

**SECTION 33 21 16
IRRIGATION WATER WELL**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. The work shall consist of furnishing all labor, material, equipment, and services necessary for the drilling of irrigation water well as described in this section.
 - 1. Drilling and casing water well
 - 2. Pump and controller
 - 3. Water and system testing and certification
- B. Specifications are intended to include everything required and necessary for proper installation of the irrigation water well whether each item is mentioned or not, and Contractor is expected to provide for a complete working system.

1.2 REFERENCES

- A. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
- B. ASTM C150/C150M - Standard Specification for Portland Cement
- C. AWWA A100 - AWWA Standard for Water Wells - International
- D. NEMA MG 1 - Motors and Generators

1.3 DESCRIPTION OF THE WORK

- A. Water well work includes the following:
 - 1. Applications and permits for drilling and developing well, including SFWMD water use permit and well drilling permit.
 - 2. Installation of a surface casing, if deemed necessary by the Well Driller and Architect
 - 3. Drilling for final water well depth
 - 4. Development of well
 - 5. Testing and reporting

1.4 BIDDERS RESPONSIBILITY

- A. Bidders submitting a proposal are responsible for inspecting the site to acquaint themselves with conditions they may encounter during construction.
- B. This includes awareness of all existing and/or proposed utilities in area of work

1.5 SUBMITTALS

- A. Section 01 33 00 – Submittals Procedures, procedures for submittals.
- B. Section 01 77 00 - Contract Closeout, procedures for submittals.
- C. Samples, Records and Reports: The Contractor shall take samples of the sub-strata formation at ten-foot intervals and at changes in formation throughout the entire depth of the well.
- D. Provide Architect/Owner the following information:
 - 1. Prior to beginning the drilling of the well, the Contractor shall submit in writing to the Architect the well driller's recommendations for the drilling of the well based upon the well driller's knowledge of the area.
 - a. The recommendations shall include the anticipated depth of the casing and the well, and address any concerns that the Contractor may have concerning the water quality or availability.
 - b. The Contractor shall not proceed with the well installation until the Architect has received and approved the preliminary report from the well driller.

2. After the well installation, but prior to installation of the pump system, the well driller shall perform and report on pumping tests as specified in this section.
 3. The well driller shall report on the static water level.
 4. The well driller shall estimate the maximum safe yield of the well and the anticipated drawdown at maximum safe yield.
 5. The well driller should provide the results of the required Non-Filterable Residue tests from an approved testing laboratory.
 - a. Two test samples are required, one test sample at the beginning of the pump test, and one test sample at the end of the pump test.
 6. The well driller shall provide an information log indicating strata encountered for the well.
 7. The well driller shall provide a certification that each well is aligned and plumb, within the specified tolerances.
- E. Provide the Architect/Owner a physical and chemical certified analysis of water from the finished well by an approved testing laboratory, in accordance with local authority requirements, including the following:
1. Test and report the results for the iron and salt content of the water from the well.
 - a. Two test samples are required, one test sample at the beginning of the pump test, and one test sample at the end of the pump test.
 2. Test and report the results for any other analysis necessary in order to conform to the requirements or regulations of the Florida DER or other government body having jurisdiction.
- 1.6 QUALITY ASSURANCE
- A. Perform Work in accordance with AWWA A100.
 - B. Drilling Firm: A company specializing in performing the work of this section with minimum 5-years documented experience.
 - C. Submit proof of state license to perform this work.
- 1.7 REGULATORY REQUIREMENTS
- A. Underground piping shall comply with Florida Building Code.
 - B. Conform to applicable code, state regulatory authority, or regulations for water-well flow capabilities and water quality.
- 1.8 ABANDONMENT OF DRILLING
- A. If necessary to abandon drilling operation before completion of water producing well, follow regulations as required by authorities having jurisdiction.
 1. Coordinate all work and permitting requirements with SFWMD prior to completing the abandonment process, provide copies of all documentation to the Owner.
 - B. Should abandonment of drilling be necessary due to poor workmanship or negligence on the part of the Contractor, no compensation will be allowed.
 - C. If abandonment of drilling is necessary due to inadequate water supply or other reason that the Architect and Owner deem no fault of the Contractor, compensation for drilling work will be adjusted.
- 1.9 PROTECTION OF WELL AND WELL FIELD
- A. The Contractor shall take precautions to prevent contaminated water or water having undesirable physical or chemical characteristics from entering stratum from which well is to draw its supply.
 1. The Contractor shall prevent contaminated water, gasoline, etc., from entering well either through opening or by seepage through the ground surface.

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- B. If the well becomes contaminated or water having undesirable physical or chemical characteristics enters well due to neglect, the Contractor shall provide casings, seals, sterilizing agents or other materials as necessary to eliminate contamination or shut off undesirable water.
 - 1. Remedial work shall be at no additional cost to the Owner.
- C. Exercise care in performance of work to prevent breakdown or caving in of strata overlaying that from which water is to be drawn.
 - 1. Develop, pump, or bail well until water pumped from well is substantially free from sand.
- D. Protect work to prevent either tampering with well or entrance of foreign matter.
 - 1. Upon completion, provide temporary well cap.
- E. An experienced supervisor or driller shall be constantly in control of well site and have authority to furnish well drilling information desired by Architect and Owner.

1.10 SUPERVISION

- A. Contractor shall provide a competent superintendent and any necessary assistants on the project when work is in progress.
- B. Contractor shall notify the Owner of any change in the job Superintendent's status on the job
- C. Superintendent shall supervise Contractor's employees and is responsible for their actions and conduct on job site.

1.11 PROTECTION OF WORK AND PROPERTY

- A. Contractor shall continuously maintain adequate protection of all his work from damage and shall protect Owner's property from injury or loss arising in connection with his work.
- B. Contractor shall avoid damage to any existing construction, equipment, piping, pipe coverings, electrical systems, sewers, sidewalks, landscaping, or any other above ground or underground installations or structures on Owner's or adjacent property and is responsible for any damage that occurs as a result of his work as provided and required by law.

1.12 CLEANING PREMISES

- A. Contractor shall keep the construction area of the system neat and orderly at all times, providing continually disposal of rubbish and waste material resulting from installation.
- B. Upon completion of the system, Contractor shall remove from property, at his own expense, all temporary structures, rubbish, and waste materials resulting from installation.

1.13 GUARANTEE

- A. Contractor shall guarantee the water well for one-year from date of final acceptance by Owner and Architect this includes all material, workmanship, and performance of the well.

PART 2 PRODUCTS

2.1 WELL COMPONENTS

- A. Casing: The well casing shall be Schedule 40 black steel, suitable for water well installations.
- B. Grout: Grout shall be ASTM C150/C150M, type to suit project conditions.
- C. Well Screen: Construct screen of AISI type 302/304 stainless steel continuous slot type fabricated by welding.
 - 1. Provide V-shaped openings, widening inwardly.
 - 2. For joints connecting screen sections, use butt-type stainless steel coupling rings.
 - 3. Provide screen with necessary fittings to install tailpiece and to provide tight seal between top of screen and well casing.
 - 4. Size the screen and gravel pack so that the maximum diameter of any particle entering the well is less than .030".

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify site conditions under provisions of Section 01 3100.
- B. Verify that site conditions will support equipment for performing drilling operations and testing.

3.2 PREPARATION

- A. Protect structures near the well from damage.
- B. Conform to well and wellfield requirements of the authorities having jurisdiction.

3.3 WELL CONSTRUCTION

- A. Drill well as required to provide required water quality and quantity.
 - 1. The Contractor shall perform water chemical analysis test as necessary during drilling in order to locate the water bearing formation that yields water with an acceptable iron and salt content.
 - 2. The Contractor shall make all reasonable efforts to obtain water on the site than has less than 0.3-ppm iron content and less than 300-ppm salt content.
 - 3. Provide information to Architect/Owner as noted in paragraph 1.5 of this section.
- B. The well casing shall be aligned and plumb.
- C. Provide permanent casing with a temporary well cap and coordinate well cap construction with pump system installer.
- D. It shall be the responsibility of the Contractor to construct a well of the type and size to produce continuous water quality and capacity as specified in this section.

3.4 TOLERANCES

- A. Maximum Variation From Plumb: In accordance with AWWA A100
- B. Maximum Offset From True Position: 1"

3.5 CLEANING

- A. Clean work under provisions of 01 77 00.

3.6 WELL DEVELOPMENT

- A. Develop well by such methods as will effectively extract from water-bearing formation maximum practical quantity of sand, drilling mud and other fine materials in order to bring well to a maximum yield per foot of draw down and to a sand-free condition.
- B. Perform work in a manner that does not cause undue settlement and disturbance of strata above water bearing formation nor disturb seal affected around casing.
- C. Continue well development until water pumped from well at maximum testing pumping rate is clear and free from sand and other debris larger than .030" in diameter.
 - 1. Water shall be considered sand-free when no samples, taken during test pumping, contain more than 2 parts per million of suspended solids by weight.
 - 2. The Contractor shall submit a certified document from an approved testing laboratory to the Architect and Owner indicating the results of the "Non-Filterable Residual" (total suspended solids) test, EPA Manual 160.2.
 - 3. Sufficient water must be filtered in order to insure a detection limit of less than 2 PPM (mg/l).
 - 4. Maximum iron allowed in the well water shall be less than 0.3 PPM.

3.7 TESTING WELL FOR PLUMBNESS AND ALIGNMENT

- A. Set casing plumb and true to line, testing for plumb and alignment after construction of well and before its acceptance.

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1. Contractor may perform additional tests during performance of work.
 - B. Test alignment of well by lowering into well, to a depth of 75', a section of pipe approximately 40' long.
 1. Provide outer diameter of pipe not more than ½" smaller than diameter of that part of casing or hole being tested.
 - C. Well casing shall not be out of plumb more than 2/3 of the diameter of the casing per 100' of length.
- 3.8 TESTING WELL FOR YIELD AND DRAW DOWN
- A. After the well has been constructed, cleaned out and the depth of well accurately measured conduct final pumping tests.
 - B. Provide a variable capacity test pump with minimum capacity of maximum expected yield at a total head equal to draw down in well, plus head loss in pump column and discharge pipe.
 - C. Provide necessary discharge piping for pumping unit to conduct water to a point of disposal to avoid a nuisance or endanger adjacent property.
 - D. Provide and maintain equipment of adequate size and type for measuring flow of water, such as weir box, orifice, or water meter.
 - E. Measure the elevation of the water level in well.
 - F. Provide labor, motive power and other necessary materials, equipment and supplies required to operate pumping unit.
 - G. After installing the test-pump and auxiliary equipment, arrange for conducting pumping test, notify the Architect and Owner at least 3-days prior to starting test.
 1. Note water level elevations referred to an assigned datum in well.
 2. Start test pump and adjust pumping rate as necessary.
 3. Record the readings of the water level in well and pumping rate at 30-minute intervals.
 4. Take water samples for analysis at the beginning and the ending of the pump test.
 - H. Final testing for each well shall consist of 4-hours of continuous pumping after reaching maximum draw down.
 1. After completion of final test, remove by any means necessary sand, stones or other foreign materials from the in well.
 - I. Upon completion of pumping test, record returning water levels in well at timed 15-minute intervals to 95% recovery, then plot a curve of the well's recovery rate.
 - J. Provide all test results and other required submittals to the Owner and Architect prior to installation of the pump.

END OF SECTION