.

The Contractor shall provide temporary discharge piping as needed to convey clarified development water to the point of discharge.

- c. **Air Compressor**
The Contractor shall provide an air compressor of adequate capacity in both volume (CFM) and pressure (PSI) to maintain air-lifting efficiency at all depths during mechanical development.

3. **Execution**

Contractor shall not commence development until solids settlement, discharge and sound control facilities are installed to the satisfaction of the District.

Mechanical development by simultaneous airlifting and swabbing shall commence within 24 hours after completion of the idle period following placement of the upper annular grout seal. Development shall be completed in two stages as described below. For the upper zone potable water may be added to help develop the well, Contractor will measure the flow rate to calculate the quantity of water added during development.

Stage One - Initial Development with Single Swab

- a. Initial mechanical development shall be completed with an open-ended single swab attached to the end of the drill pipe.
- b. Swabbing shall be completed to remove sediment and heavy fluids from the well casing.
- c. The tool shall be moved up and down three to four times in a section of well screen while airlifting. After working the tool to the bottom of the well, airlifting shall continue until all sediment is removed.

Stage Two - Development with a Double Swab

- a. Development with a double swab shall commence immediately following completion of development with a single swab.

- b. The double swab tool shall consist of a perforated steel pipe, 10 to 20 feet in length, fitted with rubber packer assemblies at the top and bottom. The bottom of the perforated pipe shall be capped.
- c. Simultaneous airlifting and swabbing using the double-swab tool shall commence in the upper-most screened interval and proceed to the lower-most screened interval. Each screened interval shall be swabbed and airlifted in 20-foot increments until the discharge water becomes substantially clear as determined by the District. Approximately 2 1/2 to 3 hours are anticipated for each 20-foot increment of screened well casing.
- d. Development in each 10- to 20-foot increment of screened well casing shall include raising and lowering the double swab tool three to four times or more in a shorter section of the screened well casing as needed to produce sediment-filled discharge water while airlifting continues.

Air-lift swabbing shall be followed by a period of airlifting without swabbing until the discharge water clears. This process shall be repeated until water produced from the 10- to 20-foot section of screened well casing becomes substantially clear and no additional settlement of the gravel pack is observed. Upon completion, the dual-swab tool shall be moved to the next 10- to 20-foot section of screened well casing and the process repeated until all screened intervals have been fully developed.

- e. Upon completion of mechanical development, the well shall be accurately sounded in the presence of the District to determine the level of accumulated sediment in the well. The sediment level shall be recorded on the Driller's daily activity log. All accumulated sediment shall be bailed from the well prior to installing the temporary test pump.

O. CHEMICAL DEVELOPMENT

1. General

If directed by the District chemical development may be carried out on the wells.

a. Description

- (1) This item includes introduction of chemicals to augment initial (mechanical) development of the well (Section 1.02.N). A chlorine solution and clay dispersing agent shall be introduced and swabbed into the well and gravel pack in successive stages.
- (2) Chemical development will be completed, in whole or in part, at the option of the District.

- (3) This item applies to wells constructed using bentonite-based drilling fluids only.
 - b. Submittals
 - (1) Daily activity log.
 - (2) Descriptions and quantities of chemicals added to the well during development.
- 2. Materials
 - a. Solution

See provision supplement(s) for assumed quantity and concentration of chlorine solution per 20 feet of well screen.
 - b. NW-220

See provision supplement(s) for assumed quantity of NW-220 solution required per 20 feet of well screen. (NW-220™ AQUA Clear™ PFD or equivalent)
- 3. Execution
 - a. If completed, chemical development shall be conducted in two stages and shall be integrated with mechanical well development.
 - b. Stage One - Chlorination
 - (1) At the option of the District, a 10 percent chlorine solution shall be introduced into the well upon completion of stage one of mechanical development using a double-swab tool.
 - (2) A pre-mixed solution of chlorine and water shall be swabbed into the screened intervals of the well from the bottom of the well to the top.
 - (3) The chlorine solution shall remain in the well for a minimum period of 12 hours, or as approved by the District. Following the idle period, the Contractor shall use the double-swab tool to remove the chlorine solution from the well by airlifting.
 - c. Stage Two - Introduction of Clay-dispersing Agent (NW-220)
 - (1) At the option of the District, introduction of NW-220 shall commence immediately upon completion of removal of the chlorine solution from the well. NW-220 shall be introduced and swabbed into each 10-foot section of well screen for a period of 30 minutes (or other period approved by the District) using a double-swab tool.

Upon completion of swabbing, the NW-220 shall be allowed to stand in the well for a period of 24 hours, or other period approved by the District.

- (2) After the idle period, mechanical well development using a double-swab tool shall continue in accordance with Section 1.02.N.

P. PUMPING DEVELOPMENT

1. General

a. Description

This item includes development of the well by surge pumping using an airlift pump (or equivalent).

b. Submittals

Daily log of pumping development including static water level, well discharges, pumping water levels, description of water discharged and hours pumped.

c. Measurement and Payment

- (1) The time required for well development will be recorded by the hour with 15-minute intervals as the smallest unit of recorded time. The time recorded for payment shall commence when the equipment installed in the well is placed in operation and shall end when pumping is stopped. Time required to run equipment into and out of the well shall be included in and paid for as described in this Section.
- (2) No payment will be made for delays resulting from: (a) equipment stuck in the borehole, (b) equipment breakdown, (c) arranging major drilling, pumping or testing apparatus, or (d) failure to conduct the operations in a diligent and workmanlike manner by which the desired results could ordinarily be expected.
- (3) No additional payment shall be made for gravel added to the annulus as the gravel pack settles during development.

2. Materials

Requirements for the test pump, discharge line, and other equipment for pumping development are described in this Section.

3. Execution

- a. Well development using the test pump shall commence after completion of initial development by air-lift swabbing and pumping, within the time period specified in the provision supplement(s). Once started, development pumping shall proceed on a continuous basis at a daily work schedule approved by the District.
- b. The well shall be developed by intermittent pumping and surging at an initial rate approved by the District and continued until the water is clear. Surging shall allow water to flow back through the bowls with free backspin and through the casing perforations.

The pump shall then be started and stopped several times and then pumped at the current rate until the water is clear. The procedure shall be repeated at District approved discharge increments up to the maximum pump or well capacity, as specified by the District.
- c. During initial pumping development, water clarification may be required in on-site water storage tanks to allow for settling of sediment prior to conveying the water to the specified point of discharge (see Special Conditions).
- d. Development records shall be maintained on at least a half-hour basis showing production rate, pumping level, drawdown, and all other pertinent information concerning well development. A representative static water level shall be measured and recorded at least once a day.
- e. The rate of sand production shall be measured using the centrifugal sand separating meter. The results of all sand production tests shall be expressed in parts per million at 5-minute intervals and shall be provided to the District immediately. The final sand production test shall be conducted in the presence of the District.
- f. Clean water shall be added continuously down the tremie pipe during development.
- g. If during development operations the gravel pack settles, more gravel shall be added as needed and the quantity recorded and reported to the District.
- h. Development shall continue at each discharge rate until the following conditions have been met:
 - (1) No further settlement of gravel pack.
 - (2) Well specific capacity (gpm/ft drawdown) remains relatively constant over an approximate 4-hour period or as specified otherwise by the District.

- (3) Sand content meets requirements specified in the provision supplement(s).
- i. The duration of development pumping shall not exceed the bid amount without prior District authorization.
- j. Upon completion of development pumping, the Contractor shall (in the presence of the District) measure the depth of the well to determine the amount of sediment deposited in the bottom. If the sediment level extends into the screened interval of the well, the Contractor shall pull the pump, clean the well of all accumulated sediment and foreign material, and reinstall the test pump prior to running the production tests.

Q. ALIGNMENT/DEVIATION TESTS

1. General

a. Description

Each single completion, shallow well will be evaluated for alignment per the specifications (District Option). The Contractor shall conduct alignment/deviation tests, using a gyroscopic tool, to determine the plumbness and straightness of the well casing. For bidding purposes, the casing interval to be tested is specified in the provision supplement(s).

b. Submittals

- (1) Within ten (10) days of Notice of Award, the Contractor shall submit to the District the name and qualifications of the firm proposed for completing the alignment/deviation tests.
- (2) Report of deviation and directional survey measurements and interpretation of well plumbness and alignment.

2. Materials

a. Gyroscopic Tool

The deviation and direction survey shall be performed with a gyroscopic-type tool or a similar type tool as approved by the District.

3. Execution

- a. Alignment/deviation testing shall be conducted in the presence of the District.
- b. Alignment criteria are specified in the provision supplement(s).

R. STANDBY TIME

1. General

a. Description

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

(1) Idle period following placement of upper annular grout seal: 24 hours.

(2) Grout and bentonite seal set up time during well construction.

b. Submittals

(1) Daily log summarizing idle resources (description, basis of claim and hours).

(2) Written claim for standby time.

c. Measurement and Payment

(1) Payment for standby time shall be based upon the hourly rate bid and the number of hours approved by the District.

(2) As indicated in various sections of this detailed provision and in the provision supplement(s), idle periods associated with specific work items are known to be required and shall be incorporated in the unit prices bid for these items. Idle time incurred during these periods shall not be the basis for a claim of standby time.

(3) Idle time in excess of the maximum period specified for a particular work item, shall accrue if specified Contractor obligations have been met and the District exceeds the specified time period through no fault of the Contractor. Payment for this idle time shall be at the unit price bid for standby time.

2. Material
(Not used)3. Execution
(Not used)

S. DESTRUCTION OF NEW WELL

1. General

a. Description

This item includes destruction of the borehole or casing for the new well. Destruction may be initiated due to actions of the Contractor or at the request of the District.

b. Submittals

- (1) Daily activity log.
- (2) Final schedule of destruction.

c. Measurement and Payment

- (1) No payment will be made for destruction required due to actions of the Contractor.

2. Materials

a. Sealing Materials

Acceptable impervious sealing materials that may be employed in the destruction of the borehole or well include neat cement or sand-cement grout.

- (1) A neat cement mixture shall be composed of one 94-pound sack of Portland cement and 5 to 6 gallons of clean water. Bentonite may be used to a total of 5 percent of the volume of cement to make the mix more fluid and reduce shrinkage.
- (2) Sand-cement grout shall be composed of not more than 188 pounds of sand and one 94-pound sack of Portland cement (2 parts sand to 1 part cement by weight) to about 7 gallons of clean water. This is equivalent to a 10.3 sack mix. Bentonite, to make the mixture more fluid and reduce shrinkage, may be used to a total of 5 percent of the volume of cement.
- (3) Quick setting cement, retardants to setting, hydrated lime and additives to make the mix more fluid may be used up to a total of 10 percent of the volume of the cement. Bentonite, to make the mix more fluid and reduce shrinkage, may be used to a total of 5 percent of the volume of cement.

- b. Filler Material
Suitable filler materials include clay, silt, sand, gravel, crushed stone and those described in the previous section. Material containing organic matter shall not be used.
3. Execution
- a. Destruction Prior to Installation of Casing
 - (1) Destruction Due to Actions of the Contractor. If destruction of the borehole is by reason of any actions of the Contractor, including but not limited to such causes as losing tools, damaging the well, misalignment, or any other cause attributed to careless or poor workmanship, the borehole shall be completely filled with bentonite, cement or other impervious earth materials in accordance with applicable State and County Standards.
No payment will be made for drilling and filling the borehole so destroyed or for mobilization and demobilization of this procedure. The Contractor shall drill a new borehole as specified in the Plans within fifty (50) feet of the original location, or as specified by the District.
 - (2) Destruction at Request of the District. If destruction of the drilled borehole is specifically requested by the District in writing, including but not limited such causes a total lack of potential aquifers, insufficient number of potential aquifers, or unacceptable quality, the borehole shall be filled completely with bentonite, cement, or other impervious materials in accordance with applicable State and County Standards. In this event, the Contractor will be paid for mobilization and demobilization at the site, as well as for the footage of drilling completed. The Contractor may then be requested to re-mobilize at a second site selected by the District. No payment for standby time will be made while awaiting a second site.
 - (3) Destruction hereunder also shall include payment for destruction of any remaining or unused portion of the pilot borehole that is not being used for final well completion.
 - (4) Payment for destruction of the borehole, if required and specifically requested by the District as set forth above, shall be made on a unit price per foot and shall be considered full compensation for all time, materials, and equipment required to complete the destruction.

b. Destruction During or After Installation of Casing and/or Well Screen

Necessity to destroy the cased borehole shall be deemed caused by the actions of the Contractor or the Contractor's negligence. In the event the borehole is destroyed after installation of casing or screen, the Contractor shall at their discretion, pull or leave the installed casing sections in place. In either case, the borehole shall be destroyed in accordance with State law by backfilling the casing and/or borehole with bentonite, cement or other impervious material.

No payment shall be made for lost or damaged casings and/or their installation in a well destroyed by reason of any action of the Contractor. The Contractor shall be required to drill a new well as shown on the Plans within 50 feet of the original site.

T. INSTALLATION OF DATA LOGGERS

1. General

a. Description

Contractor will purchase, supply, and install a total of 8 In Situ Level Troll 500 Data Loggers (or District approved equivalent) with appropriate cables, large desiccant, and wiring to reach the required depths.

b. Submittals

Provide the District the manufacturer specifications and equipment list prior to purchase for District approval.

c. Measurement and Payment

Upon submittal of operations manual, records from testing, and documentation on equipment.

2. Materials

a. Data logger will be In-Situ Level Troll 500 transducer with cable and wiring sized for placement at the respective depths in each well.

b. District has requested large desiccant package for each transducer.

c. Items will be new in original factory packaging when delivered to the site.

3. Execution

The Contractor shall provide equipment, staff, and materials for placing the transducers within each specified screen interval at the specified depth (District will determine the final depth for each transducer). Once the transducers have been placed the contractor will test that each unit is working in accordance with the manufacturer's specifications.

TABLE 02734.1
Summary of Submittals*
Detail Provision Section 02734.1

Work Phase	Submittal	Specification Section(s)	Submittal Schedule
Notice of Award	List of Proposed Subcontractors (alignment logs)	2.17	Submit names of subcontractors within 10 days of Notice of Award
Pre-Construction Conference	Drilling Fluid Program	NA	NA
All	Daily Activity Reports	All Phases of Work	Daily reports grouped and submitted weekly
Mobilization	Well Driller's Permit from Riverside County Department of Environmental Health	1.02.A	Due prior to mobilization
Conductor Casing – Not Applicable	Material Certification Reports	1.02.C	Due upon delivery of casing on-site
Sanitary Seal – Not Applicable	Cement Weigh Tickets	1.02.C	Due upon delivery of material on-site
Pilot Borehole	Formation Samples	1.02.D	Due in the field as sampled
	Lithologic Log and Drilling Rate log	1.02.D	Due in the field each day
	Gradation (Sieve) Analyses of Formation Samples	1.02.D	Due after completion of drilling
	Downhole Geophysical Surveys – Not Applicable	1.02.F	NA
	Bottom Seal, Cement Weigh Tickets and final Depth Interval	1.02.G	Due upon delivery of material on site and completion of seal installation
	Caliper Survey – Not Applicable	1.02.I	NA

Borehole Reaming	Certified Test Reports and other Documents for Blank and Screened Well Casing, and Cross Sectional Diagram illustrating the design of the well.	NA	NA
Casing and Fill Installation	Gradation (Sieve) Analyses of Gravel Pack Materials	2.1.02.K	Approved sieve analysis prior to shipping; up to three (3) sieve analyses of materials delivered on site due prior to start of casing installation
	Material Certification Reports and Cement Weigh Tickets, as applicable, for Annular Seals and Upper Annular Grout Seal	1.02.L & 1.02.M	Due upon delivery of materials on-site and prior to seal installation
	Schedule and Diagram of installed well casing, gravel pack, and annular seals	1.02.J, 1.02.K, 1.02.L & 1.02.M	Due within 2 weeks of completion of construction
Mechanical Well Development	Daily Development Summary (depth intervals developed, total hours, gravel settlement/additions, and volume of sediment bailed from well)	1.02.N	Daily reports grouped and submitted weekly
Chemical Well Development	Chemical Use Summary (descriptions and quantities of chemicals added to the well during development)	1.02.O	Due upon completion of pump installation

Pumping Development – Not Applicable	Daily Development Summary (hours pumped, surging details, daily static water level, well discharge, pumping water level, specific capacity and sand content)	1.02.P	Daily reports grouped and submitted weekly
Alignment/Deviation Testing	Results of Alignment and Deviation Surveys	1.02.Q	Five (5) field copies of survey due upon completion; ten (1) final copies, one (1) mylar original, and one (1) ASCII digital copy of survey due within one (1) week of completion
Standby Time	Daily logs summarizing idle resources and written claim for standby time	1.02.R	Due upon completion of each idle period for which standby time is claimed
Well Destruction	Final Schedule of Destruction and Materials (if required)	1.2.S	Cement weigh tickets due upon material delivery on site; destruction summary due within one week of completion
Data Loggers	Record of installation, manufacturer specs and warranties.	1.02.T	Due within 2 weeks of completion of installation and testing

** Submittals shall be delivered to the District Representative identified in the Pre-construction meeting.*

[PAGE LEFT INTENTIONALLY BLANK]