

Attachment #2

TECHNICAL SPECIFICATIONS
FOR THE CONSTRUCTION AND TESTING
OF A 5" IRRIGATION TEST WELL

The work consists of the drilling and testing of an irrigation test well for L.E. Kaufman Golf Course, Kent County, Michigan

OWNER: L. E. Kaufman Golf Course
Kent County Parks Department

CONSULTANTS: Colein & Kuhn Associates, Inc
127 W. University Drive
Rochester, MI 48307

WELL CONSTRUCTION

The irrigation well will be constructed in the sequence outlined below. The stated depth and material requirements are based on knowledge of nearby wells. All stated depth and material requirements are to be verified or adjusted as required at time of installation of well.

1. Drill one well to a depth of three hundred feet (300').
2. Install one hundred and ninety feet (190') of nominal five inch (5") diameter PVC casing.
3. Develop well to a sand-free condition.
4. Conduct six hour step rate pumping test up to maximum well capacity plus two hour recovery.
5. Report complete findings of test and provide to Consultant.
6. Based on test well data, make recommendations for permanent production well capable of 750 GPM.

QUANTITY AND PAYMENT

Prices and measurement: Payment for work under this Contract will be made on a unit price or lump sum basis for work actually completed. Final measurements of the work will be taken to determine the amount of work done, to be applied to determine the total cost. The method of applying the unit prices to measured quantities will be as herein specified.

Mobilization of Equipment: The quantity and payment for Mobilization of Equipment will be made at the lump sum price bid for the item Mobilization of Equipment in the Proposal, which shall include the cost of all labor and materials in connection with the mobilization and demobilization of equipment for this Contract. Also included in the cost

of the mobilization and demobilization shall be the cost to clean up and restore the well site to its pre-construction condition.

Well Borings: The quantity of well borings for which payment will be made will be the number of linear feet of borings, measured from the original ground surface elevation in dry areas or from water surface in wet areas, at the site of the hole to the bottom of the hole.

Payment for Well Borings will be made for the quantity, as above determined, at the unit price per linear foot bid for the item Well Borings in the Proposal, which price shall include the cost of all labor and materials for completing the boring, including, if required, the furnishing and sinking of casing, the cost of probings, if any, to locate existing utilities and the cost of their repair and removal and replacement if damaged, and all other work, materials or services in connection therewith and incidental thereto.

Well Casing: The quantity of approved well casing for which payment will be made will be the actual number of linear feet of well casing provided and installed.

Payment for well casing will be made for the quantity, as above determined, at Contract unit price per bid for item Well Casing the Proposal, which price shall include all necessary cost for the furnishing and placing of the well casing including all necessary drive shoes and packers and all other work and materials in connection with and incidental thereto.

The cost of well grouting including all labor, equipment materials used to grout the well(s) in accordance with the specifications and shall be incidental to well casing installation.

Well Development: The quantity of well development for which payment will be made will be the actual number of hours of well development provided. Well development procedures could require periodic flushing of the well, until groundwater samples are clear and suitable for sample collection.

Step-Test: Payment for six hour step test will be based on the actual number of hours that the step test is performed. All labor, materials and equipment necessary will be incidental thereto.

Constant Rate Test: Payment for the 8 hour constant rate test will be based on the actual number of hours that the rate test is performed. All labor, materials and equipment necessary will be incidental thereto.

Well Logs: Payment for well logs complete will be on a lump sum basis.

SCOPE OF WORK

The work includes the furnishing of all materials, labor, equipment and all else necessary for completing well borings, testing and pump as listed in the Proposal. The well borings shall be made to determine the character, thickness and stratification of the subsurface materials.

The exact location and depth of the well boring will be jointly determined by the Consultant and Contractor.

The Contractor may not alter his unit prices should the Owner delete any work item from the scope of work.

MISS DIG

The Contractor shall notify MISS DIG Utility Communications System and obtain clearance 48 hours prior to starting any drilling.

SITE CONDITIONS

It is required that the Contractor familiarize himself with Construction Contract Documents and with the working conditions by making a personal examination of the site. Before any drilling is started, the Contractor shall locate any adjacent utilities or underground structures, and adjust the position of the drilling site as necessary to prevent damage to them. Contractor is responsible for cost of repair if damaged.

ELECTRICITY AND FUEL

The Contractor shall furnish his own portable generator of sufficient size to run the pumps or other equipment at his own complete cost and expense. Electrical service of 480 volt is at the existing pumphouse and may be used if desired.

ADDITIONAL BORINGS

Additional borings may be necessary. The Contractor therefore agrees that the Owner may order such additional borings as may be required.

COMPETENT WORKMEN

The Contractor shall employ only competent workmen expert in the performance of the type of work required by these specifications. The crew shall be under the direct supervision of an experienced driller, and the Contractor shall provide the services of a drilling superintendent who shall be available to the job at all times. The crews and superintendent shall be in the employ of the Contractor.

PERMITS, CERTIFICATES, LAWS, AND ORDINANCES

The Contractor shall, at his own expense, obtain all permits, certifications, and licenses required of him by law for the execution of the work. He shall comply with all Federal, State, or local laws, ordinances, or rules and regulations relating to the construction and performance of the work.

PROJECT SCHEDULE

It is intended that the drilling begin as soon as possible, and the work completed by April 15, 2004, weather and site conditions permitting.

LOCAL GEOLOGY

The Contractor shall satisfy himself regarding all local conditions affecting his work by personal investigation and neither the information on local geology, not that derived from maps or plans nor from the Owner or his agents or employees shall act to relieve the contractor of any responsibility hereunder or from fulfilling any and all of the terms and requirements of the drilling contract and specifications.

WELL SITE

It is believed the selected drilling sites are clear and accessible to standard truck-mounted drilling equipment.

The exact locations of the proposed test wells are to be jointly determined by the Consultant and Contractor.

DRILLING METHODS

The drilling method used to construct the well will be at the option of the Contractor. Regardless of the drilling method the Contractor chooses, the Contractor will comply with all State and local rules and regulations governing water well construction.

EQUIPMENT REQUIREMENTS

Equipment in first class working g order must be provided. The Contractor shall use his own drilling equipment having the minimum capabilities necessary to do the described work. No unnecessary delays or work stoppages will be tolerated because of equipment failure, nor will they be considered as a valid reason for extending the length of the contract. The Contractor shall be held responsible and payment may be withheld for damages to the well due to any cause of negligence, faulty operation, or equipment failure.

WELL CASING

The well casing shall be schedule 40 PVC, or better, threaded and coupled ends, nominal five inch (5") size.

WELL DEVELOPMENT

The Contractor shall develop irrigation wells by approved procedures. Among the methods that may be acceptable for development of the irrigation well are:

- a. horizontal jetting and surging and by air lift
- b. water surge

Development work must be done in a manner that will not cause undue settlement or disturbance of the strata above the water bearing formation, or disturb the seal effected around the well casing which provides the natural sanitary protection against vertical

seepage. Water produced during development shall be conducted away from the well site in a manner that does not cause a hazard or nuisance.

PUMPING TESTS

The Contractor shall be responsible for providing all necessary pumps, prime movers, pipelines, meters, and gauges necessary for testing and should include these in his base bid price.

The Contractor shall provide, for testing the irrigation well, a pump and prime mover capable of pumping water at a minimum constant rate of 100 GPM.

The Contractor shall furnish and install in the pipeline within one hundred feet (100') of the well to be pumped, an orifice/manometer or a flow meter capable of recording instantaneous flow rates. The flow meter shall have an accuracy of five percent at the tested rate. The flow meter shall be sufficiently removed from obstructions in the pipeline, valves, elbows, reductions, etc. to allow the meter to perform within its specifications.

The Contractor shall provide a means to accurately measure static and pumping water levels in the well before, during and at the completion of the pumping tests and pumping water levels shall be measured at regular intervals during the test period. Water level measurements for the step test are to be made every one (1) minute for the first five (5) minutes, every five (5) minutes for the next fifteen (15) minutes of pumping; and every ten (10) minutes thereafter.

At the conclusion of the pumping, the recovery of water level is measured in the same sequence for at least two hours or until 95% recovery occurs.

CAPPING

The Contractor shall provide temporary capping on the irrigation wells when not in use. The cap shall be fitted to prevent malicious mischief.

TEST COMPLETION

At the completion of the test pumping, the casing is to be removed and the hole is to be abandoned using Baroid Hole Plug to the surface.

REPORTING

The Contractor is to provide to the Consultant full reports of the tests. Include complete formation data and time logs with corresponding test pump rates and pumping levels including recovery.

It is the intent that a permanent production well will be installed at the test well location for use as the irrigation pond refill source. Estimated total yield of the production well will be 750 GPM.

**CONTRACTOR'S PROPOSAL FORM
INSTRUCTIONS TO BIDDERS**

Bidders are instructed to submit bids for this project on a lump sum basis with adjustments for footage and materials more or less stated in the Contractor's Proposal Form. Bidders will complete and submit information as requested in these specifications.

All bid items shall be tax inclusive. All work will be performed in accordance with the specifications and all applicable laws.

ITEM	DESCRIPTION	LUMP SUM, UNIT PER FOOT COST OR PER HOUR BASIS
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IRRIGATION WELL - 5"

- 1.0 For providing all equipment, materials, and labor necessary to construct, develop, test, and complete and five inch (5") irrigation test well according to the specifications.

Included in the unit price is: reamed borehole to a depth of three hundred feet (300'), and one hundred and ninety feet (190') of five inch (5") diameter PVC casing, development time including step rate pumping, plus all other necessary incidentals.

Lump sum price for five inch (5") well (includes mobilization cost) \$ _____

ADJUSTMENTS

- 1.1 For reaming hole to more or less than three hundred feet (300') below the surface.

Per foot price of \$ _____

- 1.2 For furnishing and installing more or less than one hundred and ninety (190') of casing

Per foot price of \$ _____

THIS PROPOSAL IS SUBMITTED IN THE NAME OF:

Name of Contractor: _____

Signed by: _____ Date: _____

Print Name: _____

Title: _____