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Where Values Make The Difference

PURCHASING ITEM
FOR
COUNCIL AGENDA
Memo No. CA08-267

1. Agenda Item Number: #40

2. Council Meeting Date: May 22, 2008

TO: **MAYOR & COUNCIL**

3. Date Prepared: May 2, 2008

THROUGH: **CITY MANAGER**

4. Requesting Department: Municipal Utilities

5. SUBJECT: Award a project agreement to Layne Christensen Company for the Layton Lakes Well drilling, Project No. WA0808-401, in an amount not to exceed $920,865.

6. RECOMMENDATION: Staff recommends that Council award a project agreement to Layne Christensen Company for the Layton Lakes Well drilling, Project No. WA0808-401, in an amount not to exceed $920,865.

7. BACKGROUND/DISCUSSION: The development of new water production wells is required to provide water to meet the City's future demand. This proposed well site is located near the northwest corner of Lindsay Road and Appleby Road. This project agreement provides for the drilling of a new water production well at this site.

8. EVALUATION: On November 8, 2007, Council approved a one-year job order contract, JOC07-13, to Layne Christensen Company for well drilling and rehabilitation services, with the option of four one-year extensions. Staff has reviewed the scope of work, unit prices, and total cost for this project, compared them to historical costs, and has determined that they are acceptable.

9. FINANCIAL IMPLICATIONS:

Cost: $920,865
Savings: None
Long Term Costs: None

Fund Source:

Account No.	Fund Name	Program Name	CIP Funded	Amount
601.3820.0000.6713.7WA034	Water Bonds	Well Construction	FY06/07	$920,865

10. PROPOSED MOTION: Move that Council award a project agreement to Layne Christensen Company for the Layton Lakes Well drilling, Project No. WA0808-401, in an amount not to exceed $920,865.

ATTACHMENTS: Location Map, Contract

APPROVALS

11. Requesting Department

Robert Mulvey, Assistant Municipal Utilities Director

13. Department Head

Dave Siegel, Municipal Utilities Director

12. City Engineer

Sheina Hughes, Assistant Public Works Director/ City Engineer

14. City Manager

W. Mark Pentz

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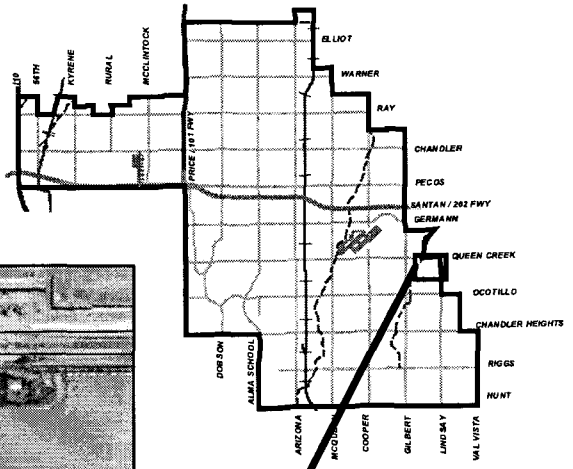
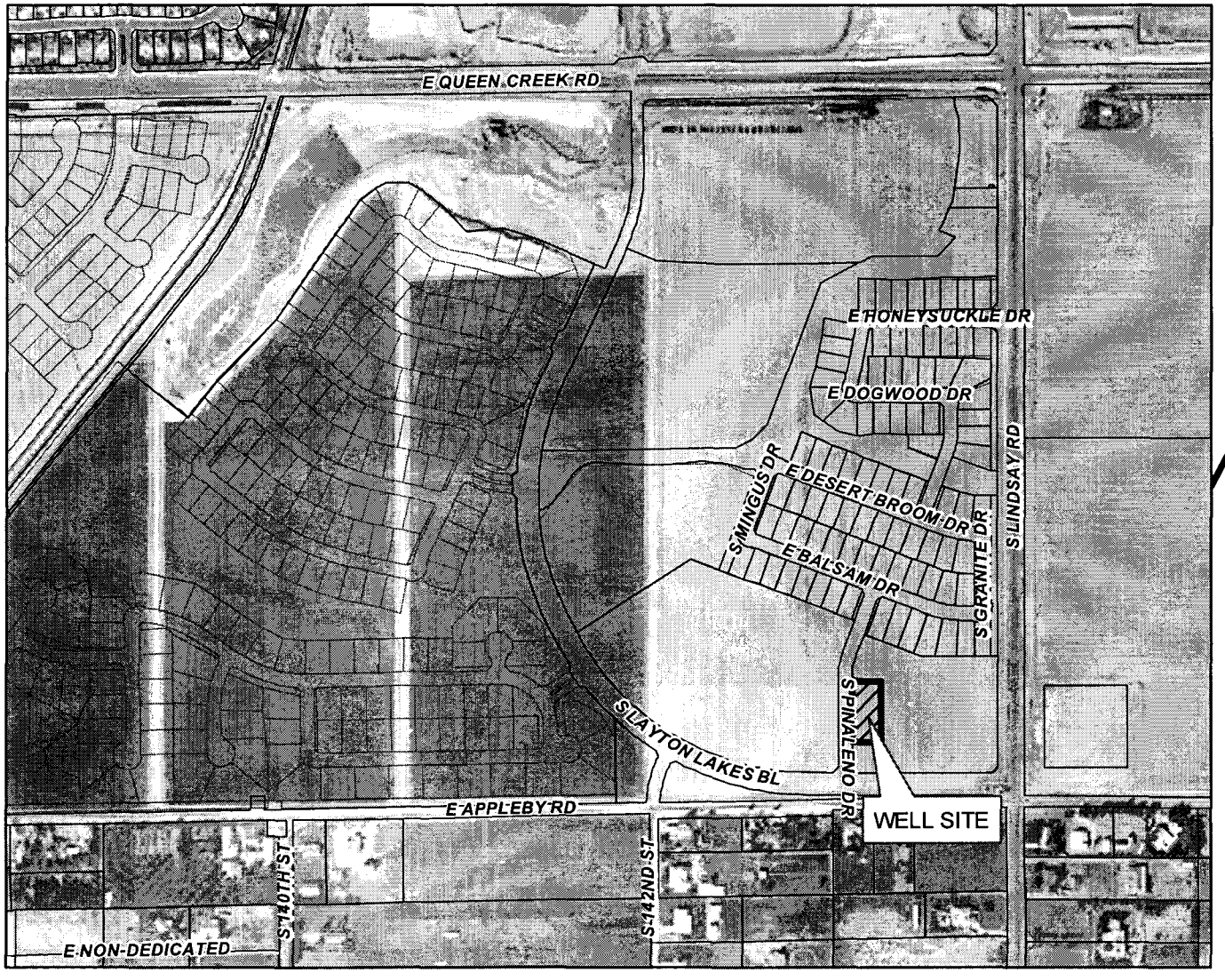
LAYTON LAKES WELL SITE LOCATION
PROJECT NO. WA0808-401





MEMO NO. CA08-267

WELL SITE

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PROJECT AGREEMENT
PURSUANT TO JOB ORDER CONTRACT NO. JOC 07-13

AGREEMENT NO: WA0808-401
PROJECT NAME (or LOCATION): Layton Lakes Well Drilling
DEPT.: Municipal Utilities

This AGREEMENT is made this 8 day of May 2008, by and between the City of Chandler, a municipal corporation (hereinafter referred to as "CITY") and **Layne Christensen Company, a Delaware corporation licensed to do business in the state of Arizona**, (hereinafter referred to as "JOC") and is a Job Order entered into pursuant to JOB ORDER CONTRACT NO. JOC 07-13.

CITY and JOC, in consideration of the mutual covenants herein set forth, agree as follows:

ARTICLE 1. DESCRIPTION OF WORK

This Job Order Project is Layton Lakes Well Drilling, Project Number WA0808-401. The scope of work consists of drilling a well at Layton Lakes, all as more particularly set forth in Exhibit A attached hereto and incorporated herein by reference.

The JOC shall not accept any change of scope, or change in contract provisions, unless issued in writing, as a contract amendment or change order and signed by the authorized signatories for each party.

ARTICLE 2. CONTRACT PRICE

CITY shall pay JOC for completion of the Work in accordance with the Contract Documents a fee not to exceed the Guaranteed Maximum Price of Nine Hundred Twenty Thousand Eight Hundred Sixty Five Dollars ($920,865) determined and payable as set forth in Contract JOC 07-13 and Exhibit B attached hereto and made a part hereof by reference.

ARTICLE 3. CONTRACT TIME & SCHEDULE

The Contract Time is forty-five days and JOC agrees to complete all Construction within forty-five (45) days from the effective date of the Notice to Proceed.

ARTICLE 4. GENERAL

This Project Agreement is entered into pursuant to JOB ORDER CONTRACT NO. JOC 07-13 and the terms and conditions contained therein are incorporated herein by reference as if set forth in full.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement on the day and year first written above.

This Agreement will be effective upon execution by the both parties.

IN WITNESS WHEREOF, the parties have hereunto subscribed their names to this ____ day of _____ 2008.

CITY OF CHANDLER

_____
MAYOR DATE:

ADDRESS FOR NOTICE
City of Chandler
P.O. Box 4008, Mail Stop 407
Chandler, AZ 85244-4008
480-782-3307

APPROVED AS TO FORM:

_____
City Attorney

By: _____
ATTEST:

_____
City Clerk

FOR THE JOC:

By:
Title: General Manager of Operations

ADDRESS FOR NOTICE
Mr. James Hausladen
Layne Christensen Co.
12030 E. Riggs Rd.
Phoenix, AZ 85249

Phone: 895-9404
Fax: 895-8699

EXHIBIT A
SCOPE OF WORK

1.0 GENERAL

1.1 LOCATION AND GEOLOGIC SETTING
The work to be accomplished under the following specification consists of the drilling and completion of one (1) production well located in Township 2 South, Range 65 East, Section 18, NE, SE, SE, in the City of Chandler. A drawing of the proposed site is included as Exhibit A-1. The well is expected to penetrate basin-fill or fluvial deposits that are primarily unconsolidated or semi-consolidated clay, silt, sand and gravel. If fluvial deposits are penetrated, course gravel and cobbles may also be encountered.

1.2 DEFINITIONS
The term CITY REPRESENTATIVE shall be understood to represent a Hydrology Consultant to be selected later by the CITY for project oversight.

1.3 SCOPE OF WORK
JOC shall install one (1) new water production well as specified herein including but not limited to JOC drilling a borehole to the specified depth using the reverse circulation rotary drilling method. JOC will initially drill a pilot borehole at a diameter determined by JOC and approved by the CITY REPRESENTATIVE. JOC shall use the pilot borehole to collect cutting samples and perform downhole zonal water sampling and geophysical testing as specified. Based on the information obtained from the pilot borehole drilling program, a final well design will be developed by the CITY and CITY REPRESENTATIVE. JOC shall then ream the borehole to the specified diameter and install the water production well pursuant to the final well design. A preliminary well design is presented in Exhibit A-2. JOC shall also perform landscape restoration and aquifer testing after the well installation is complete. In addition a well abandonment of an existing irrigation well near the new well's location will also be completed,

The CITY reserves the right to drill beyond the depths specified, or to stop at lesser depths, depending on subsurface conditions. CITY may also modify the dimensions of the well based on information obtained during the drilling of the pilot hole. The drilling, well installation, well development, well completion, and aquifer testing by JOC shall be conducted under the oversight of the CITY REPRESENTATIVE.

1.4 PERFORMANCE OF WORK

1.4.1 Operations
JOC shall employ only competent employees for the execution of work. All operations shall be performed under the direct and personal supervision of an Arizona licensed well driller with a Registrar of Contractor License type A, A-4, A-16 or L-53. JOC shall construct the production well in accordance with the Rules and Regulations of the Arizona Department of Water Resources (ADWR), Article 8, Well Construction and Licensing of Well Drillers, as amended June 18, 1990. The well construction shall also comply with the guidelines of the Arizona Department of Health Services Engineering Bulletin No. 10 (1978), and all other applicable State, County, or local regulations.

Should the well be lost due to any fault on the part of JOC, the well shall be abandoned at no cost to the CITY, in accordance with Arizona Department of Water Resources Article 8, Rule R12-15-816, and a replacement well shall be constructed in the immediate area. The replacement well location will be selected by the CITY. CITY shall pay JOC for the replacement well based on the depth and status at which the original well was terminated. JOC shall complete the replacement well in accordance with all the terms and conditions stated herein. However, if the inability to complete the well was not due to any fault of JOC, the CITY and CITY REPRESENTATIVE may designate a replacement well location and CITY shall provide additional compensation in accordance with the prices set for in Exhibit B to JOC Contract NO. JOC 07-13 by a Change Order to this Project Agreement executed by both parties.

1.4.2 Health and Safety
JOC is responsible for assuring that JOC and SUBCONTRACTOR personnel conform to all state and federal health and safety rules and regulations. JOC is responsible to assure that all CONTRACTOR personnel and SUBCONTRACTORS at the well site are thoroughly familiar with a CONTRACTOR implemented Site Safety Plan for the proposed work. JOC shall maintain a copy of the Site Safety Plan on site and shall make it easily accessible at all times. In addition, JOC shall require all personnel to be trained in the use of any personal protective equipment required by their Site Safety Plan. JOC shall meet the requirements of their Site Safety Plan at its own cost.

2.0 PROTECTION OF SITE

2.1 GENERAL

JOC shall take all necessary precautions to preserve the well site, as nearly as practical, in its present condition. JOC shall be responsible for replacing any damaged items. JOC shall clean up all litter and debris w daily and place it in containers for off-site disposal in a legal manner.

JOC shall place a plastic tarp beneath the drilling rig during mobilization to protect the site against oil or hydraulic fluid spills or leaks, and tarp will remain beneath the rig until demobilization. JOC shall fence or barricade all open sub-surface pits to help prevent accidental injury of employees and/or on-site visitors. After completion of drilling, JOC shall drain the mud pit, which will be allowed to dry to the maximum extent possible before backfilling. Soil from the mud pit excavation may be used to backfill the pit with appropriate compaction as approved by CITY REPRESENTATIVE or CITY. Wherever possible, JOC shall locate the mud pit outside the footprint of any known future structures. JOC shall dispose of drill cuttings and excess soil from the mud pit excavation by transporting material to City owned property approximately 3 miles west and spreading on the site within the boundary of the CITYS property as directed by the CITY or CITY REPRESENTATIVE.

JOC shall convey drilling fluids and water pumped from the well during drilling, sampling, and development operations to the mud pit constructed by JOC on the CITY's property at a location approved by the CITY, where it can be contained without damage to the property, contamination of other wells or waterways, or creation of a nuisance. If excess water is developed during these operations, JOC shall pump clean water as approved by the CITY REPRESENTATIVE from the mud pit to a pre-approved on-site location designated by the CITY. After completion of the work, JOC shall remove all debris, waste, trash, and unused materials or supplies; and, shall obliterate all signs of temporary construction facilities such as temporary work areas, temporary structures, stockpiles of excess, or waste materials; and, shall restore the site, as nearly as possible, to its original condition and satisfaction of the CITY.

2.2 DUST CONTROL

JOC shall install and maintain an adequate road to the well site property. JOC shall be responsible for maintaining access and dust control. JOC must maintain the access road in good condition throughout the drilling program.

2.3 SOUND CONTROL

It is JOCs responsibility to meet all ordinances regarding noise and noise control. Should the CITY deem it necessary, JOC shall construct sound barriers at the well site to control the transmission of airborne noise to home developments surrounding site. The barriers shall conform to ASTM specification E 90-90 and be a minimum of 16 feet high and shall cover a distance as needed to adequately shield the surrounding occupied structures. JOC shall present its plan to mitigate sound to CITY prior to mobilization and shall implement the plan as approved by CITY.

3.0 UTILITIES

3.1 WATER

A water source for the drilling program will be available from a nearby City owned fire hydrant. JOC shall be responsible for obtaining the necessary permits and meters to obtain water and properly monitor usage from this source. The City of Chandler Municipal Utilities Department shall be identified on the meter permit to receive all billing for water usage. JOC shall also be responsible for any other connections or ancillary equipment required for the use of the water at the site. Payment for water used on the project shall be made by the City of Chandler Municipal Utilities Department.

3.2 ELECTRICITY

JOC shall provide, at its own expense, all power required for its operations under the contract.

3.3 UNDERGROUND UTILITIES

Location of all utilities at the borehole site shall be the responsibility of JOC. Utility damage, caused by JOC, shall be repaired at JOC'S expense in accordance with the Utility specifications. CITY shall assist CONTRACTOR in identifying known on-site utilities. It is the responsibility of JOC to contact Blue Stake and obtain utility clearances well before any drilling or excavation on the project site.

3.4 SANITARY FACILITIES

JOC shall provide an on-site portable "chemical" toilet for use by JOC's employees. .

4.0 EQUIPMENT

4.1 GENERAL

JOC shall furnish and maintain in safe and efficient working condition all equipment necessary to perform the specified work, including a drilling rig or rigs capable of performing the specified operations to the specified depths; and, pumping, testing, sampling, and auxiliary equipment as specified or required to complete the described tasks and which shall meet the following requirements. The drilling rig, pumping equipment, and auxiliary equipment used for

this project shall be well maintained, and shall meet the standards of the Occupational Safety and Health Administration (OSHA). All high-pressure hoses shall be equipped with a safety chain to protect against the event of hose or coupling failure. If compressed air is introduced into the well during drilling, or well development, the air from the compressor must be treated by passage through a high volume carbon or coalescing filter to remove organic contaminants (e.g., compressor lubrication oil). The drilling rig shall have a manufacturer's specified derrick rating and hook load capacity capable of lifting no less than 1.5 times the weight of the proposed casing string as shown in the preliminary well design (Exhibit A-2) or 120,000 pounds, whichever is greater.

4.2 EQUIPMENT DECONTAMINATION

Prior to the arrival of the drilling equipment to the site, JOC shall decontaminate the drill rig and downhole tools by steam cleaning. The CITY REPRESENTATIVE must approve the method and extent of steam cleaning. JOC will be required to provide a letter of certification to the CITY REPRESENTATIVE of the decontamination of JOC'S equipment, prior to utilization. JOC may certify, in writing, the decontamination of critical (downhole) pieces of drilling equipment in lieu of actual steam cleaning, provided the downhole pieces of drilling equipment have not been in contact with any hazardous or toxic materials since the last decontamination. All necessary steam cleaning shall be conducted at JOC's expense.

5.0 REPORTS, LOGS, AND RECORDS

5.1 GENERAL

JOC shall keep accurate and legible all required logs as described below. The CITY REPRESENTATIVE must approve the drilling fluid control log.

5.2 PENETRATION RATE LOG

During the drilling of the borehole, JOC shall keep a time log showing the actual penetration time required to drill each foot of the borehole. JOC shall note the types of bits used in each interval of the borehole in this log and whether designed for soft, medium, or hard formations, including approximate weight on the bit during the drilling of the various types of formation in the various sections of the borehole. JOC shall make this log available for review by the CITY REPRESENTATIVE throughout the drilling program and shall deliver the log to the CITY REPRESENTATIVE upon completion of drilling.

5.3 DAILY DRILLER'S REPORT

During the drilling and construction of the well, JOC shall maintain a detailed driller's report and provide it daily to the CITY REPRESENTATIVE at the well site. The daily driller's report forms must be International Association of Drilling Contractors (IADC) or equal approved by the CITY REPRESENTATIVE. The report shall give a complete description of all formations encountered including number of feet drilled, number of hours on the job, shutdown due to breakdown, type of bit used, weight of the collars included in the drill string, weight on the bit, amount and type of drilling fluids used, plumbness test results at each 100-foot interval, and length and type of casing set; and, such other pertinent data as may be requested by the CITY REPRESENTATIVE. JOC shall submit this report to the CITY REPRESENTATIVE for approval daily.

5.4 DRILLER'S LOG

During the drilling of the pilot borehole, JOC shall prepare a detailed driller's log in compliance with the requirements of the Arizona Department of Water Resources (ADWR). The log shall include the reference point for all depth measurements, a generalized description of each formation encountered, the depth at which each formation is encountered, and the thickness of each formation. The lithologic log prepared by the CITY REPRESENTATIVE will be made available to JOC to assist in the preparation of the driller's log. JOC shall furnish a copy of the driller's log to the CITY REPRESENTATIVE and CITY.

5.5 DRILLING FLUID RECORD

During the drilling of the borehole, JOC shall maintain a log of drilling fluid properties. JOC shall record the drilling fluid properties on an API-approved form, and will document all items listed in Section 6.1. JOC shall make the drilling fluid log available for review by the CITY REPRESENTATIVE and CITY throughout the course of drilling, and shall deliver it to the CITY REPRESENTATIVE upon completion of each day's work activities.

6.0 DRILLING FLUID CONTROL PROGRAM

6.1 GENERAL REQUIREMENTS

JOC shall maintain current records at the site at all times to show: 1) the time, depth, and results of all drilling fluid tests; 2) all materials added to the system, i.e., kind, amount, time, and depth; and, 3) variances or modifications from the agreed upon fluid program such as time, depth, reason, and authorization. JOC is responsible for maintaining an adequate supply of drilling fluid additives (including lost circulation material) at the drilling site, and for the removal of all drilling fluids and additives from the borehole during development of the well.

6.2 DRILLING FLUID CONTROL PLAN

Drilling fluid tests will be required during periods when any drilling fluid additives (not only clear water) are being circulated in the borehole. JOC shall measure physical and chemical properties of the drilling fluid in accordance with the procedures of the American Petroleum Institute (API) Standard RP 13B "Standard Procedures for Testing Drilling Fluids". JOC shall test those samples which are collected at the rig pump discharge line, with care taken to assure a true and representative sample. JOC shall conduct drilling fluid tests a minimum of: 1) every 24 circulating-hours, 2) when significant changes to the drilling fluid are made, 3) whenever conditions appear to have changed or when problems arise, or 4) at the request of the CITY REPRESENTATIVE. JOC shall make available a Marsh-type viscosity funnel and a mud scale at the well site during all well construction operations, and upon request, shall make them available to the CITY REPRESENTATIVE. JOC shall provide a drilling fluid control plan to the CITY REPRESENTATIVE 48 hours prior to drilling. The drilling fluid control plan will outline specific drilling fluids JOC plans to use, how anticipated changes in the drilling conditions will affect the drilling fluid control plan, fluid testing procedures, and equipment that will be used. The CITY REPRESENTATIVE must approve the drilling fluid control plan.

In addition, JOC shall maintain a drilling fluid that does not exceed a sand content (solids larger than 200 mesh) of greater than 4 percent by volume, in accordance with American Water Works Association (AWWA) Standard A100.

6.3 SPECIFIC CONDITIONS

During the drilling of the borehole, and the installation of this well, JOC shall take extra care to minimize chemical and biological disturbance of the vadose zone and saturated alluvial matrix. The use of organic drilling fluid materials (such as starch, guar, or cottonseed hulls) will not be accepted for drilling. The use of "nonreversible" lost circulation materials such as newspaper and cellophane will be allowed in the upper non-production zone only. Once the expected production zone is penetrated at 400 feet bls, no lost circulation material will be allowed without prior written consent from the CITY REPRESENTATIVE. Material Safety Data Sheets (MSDS) from the manufacturer for all drilling fluid additives must be provided to the CITY REPRESENTATIVE for review prior to their use. JOC shall be responsible for maintaining the quality of the drilling fluid to assure:

1. Protection of water bearing and potential water bearing formations exposed to the borehole.
2. Representative samples of the formation material.
3. Maximum development capability and optimum potential yield of the completed well.
4. Inhibition of the formation and prevention of formation-caused drilling problems (e.g., heaving sands, swelling clays, lost circulation).
5. Protection of the integrity of the boring during the drilling operations.

6.4 LOST CIRCULATION

During the drilling of the production well, if there is no return of circulated drilling fluid for a period of at least two (2) continuous hours and JOC is unable to advance the hole at a rate of 4 feet per hour or greater, then the CITY shall compensate JOC for the period of drilling under lost circulation conditions, at JOC'S hourly rate. Also, the CITY shall provide compensation including 15 percent markup for all drilling fluid materials and additives used during the period of lost circulation. The conditions of this section shall apply from the beginning of the time period of total lost circulation, with no returns at the land surface, and shall continue only until such time as drilling fluid circulation is regained, with full or partial returns of drilling fluid at the land surface. After an initial lost circulation event has occurred, should circulation be lost again, the conditions of this paragraph will go into effect immediately, and continue until such time as drilling fluid circulation is regained with full or partial returns of drilling fluid at the land surface.

JOC shall notify the CITY REPRESENTATIVE immediately any time JOC experiences lost circulation and intends to invoke the lost circulation clause. JOC shall provide notification within the hour of observed lost circulation, and CITY shall provide a written field order to continue to JOC, or no compensation for lost circulation will be made.

7.0 WELL DRILLING AND INSTALLATION

7.1 GENERAL DRILLING METHODS

JOC shall drill the boring by the reverse rotary drilling method. The borehole diameters of these specifications shall be considered the minimum allowable. JOC shall be responsible for designing and controlling a drilling program that conforms to this specification.

7.2 SURFACE CASING INSTALLATION

7.2.1 Drilling

JOC shall drill the surface casing borehole for this production well to a minimum 36-inch diameter, to a depth of no less than 39 feet. The CITY REPRESENTATIVE reserves the right to direct the drilling of the surface casing borehole

to a greater depth depending on geologic formations and other subsurface conditions. The surface casing boring may be drilled using a rotary drilling method or by use of the bucket auger (solid stem auger) drilling method.

7.2.2 Materials

7.2.2.1 Casing - The surface casing for this production well (Exhibit A-2) shall be new, and manufactured in accordance with American Society for Testing and Materials (ASTM) Specification A53 Grade B low carbon steel. This casing shall have a 30-inch outside diameter and have a minimum 0.312-inch wall thickness. The minimum length of the surface casing shall be 40 feet, to allow for a minimum 1-foot stickup above land surface. The casing shall be factory assembled in not less than 20-foot lengths.

7.2.2.2 Cement Grout Seal - The surface casing cement grout seal material shall consist of a cement slurry containing 5.2 to 6.0 gallons of water per 94-pound sack of Portland cement. The Portland cement shall conform to ASTM Standard C150, Type II. The cement grout weight shall be measured prior to installation, as an indicator of the cement-water mix ratio. The cement grout slurry shall not exceed 17 pounds per gallon (lb/gal) (or 127 pounds per cubic foot, lb/cf). The cement grout slurry may contain sand or aggregate, which shall not exceed 50 percent by volume of the cement. Water shall be added with the sand additive as required. Bentonite, as an additive, must be in powder form and shall not exceed five percent by weight of the cement, or cement and sand. Water added for bentonite shall not exceed 1.3 gallons per 1.88 pounds of bentonite (two percent by weight in cement). Accelerator additives, such as calcium chloride, shall not exceed two percent by weight of the cement. Sodium chloride, as an additive, shall not exceed two percent by weight of the water used to prepare the grout slurry. Water used for preparing the grout slurry shall be potable. If the cement grout is not mixed on-site, JOC must provide the specific constituents of the cement grout to the CITY REPRESENTATIVE prior to placement of the grout. JOC shall mix the cement grout slurry thoroughly and free of lumps to the satisfaction of the CITY REPRESENTATIVE. Cement grout that does not comply with this specification will be rejected.

7.2.3 Casing Installation

Details for the surface casing construction are shown in Exhibit A-2. JOC shall be required to work continuously, on a 24-hour per day basis, while installing and grouting the surface casing. JOC shall furnish surface casing, conforming to Section 7.2.2, and shall place it from one foot above the ground surface to a minimum of 39 feet below the ground.

JOC shall field weld joints in the surface casing in accordance with applicable provisions of the American Water Works Association (AWWA) Standard C206 for welded joints. Alignment straps, or a CITY REPRESENTATIVE approved equal may be used to align the well casing sections prior to welding. Prior to welding, JOC shall ensure the ends of each casing section are free of grease, paint, cement, dirt, oil, scale, slag, heavy rust, or any other foreign material. JOC shall sufficiently orient the ends of the casing sections to assure 100% penetration of the weld, and adequate welding passes shall be made to provide for complete filling of the joined casing ends. Each welding pass shall be smooth and free of blisters, scale, bubbles, cracks, and imperfections that would contribute to a lack of strength of the overall welded joint. JOC shall make all well casing joints or overlaps watertight to prevent the degradation of the water supply by the migration of poor quality water. JOC shall provide a welder experienced for the method and type of welding specified to perform all welding.

7.2.4 Cement Grout Installation

JOC shall place a cement grout slurry conforming to the specification in Section 7.2.2.2 from the base of the surface casing to the ground surface. JOC shall take care to maintain an equalization of pressures to the extent necessary to prevent collapse of the surface casing. JOC shall completely fill the annular space with grout and form a continuous seal between the surface casing and the wall of the borehole. The surface casing grout seal may be placed in two separate installations to completely extend the top of the seal to the ground surface. JOC shall maintain the surface casing centered in the hole before the occurrence of the initial set of the cement grout. The CITY REPRESENTATIVE must approve the method of grout installation. A minimum curing time for the surface casing grout seal is 8 hours, and the cement grout obtaining a compressive strength of 500 pounds per square inch (psi).

7.3 WELL BORING

JOC shall construct the well borehole by initially drilling a pilot borehole to a maximum of 1500 feet, at a diameter of 17-1/2 inches. It is expected that a substantial clay formation will be encountered at approximately 800 feet bgs. If clay is contacted as expected, JOC shall continue the drilling for approximately 50 additional feet to confirm the clay contact. Following analysis of data collected during the drilling of the pilot borehole, downhole geophysical logging, and zonal sampling, JOC shall ream the borehole to a diameter of 28 inches to the specified depth. However, the CITY REPRESENTATIVE reserves the right to direct the drilling of the well borehole to a greater or lesser depth, depending on geologic formations and other subsurface conditions. JOC shall drill the well boring using the method described in Section 7.1, and in compliance with the drilling fluid testing and reporting requirements of Section 6.0. During the drilling of the well boring, JOC shall conduct all operations on a 24-hour per day, 7-day per week basis.

7.3.1 Lithologic Samples

During the drilling of the pilot hole, JOC shall collect and preserve for the CITY REPRESENTATIVE, two duplicate samples of the drill cuttings. JOC shall collect the samples at 10-foot intervals from the base of the surface casing to the bottom of the pilot borehole. JOC shall provide an acceptable means of sampling the drilled cuttings at the discharge pipe. Catching the drilled cutting samples in sieves will not be allowed. JOC shall provide a sump-type or baffle-type sample catching device. JOC shall carefully collect each cutting sample from the sampling point, and JOC shall clean the sample catching device of all cuttings after each sample is taken.

JOC shall place the samples in 4.5-inch x 6-inch cloth sacks (HUBCO or equal) furnished by JOC. In addition, as an on-site visual record of the borehole stratigraphy, JOC shall lay each sample out in a sample storage area on a water-proof tarp or ground cloth for each sampled interval in descending order. The storage area and ground cloth must allow samples to be maintained in sequence and unmixed with surface material or other samples until they have been examined and logged by the CITY REPRESENTATIVE. JOC shall submit details of the proposed formation sampling method including the sampling equipment to be used to the CITY REPRESENTATIVE prior to the start of drilling. The CITY REPRESENTATIVE prior to the start of drilling must approve the sampling program.

7.3.2 Geophysical Logging

JOC will provide geophysical logging services following the completion of the pilot borehole. JOC shall conduct caliper, spontaneous potential, 64-inch and 16-inch normal resistivity, sonic, gamma ray, guard, deviation and temperature analyses. Following completion of the reaming the borehole to twenty-six (26) inches, the CITY REPRESENTATIVE shall provide an additional caliper log analysis for determination of annulus volume. Since the length of time for geophysical logging is uncertain, twelve (12) hours of standby time for pricing purposes has been included in the unit price sheet (Exhibit B).

7.3.3 Formation Water Quality Sampling

The CITY REPRESENTATIVE may select up to twelve (12) intervals for water quality sampling in the borehole. The CITY REPRESENTATIVE may add additional sampling intervals after reviewing the borehole data. JOC shall begin sampling with the deepest interval and continue up the borehole to the shallowest. JOC shall ensure the borehole is open from the land surface to the lowest depth in which the formation will be sampled.

JOC shall provide a six (6) inch diameter sampling tool which will consist of a thirty (30) foot long section of perforated steel casing attached to a minimum six (6) inch inside diameter eductor pipe with a minimum 1.5-inch inside diameter air line. JOC shall plug the lower end of the sampling tool with a steel plate welded across the open bottom. JOC shall be required to have for air lifting purposes, a compressor capable of supplying a minimum of 750 cubic feet per minute and 350 pounds per square inch.

JOC shall handle each of the zone sampling intervals in the following manner. JOC shall install backfill as approved by the CITY REPRESENTATIVE in the borehole to within 20 feet of the lowest interval to be sampled. JOC shall then place a 10 foot bentonite seal in the borehole bringing the material up to within 10 feet of the lowest interval to be sampled. JOC shall then place the sampling tool in the borehole adjacent to the interval that is to be sampled. JOC shall then place an appropriate gravel pack as approved by the CITY REPRESENTATIVE within the borehole and around the sampling tool and drill pipe to a depth of approximately 10 feet above the top of the sampling tool. JOC shall place another 10 foot thick bentonite seal on top of the gravel pack to isolate the interval to be sampled. JOC shall use a sounding device approved by the CITY REPRESENTATIVE to determine the depths to the top of the emplaced materials.

JOC shall air lift the water to the surface for approximately 12 hours or until the temperature, electrical conductivity, and pH of the air-lifted water stabilizes. The CITY REPRESENTATIVE shall be responsible for the collection of water quality samples. Once the CITY REPRESENTATIVE has collected the necessary samples, JOC shall withdraw the eductor pipe and sampling tool up to the next sampling interval.

Should JOC be required to take more than twelve (12) formation samples, the additional formation sample(s) shall be paid for on the same unit cost basis as the first twelve formation samples. Should JOC be required to air lift the well more or less than the 12 hours listed in the specifications, then JOC shall be compensated on an hourly rate specified in JOCs unit price sheet.

7.4 PRODUCTION WELL INSTALLATION

7.4.1 Materials

The materials that are anticipated to be installed in the production well are described below. The actual quantities of materials to be used are subject to change, based on information obtained during the drilling and testing of the pilot borehole. The CITY REPRESENTATIVE shall determine the exact well casing specification prior to installation of the well, based on the analysis of the data collected during the drilling and testing of the pilot hole. The CITY

REPRESENTATIVE shall provide JOC with the final design specifications within a period of 72 hours following completion of all geophysical logging and zonal samples.

JOC shall be responsible for the timely delivery to the drilling site the well casing and well screen materials necessary to complete the production casing design program as determined by the CITY REPRESENTATIVE. The final length of the well screen interval(s) and the blank casing interval(s) shall be determined by the CITY REPRESENTATIVE based on analyses of the pilot boring data.

7.4.1.1 Well Casing And Screen - JOC shall install the well casing and screen schedule for the production well in accordance with the general sequence detailed below:

1. Low-carbon steel casing
2. Stainless steel well screen
3. Stainless steel bottom sump

The low-carbon steel well casing shall be manufactured in accordance with ASTM Specification A53 Grade B steel or ASTM Specification A139 Grade B steel, applicable parts. The low-carbon steel well casing shall have a 16-inch outside diameter and a 0.375-inch wall thickness.

The stainless steel well casing and screen shall be manufactured in accordance with ASTM A778, and the steel from which the casing and screen is manufactured shall be stainless steel Type 304 L. The stainless steel well casing and screen shall have a 16⅝-inch outside diameter and a 0.312-inch wall thickness.

The well casing and screen shall be factory assembled in not less than 40-foot long sections. Section ends shall be machined with a beveled edge to facilitate proper alignment of joined casing sections.

The bottom sump shall consist of a 10-foot section of type 304 L stainless steel casing installed at the base of the screened interval. The bottom sump shall have a 16⅝-inch outside diameter and a 0.312-inch wall thickness. The bottom sump shall be capped with a bottom plate or shoe consisting of the same composition and same wall thickness as the bottom sump casing.

The openings in the stainless steel screen shall be machine made, horizontal to the axis of the casing, and of a louver form with the aperture facing downward. The louvered openings shall be 2⅞-inches in length, and spaced approximately 1 inch apart in the vertical direction with 12 perforations per circle to provide 144 openings per linear foot. For pricing purposes, the screen aperture size shall be 0.070 inch, and shall be a "Ful Flo" pattern as manufactured by Roscoe Moss Company, Los Angeles, California. One end of each stainless steel screen section shall be furnished with a welding collar of the same wall thickness and have the same physical and chemical properties as the corresponding screen sections. The welding collars shall have a minimum 5-inch length and shall fit the outside diameter of the well screen within 0.0625-inch diametrical clearance. The welding collars shall be factory-welded to the screen sections at one end. The inside edge of the welding collars shall be ground or sufficiently scarfed to remove sharp edges or burrs. Three alignment holes shall be provided in each welding collar (spaced at 120 degrees), to ensure proper abutment of the screen sections. The alignment holes shall be no larger than 1 inch in diameter and shall be completely filled with fillet welding.

7.4.1.2 Mechanical Connection - Because the blank casing and the well screen will be assembled using dissimilar metals (low-carbon and stainless steel for the casing and screen, respectively), JOC shall use an adapter (mechanical connection) to separate the casing and screen to mitigate galvanic corrosion. JOC shall use the specific design and materials to be used in the mechanical connection as manufactured by Roscoe Moss Company, Los Angeles, California. JOC shall install the mechanical connection per the manufacturers' recommendation.

7.4.1.3 Camera Tube And Re-Entry Box - JOC shall construct the camera tube of low-carbon steel with an outside diameter of 4½ inches (nominal 4-inch diameter), and a schedule 40 (0.237-inch) or greater wall thickness. JOC shall join the bottom of the camera tube to a pre-fabricated LCS re-entry box as manufactured by Roscoe Moss Company, Los Angeles, California (Appendix B).

Prior to casing installation, JOC shall submit certified test reports or manufacturer provided specifications sheets to the CITY REPRESENTATIVE to demonstrate compliance with the physical and chemical properties of the well casing steel that are specified herein.

These casing and screen dimensions are for pricing purposes only, and are subject to change at the discretion of the CITY REPRESENTATIVE. The CITY REPRESENTATIVE shall provide a final screen design based on analysis of the formation cuttings collected during drilling of the pilot borehole, zonal water quality sampling and geophysical logging.

7.4.1.4 Filter Pack - The filter pack shall consist of clean, well-rounded grains that are smooth and uniform. The filter pack shall be siliceous with a limit of five percent, by weight, calcareous material. JOC shall obtain the filter pack material from a source that has been approved by the CITY REPRESENTATIVE. The filter pack material shall consist of well-rounded particles with an average density of not less than 2.5 grams per cubic centimeter. Not more than one percent, by weight, of the material shall have a density of 2.25 grams per cubic centimeter or less. The filter pack shall contain not more than two percent, by weight, of thin, flat, or elongated pieces (pieces in which the largest dimension exceeds three times the smallest dimension) determined by hand packing. The filter pack material shall be free of shale, mica, clay, dirt, loam and organic impurities of any kind and shall contain no iron or manganese in a form or quantity that will adversely affect the water quality. The anticipated filter pack grain size will be retained by the #9 U.S. Standard Sieve and pass through the #6 U.S. Standard Sieve. For pricing purposes, filter pack material provided by Colorado Silica Sand, Inc. will be acceptable. The filter pack grain size shall be determined by the CITY REPRESENTATIVE at the conclusion of the drilling of the pilot hole.

JOC shall submit samples of the filter pack, including sieve analysis, to the CITY REPRESENTATIVE for approval, a minimum of three days prior to delivery of the filter pack to the site. JOC shall provide a suitable storage area for the filter pack. JOC shall deliver the filter pack to the site directly from the supplier in order to minimize contamination. Filter pack material must be bagged (bulk bags are acceptable), and shall be contained and temporarily stored on site in such a manner as to prevent contamination. Unbagged delivery of filter pack material will not be accepted.

7.4.1.5 Bentonite Seal - The bentonite seal material shall consist of sodium bentonite pellets, bentonite chips or bentonite slurry. The bentonite seal material shall contain no hazardous materials or gypsum. JOC shall provide a sample of the bentonite material to the CITY REPRESENTATIVE for approval no less than three days prior to installation.

7.4.1.6 Formation Stabilizer – (Alternate must be preapproved by CITY before use) The formation stabilizer shall consist of a cleaned/washed aggregate. The formation stabilizer material must be composed of inert materials, containing no organic material or hazardous materials of any kind. An acceptable formation stabilizer would consist of clean siliceous pea gravel. JOC shall provide a sample of the formation stabilizer material to the CITY REPRESENTATIVE for approval no less than 24 hours prior to installation.

7.4.1.7 Cement Grout - The cement grout seal material shall consist of a cement slurry containing 5.2 to 6.0 gallons of water per 94-pound sack of Portland cement. The Portland cement shall conform to ASTM Standard C150, Type II. JOC shall measure the cement grout weight prior to installation, as an indicator of the cement-water mix ratio. The cement grout slurry shall not exceed 15 lb/gal (112 lb/cf). The cement grout slurry may contain pozzolanic (fly ash) material as an additive, which complies with ASTM Standard C618, and which shall not exceed 50 percent by volume of the cement. Water shall be added for the pozzolan, as required. Sand or aggregate material additives shall not be used. Bentonite, as an additive, must be in powder form and shall not exceed five percent by weight of the cement, cement and sand, or cement and pozzolan. Water added for bentonite shall not exceed 1.3 gallons per 1.88 pounds of bentonite (two percent by weight in cement). Accelerator additives, such as calcium chloride or sodium chloride shall not be used. Water used for preparing the grout slurry shall be potable. The CITY REPRESENTATIVE must approve the water source and the specific constituents of the cement grout.

If the cement grout is not mixed on-site, JOC shall provide the specific constituents of the cement grout to the CITY REPRESENTATIVE 3 days prior to placement of the grout. JOC shall mix the cement grout slurry thoroughly and free of lumps, to the satisfaction of the CITY REPRESENTATIVE. Cement grout which is not adequately mixed will be rejected by the CITY REPRESENTATIVE due to possibilities of the slurry bridging during placement. JOC shall provide a cement mix design, the mix water source, and the specific constituents of the cement grout to the CITY REPRESENTATIVE at least three days prior to the start of cementing operations.

7.4.2 Casing Installation

During the installation of the well casing, JOC shall keep the boring full of drilling fluids of the types specified in Section 6.0 and free from any obstructions detrimental to complete casing installation. JOC shall center the well casing in the hole so as not to interfere in any way with the grout seal, filter pack, well installation, or maximum efficient operation of a 14-inch diameter vertical turbine pump for use in the 16-inch inside diameter well casing. Details for this production well construction are shown in Exhibit A-2. JOC shall be required to work continuously, on a 24-hour per day, 7-day per week basis, while installing and completing the well.

JOC shall set this well casing in the open borehole with the casing and well screen set at depth intervals specified by the CITY REPRESENTATIVE. JOC shall secure low carbon steel casing centralizers to the well casing and screen at intervals of not greater than 80 feet. JOC shall hang the casing in suspension until the filter pack and cement grout seal have been installed. JOC shall install the sounding tube with the casing.

7.4.2.1 Joints in the Well Casing - JOC shall field weld joints in the low carbon steel well casing and well screen in accordance with applicable provisions of the American Water Works Association (AWWA) Standard C206 for welded joints. JOC shall follow a welding sequence which will avoid excessive distortion. JOC shall ground, or sufficiently scarf, the ends of the casing lengths to remove sharp edges or burrs. JOC shall install section ends either with joint collars or beveled to a 30o angle, perpendicular to the axis of the casing, to facilitate proper alignment of joined casing sections, and section ends hall not vary more than 0.010 inches at any point from a true plane at right angles to the axis of the casing. JOC shall make all well casing joints or overlaps watertight to prevent the degradation of the water supply by the migration of poor quality water. A welder experienced and certified for the method and type of welding specified shall perform all welding.

7.4.3 Annulus Material Installation

7.4.3.1 Filter Pack - JOC shall place filter pack sand, conforming to the specifications of Sections 7.4.1.4 from the bottom of the well to the specified depth, and shall completely fill the annulus in the specified interval. The filter pack interval must extend at least 50 feet above the perforated interval (Exhibit A-2). JOC shall maintain drilling fluid to the full depth of the well and the well casing, and shall maintain screen in tension until the filter material placement has been completed to the specified level. JOC shall take care to avoid bridging during installation of the sand.

JOC shall install the filter pack simultaneous with reverse circulation of drilling fluids down the annulus at a rate of no less than 250 gallons per minute. At no time shall JOC locate the bottom of the tremie pipe at a distance greater than 50 feet above the interval being filled during filter pack placement. JOC shall measure the level of the filter pack periodically during placement, as required by the CITY REPRESENTATIVE. The method of filter pack level measurement must be approved by the CITY REPRESENTATIVE. JOC shall continuously place the filter pack, except when additional precautions are necessary to prevent bridging, or measurements of the filter pack level are being conducted.

Because a swabbing tool is to be used during filter pack installation to prevent bridging, it is imperative that JOC take extreme caution in order to prevent pressure differences, screen collapse or hole collapse.

The quantity of filter pack material placed in the annulus shall not be less than that of the volume computed based on the results of the caliper log performed after borehole reaming. Upon completion of the filter pack placement, excess filter material will be judged an indication of voids in the sand envelope, and JOC shall undertake corrective measures at JOC's expense. The specific method of placement and material must be approved by the CITY REPRESENTATIVE.

7.4.3.2 Filter Pack Disinfection - Simultaneous with the installation of the filter pack sand, JOC shall add granular or liquid hypochlorite or similar disinfectant to the filter pack sand at the rate of 2-pound per cubic yard of filter material, based on 70 percent chlorine content. If a lesser strength hypochlorite or other chlorine product is used, JOC shall adjust the quantity accordingly.

JOC shall apply the disinfecting agent uniformly throughout the entire portion of the well below the water table, without relying on subsequent mechanical surging action for dispersing the disinfectant. The specific method used to disinfect the filter pack must be approved by the CITY REPRESENTATIVE.

7.4.3.3 Bentonite Seal - JOC shall install the bentonite seals complying with Section 7.4.1 in the well annulus through a tremie pipe. JOC shall place a ten-foot bentonite seal directly above the gravel pack interval (Exhibit A-2). The CITY REPRESENTATIVE must approve the specific installation procedure, the bentonite product, and the fine sand material.

7.4.3.4 Grout Seal - The well casing grout seal shall consist of a cement slurry conforming to the specification in Section 7.4.1.7. JOC shall place the grout to completely fill the annular space between the well casing and the wall of the borehole from the top of the bentonite seal to the surface (Exhibit A-2).

JOC shall place the grout by pumping through a tremie pipe. Prior to pumping the cement grout through the tremie pipe into the annulus, JOC shall pass the cement grout through a 2-inch slotted bar strainer, in order to remove any unmixed lumps. When installing the grout, JOC shall continuously submerge the discharge end of the tremie in the grout until the zone to be grouted is completely filled.

JOC shall hang the well casing in the borehole to maintain tension on the pipe throughout the grouting operation. JOC shall place the grout seal in as few lifts as possible without compromising the stability of the well casing. The CITY REPRESENTATIVE must approve the specific method of installation. A minimum curing time for the well casing cement grout seal is 12 hours, and the cement grout must obtain a compressive strength of 500 pounds per square inch (psi) during curing time.

7.5 WELL DEVELOPMENT

JOC shall accomplish well development by simultaneously swabbing and air-lift pumping. A detailed diagram of the development tool to be used must be submitted to the CITY REPRESENTATIVE for approval prior to mobilization. Well development shall proceed from the bottom of the screen to the top of the screen, at a rate of no less than 3 minutes per foot of screen, unless otherwise directed by the CITY REPRESENTATIVE. The development duration will be based on results not time, therefore actual time spent developing the well may vary from the quantity listed in the unit price sheet. JOC shall be compensated at the appropriate unit rate for the actual hours of well development.

JOC shall be required to have for air lifting purposes, a compressor capable of supplying a minimum of 750 cubic feet per minute and 350 pounds per square inch. Airlifting will require a minimum of a 6-inch inside diameter eductor pipe with a minimum 1.5-inch inside diameter airline. Chemical additives, such as sodium acid pyrophosphate (SAPP) may be added to the well bore to breakdown the drilling mud at the request of the CITY REPRESENTATIVE. Actual additions must be pre-approved by the CITY REPRESENTATIVE. The CITY REPRESENTATIVE must approve the specific methods and equipment for well development.

Because a swabbing tool is to be used during development, it is imperative that JOC take extreme caution in order to prevent pressure differences, screen collapse or hole collapse.

Subsequent to swabbing and airlift development, JOC shall further develop the well by pumping and surging to remove additional fine sediment from the well bore using the test pumping equipment. The CITY REPRESENTATIVE must approve the specific surge-and-pump development program.

7.6 WELL PLUMBNESS AND ALIGNMENT

JOC shall test for plumbness and alignment during the pilot hole drilling and after the complete construction of the well. If the well fails the plumbness and alignment tests, JOC shall correct the plumbness and alignment to the satisfaction and approval of the CITY REPRESENTATIVE. Plumbness and alignment correction costs shall be borne by JOC.

During the drilling of the pilot hole, JOC shall perform plumbness and alignment tests by use of an inclinometer (Eastman mechanical drift indicator available from the Eastman Oil Well Survey Company, or equal) at 100-foot intervals. JOC shall use a 3-degree unit with the inclinometer. The maximum acceptable drift from vertical shall be no more than 0.50 degree (10.5"/100 feet), unless otherwise approved by the CITY REPRESENTATIVE.

At the completion of pilot borehole drilling, JOC shall test plumbness and alignment using a Magnetic Deviation Tool or other device as approved by the CITY REPRESENTATIVE as part of the Geophysical Logging, Section 7.4.2. The maximum acceptable drift shall not exceed two-thirds the inside diameter of the casing to be installed in that part of the well being tested per 100 feet of depth as specified by American Water Works Association (AWWA) Specification document A100-97, Section 1-6.3. If the pilot hole does not conform to AWWA A100-97, Section 1-6.3, JOC shall submit to the CITY REPRESENTATIVE a written plan of corrective action.

JOC shall test the final plumbness and alignment of the casing by lowering a 40-foot long dummy to the bottom of the well. The outer diameter of the dummy shall be 2 inch less than the smallest inside diameter of the casing and screen. The dummy shall consist of a rigid spindle of extra heavy steel pipe with three rings rigidly fixed to the pipe so that they cannot move longitudinally along the pipe. The rings shall be truly cylindrical and shall be placed one at each end of the dummy and with one ring in the center. The rings shall consist of suitable materials, which will not harm the interior of the casing while being lowered or raised. Should the dummy fail to move freely throughout the entire length of the casing and screen, JOC, at its own expense, shall correct the plumbness and/or alignment of the well. The dummy test for plumbness and alignment must be witnessed and the results approved by the CITY REPRESENTATIVE to be acceptable.

The CITY REPRESENTATIVE may waive the requirements of plumbness and alignment if: (1) JOC has exercised all possible care in constructing the well, and fully executed the corrective action plan, submitted as part of this section, to the satisfaction of the CITY REPRESENTATIVE, and (2) the utility of the completed well will not be materially affected, and (3) JOC has submitted a written report explaining the cause of the borehole deviation and corrective actions taken to bring the well within acceptable limits of deviation. JOC shall furnish that report to the CITY REPRESENTATIVE prior to acceptance of the well.

7.7 FINAL WELL VIDEO

After completion of test pump operations, JOC shall provide a color well video with side scanning capability of both the well casing and video access tube. These videos must be conducted under the observation of the CITY REPRESENTATIVE or CITY and quality and clarity of the well videos must be acceptable to the CITY. These videos must be approved prior to the acceptance and final payment for the well

8.0 AQUIFER TESTING

8.1 GENERAL

Aquifer testing will consist of a maximum of 20-hours development period, 20 hours of step-discharge test (with a minimum of 12-hours of recovery), and a 24-hour continuous rate aquifer test, followed by a 24-hour water-level recovery period. The step-discharge test pumping rates will vary incrementally from approximately 500 to 2000 gallons per minute (gpm). The pumping rate of the 24-hour constant rate test will be determined based on the step-discharge test results. This test will start a minimum of 12 hours following the completion of the step-discharge test. The CITY reserves the right to extend or shorten the test durations.

8.2 TEST EQUIPMENT

JOC shall furnish pumping equipment capable of pumping at a rate of 2000 gallons per minute (gpm), with a total dynamic head of approximately 400 feet, and with satisfactory throttling devices and valves, so that the discharge can be adjusted to various rates. CITY REPRESENTATIVE shall determine the test pump setting based on the final well design. The anticipated pump setting is 400 feet below land surface. The pumping unit shall be complete with an ample power source and shall be capable of being operated without interruption for a minimum period of 24 hours.

JOC shall not remove the pump equipment from the well until after the completion of the water level recovery test. JOC shall also provide two discharge meters, as specified in Section 8.3. The CITY REPRESENTATIVE must approve the test pump, motor, and accessories.

8.3 PUMP DISCHARGE

JOC shall operate the pump at discharge rate(s) directed by the CITY REPRESENTATIVE. JOC shall control discharge from the pump by a gate valve and/or engine throttle. JOC shall control the discharge and maintain it at the specified rate for the entire test duration with an accuracy of plus or minus five percent. JOC shall measure the pump discharge with a calibrated orifice or venturi meter. JOC shall install a propeller type flow meter in the discharge pipe as an alternate method of discharge measurement. JOC shall provide documentation regarding the accuracy of the meters to the CITY REPRESENTATIVE prior to testing. JOC shall also furnish equipment for measurement of the sand production during pumping. The sand measurement device shall be a Rossum Sand Sampler or equal, as in accordance with AWWA Standard A100-84. The CITY REPRESENTATIVE must approve the discharge measurement devices.

JOC shall orient the discharge pipe in such a manner as to ensure that the pipe remains full of water at the location of the flow meters at all times during pumping. JOC shall install an approved spigot or valve for water sample collection in the discharge pipe.

For pricing purposes, JOC shall assume the discharge water from the well during zone sampling, airlift development, and pump development will be directed to a lake/retention area near the well site. JOC is responsible for properly directing the discharge water and maintaining it within the boundary of the lake/retention area. JOC shall prevent any damage to the lake/retention area embankment and shall install adequate erosion control measures at the point of discharge. CITY shall work with JOC to coordinate with developer to arrange for the use of the lake area for discharge during the drilling of the well and shall obtain any required permits for discharge during the completion of this contract. JOC must abide by all permit provisions and shall be responsible for all water discharged on this site. JOC shall continuously monitor and maintain the discharge so as not to cause nuisance or damage to any downstream property or structures.

9.0 WELL ABANDONMENT

The JOC shall abandon the existing irrigation well ADWR registration #55-624354 at the Layton Lakes site pursuant to ADWR Article 8, Rule R12-15-816, according to ADWR Standard Method. The Registration of Existing Wells form for this well is presented in Appendix A.

The JOC shall remove and stack on site any existing pumping equipment. The setting depth of the pump is currently unknown. For bidding purposes a setting depth of 400 feet is assumed. After removal of the pump equipment, the JOC shall conduct a color video of the well to determine the well's structural condition. The JOC will perforate the well using a Mills Knife tool approximately two cuts per round with one round every foot for a minimum of one hundred vertical feet within the well casing. The location of these cuts shall be determined by the City's Representative.

The cement grout shall be pumped into the well through a tremie pipe, unless the interval to be sealed is above the water surface. The discharge end of the tremie pipe shall be continuously submerged in the grout during cementing operations.

The surface demolition of the concrete well pad and other surface appurtenances shall be done by others and should not be included within the scope of this item.

10.0 VISITATION AND INSPECTION

At any reasonable time during the term of work, the CITY REPRESENTATIVE, CITY, or any of their duly authorized representatives, shall have access to JOC'S facilities and have the right to examine books, documents, and records of JOC involving transactions related to these specifications.

11.0 MEASUREMENT AND PAYMENT

11.1 BASIS OF MEASUREMENT AND PAYMENT

Compensation for all work specified to be performed under this specification shall be made under the payment items presented in this section. The prices for the said payment items shall be full compensation for all costs in connection therewith. Principal features of the work to be included under the various payment items will be on a linear foot, hourly, daily, per ton, per cubic yard, or lump sum basis, as designated.

11.2 PAYMENT ITEMIZATION

A payment schedule for well construction, development, and testing of one production well is presented in Exhibit B. Detailed descriptions of each item of the payment schedule (Exhibit B) are presented below.

11.2.1 Item 1 - Mobilization and Demobilization

Consists of assembling all drilling, testing, and support equipment at the job site; removing or transferring the equipment from the job site when the work is completed; and, job site cleanup. Payment shall be made on a lump sum basis.

11.2.2 Item 2 - Surface Casing Construction

Consists of all labor, equipment, and material costs associated with drilling, in accordance with Section 7.2.1, a 36-inch diameter surface borehole to 39 feet; providing a 30-inch diameter steel surface casing in accordance with Section 7.2.2.1; installation of the surface casing in accordance with Section 7.2.3; and, installation of the surface casing cement grout seal in accordance with Section 7.2.4. Payment shall be made on a linear foot basis.

11.2.3 Item 3 - Borehole Construction

Consists of all labor, equipment, and material costs associated with drilling a minimum 28-inch diameter borehole from 39 feet to 1200 feet in accordance with Section 7.3. Item 3 costs should incorporate all labor, equipment, materials, recording requirements. Payment shall be made on a linear foot basis.

11.2.4 Item 7 – Standby for Geophysical Logging

Consists of the standby time required during the conduct of a series of geophysical analyses as described in Section 7.3.2. Payment shall be made on an hourly basis.

11.2.5 Item 8 – Formation Water Quality Sampling

Consists of all labor, equipment, and material costs associated with the collection of zone specific ground-water samples as specified in Section 7.3.3. Air lift development shall be for a period of 12 hours. Additional air lift development shall be on an hourly basis. Payment for each sample shall be on a lump sum basis.

11.2.6 Item 10 thru 15 - Casing Cost

Consists of the cost of the well casing and screen described in Sections 7.4.1.1, the mechanical connection described in 7.4.1.2, and the camera tube and re-entry box described in Section 7.4.1.3. Item 6 also includes the bottom well cap. Payment shall be on a linear foot basis.

11.2.7 Item 16 & 17 - Casing Installation
Consists of all labor and equipment costs required for the installation of the well casing and screen, including welding requirements, logs and records, as specified in Section 7.4.2 and video access tube as specified in Section 7.4.1.3. Payment shall be made on a linear foot basis.

11.2.8 Item 18 thru 22 - Annulus Material Installation
Consists of all labor, equipment, and material costs to furnish (Section 7.4.1) and install (Section 7.4.3) the filter pack, bentonite seal, and fine sand seal and cement grout. Payment shall be made on a cubic foot, ton, lump sum and cubic yard basis.

11.2.9 Item 23 - Swab and Air-lift Development
Consists of all labor, equipment, and material costs associated with the development of the production well by swabbing and air-lift pumping as specified in Section 7.4. Payment shall be made on an hourly basis.

11.2.10 Item 24 & 25 - Aquifer Testing
Consists of the cost of all labor, equipment, and materials associated with the well test requirements, as described in Section 8.0. Payment for Item 24 shall be made on a lump sum basis. Payment for Item 25 shall be made on an hourly basis.

11.2.11 Item 26 - Plumbness and Alignment (Dummy) Test
Consists of the testing of the production well for plumbness and alignment (dummy test), as described in Section 7.5. Payment shall be made on a lump sum basis.

11.2.12 Item 27 & 28 - Unavoidable Delay
Consists of the cost of maintaining equipment and personnel if a work stoppage occurs, which is not due to any fault of JOC. Payment shall be made on an hourly basis.

11.2.13 Item 29 - Final Well Videos
Consists of the cost of all labor and equipment to conduct specified well videos. Payment for this item shall be made on a lump sum basis.

11.2.13.1 Item 30 – Sound Control
Consists of the cost of all labor, equipment and materials to install and maintain adequate sound protection materials as approved by the CITY for the duration of the project. Payment for this item shall be made on a per square foot basis.

11.2.15 Item 31 – Temporary Site Fencing
Consists of the cost of all labor, equipment and materials to install temporary fencing and gates to adequately secure the drill site as required by the CITY. For pricing purposes use a rental period of Two (2) months. Payment for this item will be made on a lineal foot basis.

11.2.16 Item 32 – Temporary Water Discharge Piping
Consists of the cost of all labor, equipment and materials to install temporary piping system and appurtenances to direct water discharges during well development and pump testing to a discharge point as directed in Section 8.3 and as directed by the CITY REPRESENTATIVE. Payment for this item will be made on a lineal foot basis.

11.2.17 Item 33 – Abandon Existing Irrigation Well – Equipment Removal and Abandonment Preparation
Consists of the cost of all labor, equipment and materials to remove pumping equipment and video the well and mills knife the casing according to ADWR standards and Section 9.0.

11.2.18 Item 34 - Abandon Existing Irrigation Well – Well Cementing
Consists of the cost of all labor, equipment and materials to complete the grouting of the well according to ADWR standards and Section 9.0., using tremie grouting of neat cement. Payment for this item will be made on a cubic yard basis.

11.2.19 Item 35 – Owners Project Allowance
Consists of an allowance to reimburse the JOC for reasonable costs for unforeseen items encountered during the drilling and testing of a water supply well.

Notes

a. Quantities are not guaranteed. Final payment will be based on actual quantities. If the required quantities of the items listed above are increased or decreased by Change Order, the unit prices set forth above shall apply to such increased or decreased quantities.

b. Items 18, 19, 21 and 22 quantities are volume estimates based on the preliminary well design included as Exhibit A-2. These volume calculations have been increased by 30% to allow for possible quantity overages due to variations in the borehole diameter.

c. Although no unavoidable delays are expected, 12 hours with crew and 12 hours without crew are included as a contingency for pricing purposes.

EXHIBIT A-1

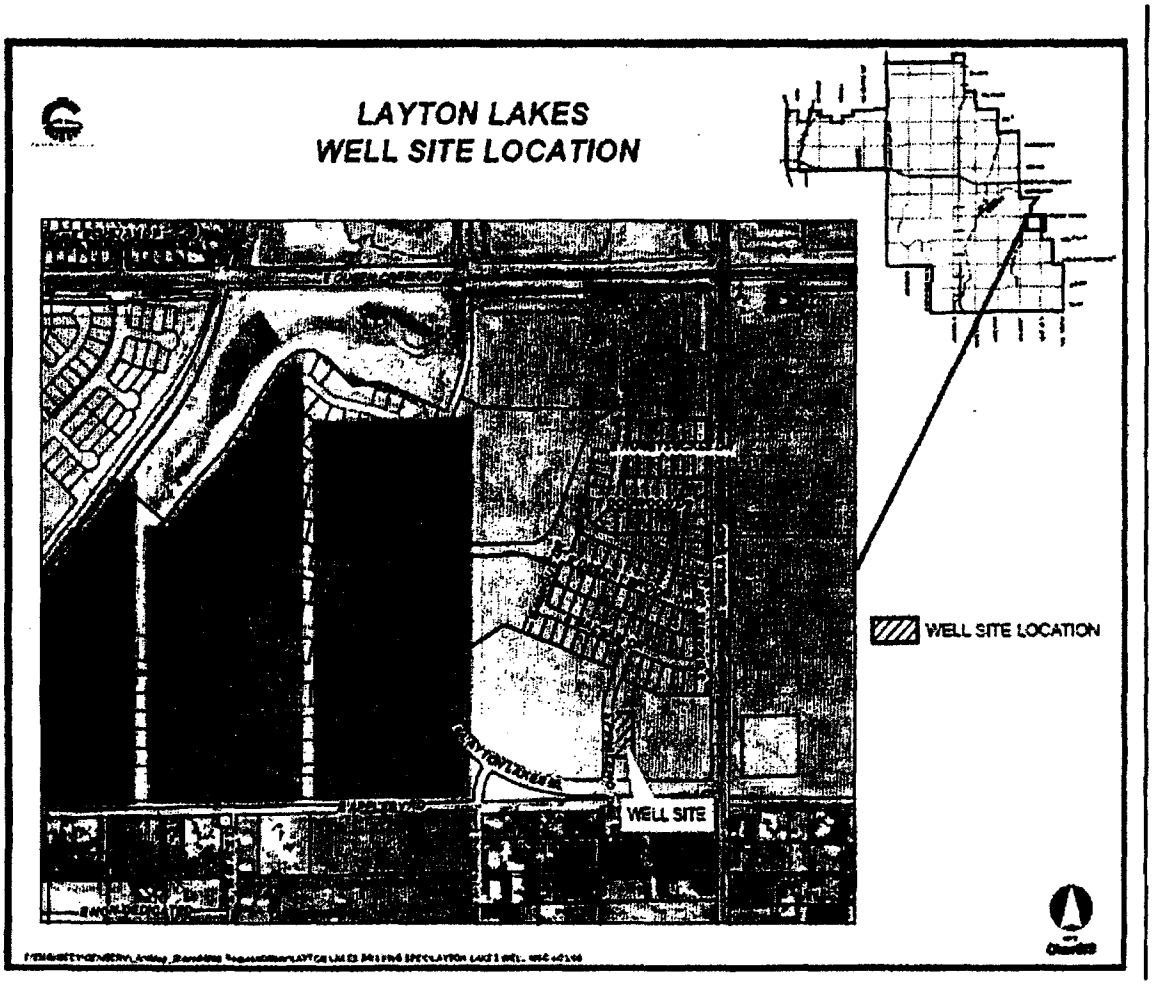
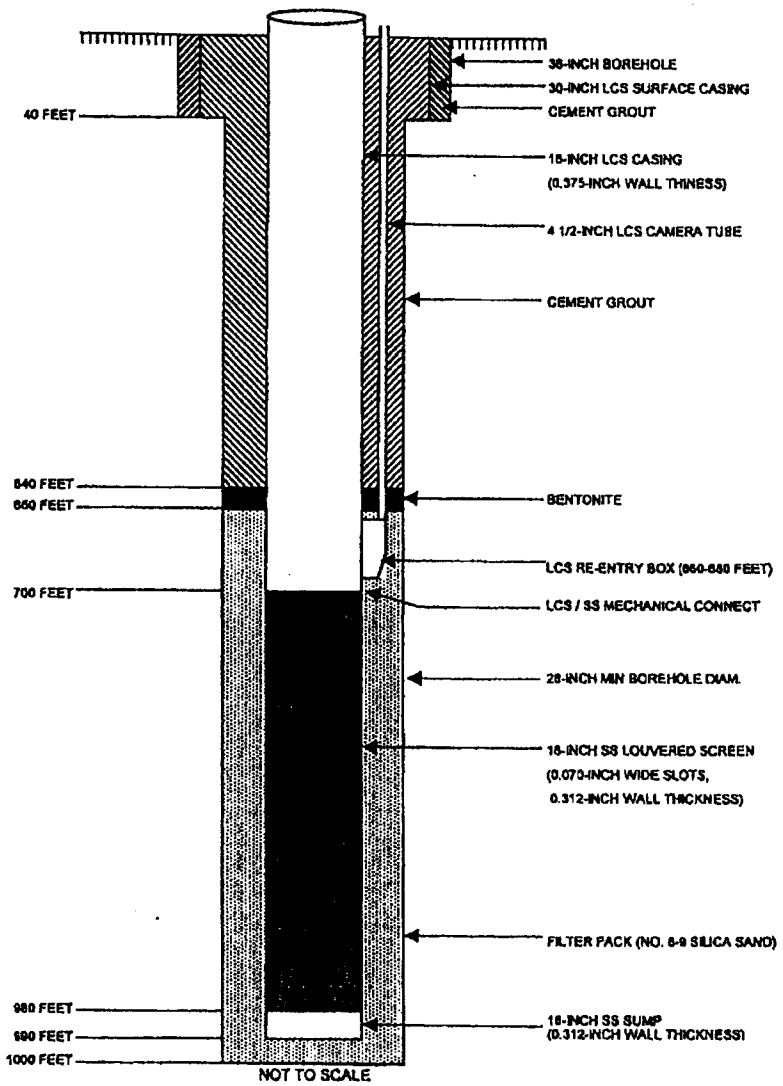

LAYTON LAKES
WELL SITE LOCATION
WELL SITE
WELL SITE LOCATION

EXHIBIT A-2 cont.



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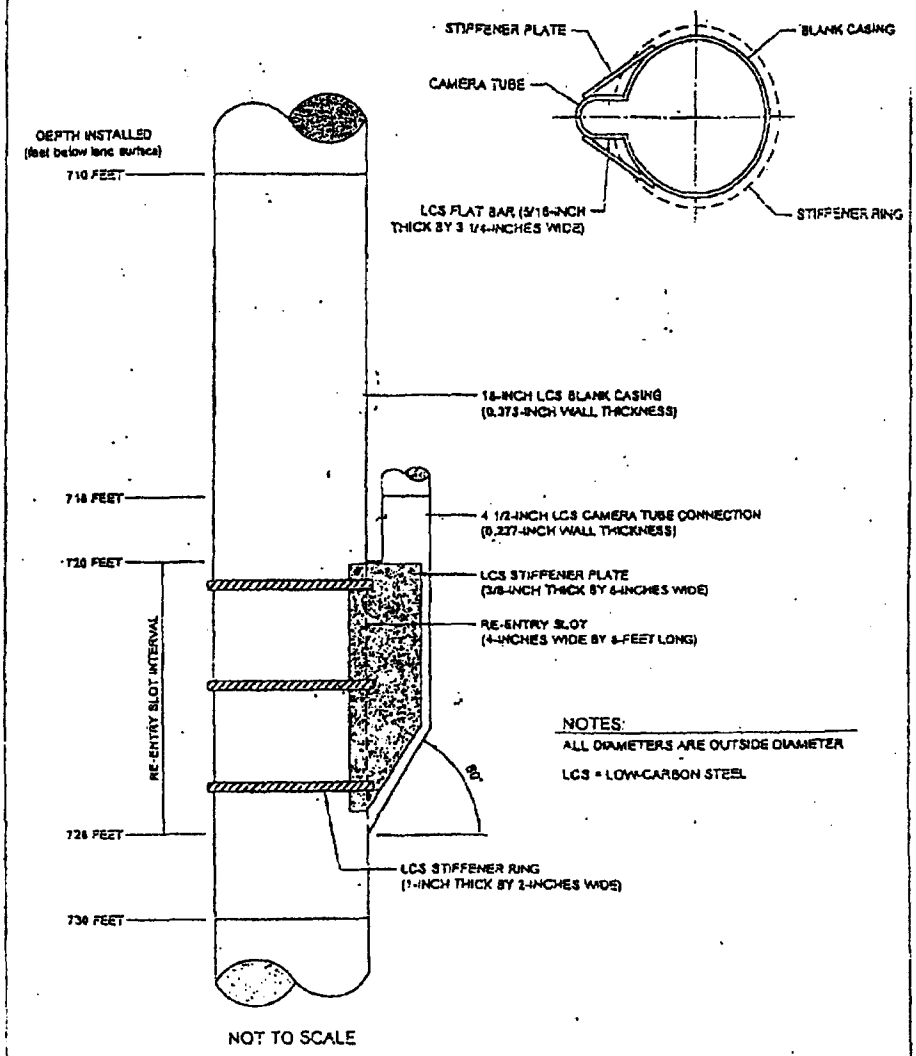
NOTES:
SS=STAINLESS STEEL
LCS = LOW-CARBON STEEL
ALL DIAMETERS ARE OUTSIDE DIAMETERS

Figure 1
T2S, R6E, Sec18 (ADD)
PRELIMINARY WELL DESIGN
CHANDLER, ARIZONA

EXHIBIT A-2 cont.



RE-ENTRY BOX DETAIL

EXHIBIT A-2 cont.

DEPARTMENT OF WATER RESOURCES
99 EAST VIRGINIA AVENUE
PHOENIX, ARIZONA 85004

RECEIVED JUN 11 1982 DEPT. OF WATER RESOURCES

REGISTRATION OF EXISTING WELLS

READ INSTRUCTIONS ON BACK OF THIS FORM BEFORE COMPLETING
PRINT OR TYPE — FILE IN DUPLICATE

REGISTRATION FEE (CHECK ONE)	
EXEMPT WELL (NO CHARGE)	☐
NON-EXEMPT WELL — $10.00	☒

FOR OFFICE USE ONLY
REGISTRATION NO. 55- 624,354 (48)
FILE NO. D(2-6)18add
FILED 6-11-82 (DATE) AT 3 (TIME)
INA
AMA PHOENIX

1. Name of Registrant:
L.R. and Roberta N. Layton
551 West Elliot Rd. (Address) Chandler (City) Arizona (State) 85224 (Zip)

2. File and/or Control Number under previous groundwater law:
N/A (File Number) 35- N/A (Control Number)

3. a. The well is located within the SE ¼ SE ¼ NE ¼, Section 18, of Township 2S N/S, Range 6E E/W, G & SRB & M, in the County of Maricopa.
   b. If in a subdivision: Name of subdivision _____, Lot No. _____, Address _____.

4. The principal use(s) of water (Examples: irrigation - stockwater - domestic - municipal - industrial)
Irrigation.

5. If for irrigation use, number of acres irrigated from well 488.

6. Owner of land on which well is located. If same as Item 1, check this box ☒
_____
(Address) (City) (State) (Zip)

7. Well data (If data not available, write N/A)
   a. Depth of Well 523 feet
   b. Diameter of casing 20 inches
   c. Depth of casing N/A feet
   d. Type of casing N/A.
   e. Maximum pump capacity 1800 gallons per minute.
   f. Depth to water N/A feet below land surface.
   g. Date well completed _____ (Month) _____ (Day) 1951 (Year).

8. The place(s) of use of water. If same as Item 3, check this box ☐.
____ ¼ ____ ¼ ____ ¼, Section ____ Township ____ Range ____
____ ¼ ____ ¼ ____ ¼, Section ____ Township ____ Range ____
see attached sheet
Attach additional sheet if necessary.

9. DATE 6-10-82 SIGNATURE OF REGISTRANT L.R. L.N.

RECEIVED
JUN 11 1982
DEPT. OF
WATER RESOURCES

L.R. and Roberta N. Layton
551 West Elliot Rd. Chandler, Arizona 85224

LEGAL DESCRIPTION:

(1). SE¼ Sec 7

(2). N½ Sec 18

(3). W½, SW¼ Sec 18

Township 23; Range 6E in Maricopa county

EXHIBIT B
FEE SCHEDULE

Item No.	Description	Est. Qty	Unit	Unit Price	Extended Price
1	Mobilization/Demobilization	1	LS	$41,000	$41,000
2	Surface casing construction	40	LF	$425	$17,000
3	17.5-inch pilot hole	1,500	LF	$51	$76,500
4	28-inch borehole reaming	1,000	LF	$64	$64,000
5	Lost Circulation	12	HR	$300	$3,600
6	Drilling Fluid During Lost Circulation Allowance	1	LS	$10,000	$10,000
7	Standby for geophysical logging	12	HR	$250	$3,000
8	Formation water quality sampling (includes 12 hr airlift per sample)	12	EA	$7,000	$84,000
9	Air lift development (additional)	24	HR	$325	$7,800
10	16-inch LCS blank well casing	670	LF	$98	$65,660
11	16-inch LCS video access port (20 ft length)	1	EA	$9,500	$9,500
12	16-inch 304 SS louvered well screen	280	LF	$570	$159,600
13	16-inch 304 SS blank well casing	10	LF	$580	$5,800
14	16-inch 304 to LCS mechanical coupling	1	EA	$5,000	$5,000
15	4.5-inch video access tube	670	LF	$12	$8,040
16	Install 16" well casing and screen	980	LF	$9	$8,820
17	Install video access tube	670	LF	$3	$2,010
18	F&I bentonite seal	40	CF	$65	$2,600
19	F&I silica sand filter pack (6x9)	75	TN	$775	$58,125
20	Filter pack disinfection	1	LS	$1,000	$1,000
21	F&I cement grout	100	CY	$415	$41,500
22	F&I formation stabilizer (Alternate)	50	TN	$45	$2,250
23	Swab and air-lift development	60	HR	$350	$21,000
24	F, I, & R test pumping equipment	1	LS	$18,000	$18,000
25	Pumping test period	64	HR	$290	$18,560
26	Plumbness & Alignment Test	1	LS	$3,750	$3,750
27	Unavoidable Delay with Crew	12	HR	$250	$3,000
28	Unavoidable Delay Without Crew	12	HR	$150	$1,800
29	Final well video	1	EA	$850	$850
30	Sound blankets	3,200	SF	$6	$19,200
31	Temporary Site Fencing (3 months Rental)	600	LF	$4	$2,400
32	Temporary Water Discharge Piping	5,000	LF	$7	$35,000
33	Existing Irrigation Well, Equipment removal and abandonment preparation	1	LS	$20,000	$20,000
34	Existing Irrigation Well - Abandonment with Neat Cement according to ADWR Standard Method	85	YD3	$300	$25,500
35	Project Allowance	1	LS	$75,000	$75,000
	Total Base Bid				**$920,865**