



12 OCTOBER 2017:  
FOR BIDDING PURPOSES ONLY  
**DRAFT & PRELIMINARY**  
NOT FOR CONSTRUCTION

Figure 4  
MOWD  
MOWD Well No. 4 - Replacement - Preliminary Design

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**BID ITEMS:**

1. The contractor shall procure and comply with the provisions of Ventura County Water Well Drilling Permit. Any fees for application and compliance therewith shall be borne by the contractor.
2. The contractor shall mobilize and demobilize all necessary equipment and materials to the project site, and restore (as applicable) the affected portions of the property to pre-existing conditions after completion of the work.

The contractor shall ensure that his operations comply with the County noise ordinances. He may either time his work to comply with conditions, construct temporary noise attenuation barriers, or other means of compliance.

Onsite sources of water are available at numerous locations near the well site. Water for drilling may be obtained from a point as directed by the owner's representative and then trucked or piped over to the drill site. The contractor shall supply any hoses or piping or water trucks that may be needed to convey water to the drill site.

Drill cuttings and fluids shall be retained in closable bins and stored at a secured location that has been pre-approved by MOWD. Cuttings with bentonite or natural clays shall not be spread on the property, as it represent sensitive watershed and habitat areas, and shall not be allowed to flow off of MOWD property or river/creek channel areas.

3. Prior to pilot hole drilling, a 30-inch ID conductor casing shall be installed to provide upper hole stability during drilling operations. The conductor is estimated to be at least 40 feet in depth, cemented in a 36-inch minimum-diameter borehole under county inspection. The conductor casing shall provide upper hole stability such that the well bore may fully penetrate the river alluvium.
4. The contractor shall drill a minimum 6-inch-diameter pilot hole to an approximate depth of 260 feet at the replacement Well No. 4 site. Drilling methods which minimize fluid use are preferred to avoid mud invasion to target water bearing formation, though direct or reverse rotary drilling methods are acceptable, with air as deep as practical and conversion to mud-rotary methods only as needed to advance. Ventura River alluvium, consisting of grain sizes ranging from silt and clay up to boulders, is anticipated throughout the bore. Cemented sandstone, conglomerate, shale, and siltstones of the Sespe formation are anticipated to underlie the alluvium and are to be penetrated by 40 feet for confirmation and cellar pipe housing. Pilot hole drilling will cease when the geologist determines that an adequate thickness of the Sespe formation target formations and/or water-bearing fracture zones have been penetrated.

Perched, unconfined, and confined groundwater conditions may be encountered in the various aquifers penetrated by the pilot borehole. Static water level depths in boreholes and nearby wells completed in target aquifers are recently on the order of 20 to 80 feet below ground surface. Drilling fluid additives may be necessary for reasons including controlling any potential failure of unconsolidated material, clay swelling potential, seepage of

poor quality water from the formations, or large differential heads between aquifers. Lost circulation is not uncommon when drilling in this formation; contractor shall be prepared for such conditions.

As drilling of the pilot holes proceed, the driller shall collect and accurately label (in closable bags) cuttings samples of representative formation materials at least every 10 feet from ground surface to the total depth and at every major change of formation materials.

In addition to collecting cuttings samples for geologist review, the driller shall keep logs of formation descriptions (including color), accurate drilling penetration rates, and detailed information on the approximate rates of fluid circulation and depths of any groundwater encountered during drilling of the pilot holes.

The driller should maintain frequent communication with the geologist throughout the project and should communicate daily with the geologist during pilot hole drilling.

If fluids are used, the contractor must monitor drilling fluid properties every 4 to 6 hours in order to maintain them well within industry standards. A record of such fluid properties monitoring should be kept onsite by the driller during pilot hole drilling and subsequent reaming. Desanding equipment in the mud circulation system is desirable, especially for mud rotary drilling. Fluid properties shall meet the following guidelines:

- Mud weight – a maximum of 80 lbs. per cubic ft (10.7 lbs./gal) during pilot hole drilling, a maximum of 75 lbs. per cu ft (10.0 lbs./gal) during pilot hole reaming, and 70 lbs. per cu ft (9.4 lbs./gal) during casing installation and gravel packing.
- Marsh funnel viscosity – a maximum of 50 seconds during pilot hole drilling, a maximum of 45 seconds during pilot hole reaming, and a maximum of 40 seconds during casing installation and gravel packing.
- Sand content of mud entering the pump – a maximum of 5% by volume during all aspects of drilling.

The geologist will be onsite occasionally to log all drill cuttings samples collected by the driller, log cuttings in real time when target aquifers are encountered, determine when an adequate thickness of aquifer material has been penetrated to terminate the pilot hole, and to be present when any geophysical logging is conducted.

5. At the completion of the pilot hole (if warranted as determined by the geologist), a suite of electric logs shall be run, including an SP, 16" and 64" normal resistivity logs, gamma log, and a point resistivity log. A plumbness/alignment/deviation survey shall be conducted in the pilot borehole. A downhole sonic/variable density survey shall also be conducted. The geologist shall approve the selection of the geophysical logging subcontractor.

The drill cuttings samples, driller notes on all downhole information, drilling penetration rates, and geophysical log data will be reviewed by qualified hydrogeologic personnel to: verify geologic formations penetrated; identify the thicknesses and depths of potential aq-

uifers; assess the potential flow rates from a completed well; evaluate potential gravel pack and seal requirements; and identify locations for well screen and blank (unperforated) casing. Proper selection of gravel pack gradations and screen slot sizes is important for sand-free production. The assistance of the drilling contractor in these decisions is important, especially with regard to the availability of appropriate materials.

6. If the pilot hole data prove successful and appear to meet the needs of MOWD, the borehole shall then be reamed out in order to provide adequate spacing for a 16-inch-diameter stainless steel casing, ancillary tubing, gravel pack, and cement sanitary seal(s). The geologist shall select the depth of the ream after reviewing pilot hole data. The reamed hole should not be left uncased. Reamed diameter should be a minimum of approximately 22 inches, but not greater than 26 inches, depending on the final diameter of the casing selected for use. This will provide a nominal 3-inch radial annular space for gravel pack and seal around the casing (minimum).

Control of drilling fluid properties is also important during reaming operations, and fluid properties should be monitored and recorded on a regular basis as noted above.

To confirm the proper ream diameters and volumes, the contractor shall conduct a caliper survey of the reamed borehole.

7. Blank well casing shall be 16-inch-inside-diameter (ID), spiral weld, 304 Stainless steel water well casing. Centering guides shall be placed approximately every 80 ft on the casing during installation.

The contractor shall confirm and bear full responsibility that the casing installed shall be capable of withstanding the pressures and temperatures of downhole conditions, including the weight of the casing itself, annular material (including gravel pack and seals), and differential heads during completion, development, testing, and operation of the well.

The casing shall be sufficiently plumb and straight so that a 12-inch-diameter, vertical turbine pump and bowl assembly may be freely lowered and raised within the total length of the casing and function within compliance of AWWA plumbness and alignment recommendations. Any deviation of more than 10 inches per 100 feet of casing may be grounds for MOWD to reject the well, in which case the contractor will drill a new well for the MOWD at contractor's expense.

8. Perforated well casing shall be 16-inch-ID, spiral weld, 304 Stainless steel, super-flo louvered water well casing. The geologist will select the screen locations and screen slot width on the basis of the electric log and of formation materials encountered during pilot hole drilling. A perforated slot width of approximately 0.090 inch (90 slot) is anticipated. Perforated intervals should be selectively placed in the saturated, fractured/jointed portions of the formations penetrated by the pilot hole. Approximately 150 feet of saturated aquifers are anticipated to be targeted for the setting of well screen in the well.

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self, annular material (including gravel pack and seals), and differential heads during completion, development, testing, and operation of the well.

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9. A 10-foot long cellar Pipe section of blank casing with an end cap shall be 16-inch-ID, spiral weld, 304 stainless steel water well casing, set below the perforations.

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The casing shall be sufficiently plumb and straight so that a 12-inch-diameter, vertical turbine pump and bowl assembly may be freely lowered and raised within the total length of the casing and function within compliance of AWWA plumbness and alignment recommendations. Any deviation of more than 10 inches per 100 feet of casing may be grounds for MOWD to reject the well, in which case the contractor will drill a new well for the MOWD at his expense.

10. A 2-inch-diameter gravel feed tube shall be emplaced in the annular space between the casing and the borehole wall from ground surface to 70 feet. The gravel feed tube may be PVC or other compatible material as approved by MOWD. The Gravel feed tube must ultimately be surface-vented such that air or gas may be released from the gravel annulus.
11. Gravel pack shall be emplaced in all but the upper 60 feet of the reamed well bore. For cost estimation purposes, an approximate depth interval is anticipated to be from 100 to 260 feet below ground surface in the MOWD Well No. 4 replacement well. Clean, high silica content gravel pack such as that available from Cal-Silica, or an approved equal, is recommended. The geologist and the contractor will determine the appropriate gravel pack gradation. A 6X9 gradation for the gravel pack is anticipated.
12. Above the gravel pack, comprising the interval between ground surface and the top of the gravel pack, approximately 100 ft of the annular space shall be cemented-off using a 10-sack sand-cement slurry to create a thorough sanitary seal. Portland cement utilized shall be ASTM C150 Type I (API Class A) or Type II (API Class B). The sealing material should be pumped via a tremie from the top of the gravel pack, with the tremie removed as the cement level rises in the annulus. To prevent casing collapse, the seal shall be poured slowly.

The cement seal shall set for a minimum of 24 hours prior to development operations in the well. The contractor shall provide advance notice to the County and shall have a County inspector witness the installation of the sanitary seal.

13. Mechanical development of the well should begin with the removal of heavy drilling fluid and sands, followed by introduction, circulation and recovery of a 1500 part per million (PPM) chlorine solution throughout the louvered well casing. This will be followed by installation and agitation, via bailer or tremie pipe, of New Well 220 (NW-220) or equivalent breakdown products within the screened zones in the well (approximately 4 hours). This should be followed, after allowing a period of 8 to 12 hours for the NW-220 to remain in the well, by up to 36 hours of air jetting/air lifting techniques in the screened portions of the well. Fines and debris collecting at the bottom of the well should be periodically air lifted or bailed out. Use of one gallon of NW-220 per 500 gallons of fluid in the well is considered appropriate to use. It should be purged from the well within 24 hours. The contractor, together with the owner, shall determine the appropriate disposal of these fluids. Discharged water, once clear, may be pumped as directed by MOWD.
14. After completing the well, a temporary test pump shall be installed to complete development and to determine aquifer characteristics, potential production rates and resulting pumping levels, and the water quality of the final well blend. With these data, the permanent pumping rate and pump depth setting can be established.

The test pump should be capable of pumping at least 2000 gpm from a depth of 200 ft. These pump requirements are estimates only. The final recommended test pump setting would be made after completion of the well.

Water discharged during all phases of development and test pumping shall be discharged to a location approved by MOWD. The water shall be discharged in such a manner as to prevent erosion or flooding or unauthorized runoff from the property or unauthorized discharge to the waterways.

15. Pumping development (pumping and surging) shall be conducted for approximately 48 hours in the well, or until sand production has been minimized and specific capacity has stabilized.

A nine-hour, three-point step drawdown test, followed by a minimum 24-hour-long constant rate aquifer test is recommended in the well. Each point of the step test should be pumped for approximately three hours. Accurate water level monitoring in the new well is important during these tests. Water samples will be collected by the well owner or the geologist prior to cessation of the 24-hour constant-rate pumping in order to perform laboratory testing for all inorganic and heavy metals constituents, and for key irrigation suitability parameters. Immediately after completion of the constant discharge test, the water level recovery shall be monitored for a period of two hours. Following removal of the test pump, any fill material shall be air lifted or bailed from the bottom of the well.

The well shall then be disinfected using an approved liquid chlorine compound sufficient to produce 500 ppm available chlorine when mixed with the total volume of water in the well. A bailer or swab tool may be used to disperse the disinfectant throughout the full column

of water in the well. Alternatively, disinfection may be accomplished by using the test pump for surging without discharge. The disinfectant shall remain in the well for a minimum of 24 hours.

16. The well shall be covered during the drilling and construction period so that the well bore is protected at all times for purposes of safety and to preclude vandalism. After well completion, a 6-ft by 6-ft square, 18-inch below grade and 24-inch above grade concreted pump pedestal shall be constructed, including steel reinforcement and a 2" diameter steel vent tube, 2" diameter access tube, meeting Ventura County standards. After test pumping, a locking cap is to be securely placed over the casing and tubing for protection against undesired access into the well.
17. Contractor shall remove transport and dispose of drilling muds and/or cuttings if said items are not able to be used/spread on site at owner's direction.
18. While not anticipated, costs for standby time shall be provided with the contractor's bid. Only standby time requested in writing by the MOWD will be compensated to the Contractor.
19. While not anticipated, a standard drill rig time for additional operations shall be provided with the contractor's bid.
20. Destruction at request of owner's representative:

If destruction of the drilled hole is specifically requested, in writing, by the owner's representative (including the Geologist), due to such causes including, but not limited to a lack of potential aquifers or unacceptable quality, the hole shall be completely filled with cement, bentonite, and/or other materials in accordance with applicable State and County standards. In this event, the contractor will be paid for the work conducted including mobilization and demobilization. Payment for pilot hole destruction, if specifically requested by the owner's representative, shall be made on a per linear foot basis.

21. Destruction due to actions of contractor:

If destruction of the drilled hole or well is by reason of any actions of the contractor, due to such causes including, but not limited to losing tools, damaging the well, casing collapse, misalignment, or any other cause attributed to careless or poor workmanship, negligence, or faulty materials, the hole or well shall be completely filled with cement, bentonite, and/or other materials in accordance with applicable State and County standards. No payment will be made for drilling and filling the hole so abandoned, for lost or damaged casings, or for demobilization and subsequent mobilization to a new site. The contractor shall drill a new well within 50 ft of the original location.

**MOWD Well No. 4 - Replacement**

**Bid Guideline Sheet**  
**Drilling of test holes and construction of new water wells**  
**Meiners Oaks Water District**  
**202 West El Roblar Drive**  
**Ojai, CA 93022**



October 13, 2017 Project Narrative

Project involves the drilling of test hole and completion, if warranted, as new water supply well for municipal service. Anticipated total depth of bore is 260 feet.

Item No.	Description	Unit	Unit Cost	Number of Units	Extension
1	Permitting via Ventura County for new well construction	Each		1	\$0.00
2	Mobilization & demobilization, including limited site preparation and restoration	Lump Sum		1	\$0.00
3	Furnish and install conductor casing through surface soils at well locations, 0 to 40 feet estimated at each; 30-inch minimum inside-diameter casing set in 36-inch minimum diameter borehole, sealed with a sand-cement slurry annular seal under County inspection.	Feet		40	\$0.00
4	Drill 6-inch-diameter (nominal, minimum) pilot borehole, from base of conductor casing (40 feet) to 260 feet bgs or as directed by Geologist/Owner; collect, bag, and label cuttings.	Feet		220	\$0.00
5	Conduct down-hole geophysical survey of boring: standard electric log package, deviation, and sonic/VDL log by Geologist-approved logging subcontractor	Each		1	\$0.00
6	Ream borehole to 22 inches diameter (minimum) from base of conductor to total depth to accommodate casing and annular material; conduct caliper survey	Feet		220	\$0.00
7	Furnish and install 16-inch diameter 304SS Sprial Weld Blank Water Well Casing.	Feet		90	\$0.00
8	Furnish and install 16-inch diameter Super-Flo Louvered 304 Stainless Steel Spiral Weld casing	Feet		150	\$0.00
9	Furnish and install 16-inch diameter 304SS Sprial Weld Blank Water Well Casing with end cap	Feet		10	\$0.00
10	Vented Gravel Feed tube to 70 feet bgs	Feet		70	\$0.00
11	Furnish and install gravel pack pumped via tremie pipe	Feet		200	\$0.00
12	Furnish and install cement annular seal pumped via tremie pipe - contractor to ensure compatibility with casing to avoid collapse	Feet		60	\$0.00
13	Mechanical Development	Hour		50	\$0.00
14	Furnish and install temporary pump 2000 gpm capacity; set at 170 feet below grade; include temporary power source	Lump Sum		1	\$0.00
15	Conduct test pumping and development as directed, maintain discharge on property or to catch basins as directed by owner; disinfect well	Hour		81	\$0.00
16	Complete well heads to county standards, including concrete pedestal at grade and ancillary tubing	Lump Sum		1	\$0.00
17	Removal, transport, and disposal of drill cuttings and muds to approved offsite facility	Cubic Yards		0	\$0.00
18	Standby Time	Hour		0	\$0.00
19	Additional operations	Hour		0	\$0.00
20	Destruction of Pilot borehole to County Standards	Feet		0	\$0.00
	<b>TOTAL (Excluding Item Nos. 17, 18, 19, and 20)</b>				<b>\$0.00</b>

**Notes:**

1. Only the actual units of items actually directed by owners/Geologist and completed will be paid.
2. Owner reserves the right to delete any or all items.
3. Should drilling or casing (etc.) be advanced to a shallower or deeper depth or at an alternative location on this mobilization, costs presented herein shall apply.
4. No standby time will be paid during the evaluation of cuttings to specify gravel pack and casing apertures. Owner anticipates having final casing design within 24 hours of completion of geophysical log in pilot bore.