

January 17th, 2001

**WATER WELL SPECIFICATION
EAU GALLE DAM - HIGHLAND RIDGE CAMPGROUND
SPRING VALLEY, WISCONSIN**

1. GENERAL – Part 1

1.1 SCOPE. This section covers the requirements for drilling, installing, developing, and disinfecting a new public water supply well. This section also covers conducting a pump test.

1.2 APPLICABLE PUBLICATIONS. The publications listed below form a part of this specification to the extent referenced and are referenced to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 53 (1999b) Pipe, Steel, Black, and Hot Dipped,
Zinc-Coated Welded and Seamless

ASTM C 150 (1998a) Portland Cement

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA EWW (1995) Standard Methods for the
Examination of Water and Wastewater

AWWA A100 (1997) Water Wells

AWWA B300 (1992) Hypochlorites

AWWA B301 (1992) Liquid Chlorine

AWWA C200 (1997) Steel Water Pipe - 6 Inch (150mm)
and Larger.

AWWA C206 (1997) Field Welding of Steel Water Pipe

CODE OF FEDERAL REGULATIONS (CFR)

40 CFR 141 National Primary Drinking Water Regulations

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
WISCONSIN ADMINISTRATIVE CODE

Chapter NR 809	(1999) Safe Drinking Water
Chapter NR 811	(1998) Requirements for the Operation and Design of Community Water Systems
Chapter NR 812	(2000) Well Construction and Pump Installation
Chapter NR 845	(2000) County Administration of Chapter NR 812, Private Well Code

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	National Electrical Code
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1.3 WELL CONSTRUCTION AND GENERAL REQUIREMENTS

1.3.1 Work required under this solicitation consists of furnishing all materials and labor for drilling and installing a new 6-inch (nominal) diameter public drinking water well, approximately 200-300 feet deep, which will produce a continuous yield of at least 25 gallons per minute (see enclosed well drawing). The new well will be the potable water source for a new campground with approximately 12 camp sites. In addition to drilling the well and installing the well casing, the work required includes:

- Developing the well
- Conducting a pump test
- Disinfecting the well
- Testing the well water for safe drinking water standards
- Installing a new, permanent submersible pump and motor and pit less adaptor
- Installing discharge pipe and curb box

All work shall meet the Wisconsin Department of Natural Resources Administrative Code, Chapters NR 809, 811, 812, and 845. It shall be the Contractors responsibility to locate any existing utilities by contacting "Diggers Hotline" (1-800-242-8511) prior to beginning any drilling activity. The drilling operations shall start within 90 calendar days of contract award and shall be completed within 30 calendar days of commencing drilling operations.

1.3.2 The Contractor shall take all precautions necessary to prevent contaminated water or water having undesirable physical or chemical properties from entering the water supply stratum through the well bore, or through seepage from the ground surface. The Contractor shall also take all precautions necessary to prevent contamination of the

ground surface or of surface waters from the drilling of the well. The well head shall be protected and secured to prevent contamination by animals or vandals.

1.3.3 The new well shall be installed just west of Dugan Road (Highland Ridge Campground entrance road) approximately 2 miles north of Spring Valley, WI on U.S Government property associated with Eau Galle Reservoir in St. Croix County, WI. The exact location will be staked in the field by the Government prior to the beginning of drilling activity. Arrangements to view the site can be made by contacting Mr. Lloyd Mathiesen or Mr. Dave Reynolds at (715) 778-5562. It is highly recommended that the Contractor conduct a site visit prior to submitting a bid. The site will be accessible with typical drilling equipment. The Contractor shall comply with all safety and health requirements as outlined in EM 385-1-1, September 1996 to insure safe working conditions for his employees and for guests and employees of the of the park. A copy of this manual shall be provided to the Contractor.

1.3.4 **Installation of the well may only be performed between the hours of 7:00 AM and 6:00 PM, Monday through Saturday.** The Contractor will not be allowed to work on Sunday without the permission of the Contracting Officers Representative or his designated authority. The access road to the well site will be open to park visitors and may be used by the Contractor for moving equipment and materials to the well site. The Contractor is to take all possible precautions to protect the construction site in accordance with WIDOT 107.

1.3.5 The subsurface consists of surface layer composed of a mixture of unconsolidated gravels, sands, clays, or weathered bedrock fragments (0 - 80 ft. thick), overlying hard dolomite or limestone bedrock, (100 - 180 ft. thick), which in turn overlies a water bearing sandstone unit. The attached water well log, included in this scope, may be representative of the conditions that are likely to be encountered.

1.3.6 Electrical work shall conform to the National Electrical Code, NFPA 70. The power pole, meter socket, and transformer will be provided by and installed by the Government prior to the Contractor commencing work. The Contractor shall be responsible for providing and installing the pump control panel, meter, and installing conduit and wiring from the control panel to the pump. The Contractor shall be responsible for the design of the electrical system. Contact for the Power Company:

Xcel Energy at 1-800-628-2121

1.4 SUBMITTALS

1.4.1 General. The Contractor must be a licensed well driller in the State of Wisconsin. The Contractor shall obtain all permits, pay all applicable fees, and prepare all construction reports, abandonment logs, and pumping reports. The Contractor shall comply with all applicable state, federal, and county requirements for drinking water wells. The Contractor shall be responsible for all utility locations for all work done on

the site. Upon completion of all work items, all equipment and debris shall be removed and the site shall be restored as near as possible to its original condition. Work shall not be considered complete until the site has been restored to the satisfaction of the Contracting Officer. The Contractor shall be responsible for all property damage or personal injury arising from their actions. In the event that the Contractor fails to construct a well of the required capacity, alignment, or should the well need to be abandoned because of the loss of tools or for any other cause arising from the actions of the Contractor, the drill hole shall be abandoned and the casing removed per state regulations. Following completion of the new well, a well water sample shall be provided to a laboratory of the Contractor's choice and tested using state and/or EPA approved methods and procedures. The following submittals shall be sent via fax or mail to:

Mr. Richard Otto
Contracting Officers Representative
1114 South Oak Street
LaCrescent, MN 55947
(507) 895-6341
(507) 895-4116 (fax)

1.4.2 Drilling Plan. A minimum of at least ten (10) working days before beginning work, the Contractor shall submit for approval his proposed plan for drilling and constructing the new water supply well. The plan shall include, but not be limited to, the proposed method of drilling and equipment to be used, details and specifications on proposed casing, grouting materials and methods, equipment and methods proposed for well development and for performing pump tests. No work shall be performed until the drilling plan has been approved, and no deviation from the approved drilling plan will be permitted without prior approval of the Contracting Officer. The final installed well pump shall not be used for developing the well.

1.4.3 Permits. The Contractor shall be responsible for obtaining all permits, licenses, or other requirements necessary for execution of the work. Before beginning work, the appropriate state office (Wisconsin Department of Natural Resources, Eau Claire, Wisconsin) shall be notified. A copy of all such documents and pertinent correspondence shall be furnished to the Contracting Officer prior to the beginning of the work.

1.4.4 Well Log. During the drilling operations, a detailed, graphic drilling log shall be maintained. As a minimum, a detailed drillers log shall include the depths at which groundwater is encountered, depths and descriptions of all formations (different soil and rock types); identification of each stratum shall be made using the Unified Soil Classification System or standard rock nomenclature. Soil and rock samples shall be collected and labeled every 10 feet. The samples shall be on site and readily available for inspection by Government representatives. Two (2) copies of this log shall be submitted to the Contracting Officers Representative.

1.4.5 Test Results. All results from well capacity tests will be submitted to the Contracting Officers Representative within 72 hours. Water quality test results will be

submitted to the Contracting Officers Representative within 72 hours after the Contractor receives results from the testing laboratory.

1.4.6 Electrical Design. The Contractor shall be responsible for the electrical design. Design shall meet requirements of the National Electrical Code. Provide shop drawings of the pump panel, circuit breaker, and disconnect for information purposes only. Standard manufacturers catalogue cuts are acceptable. Include this information in the final Operation and Maintenance manual.

1.4.7 Pump. Shop drawings shall be submitted showing the pump selection, capacity-head curves, and material data. Electrical information on the pump shall be submitted showing the voltage, current draw, and horsepower requirement. Submit a cross sectional drawing showing the pump installed in the new well. Standard manufacturers catalogue cuts are acceptable. Include all pump information in the final Operation and Maintenance manual.

1.4.8 Pit Less Adaptor. Submit shop drawings showing complete dimensions, material data, and technical description. Standard manufacturers catalogue cuts are acceptable. Include information in final Operation and Maintenance manual.

1.4.9 Curb Stop and Discharge Piping. Submit installation and layout drawing. Submit material data and technical description. Standard manufacturers catalogue data and hand sketches are acceptable.

1.4.10 Operation and Maintenance Manual. Submit 4 copies of an O & M manual that includes maintenance and repair procedures for the pump. Include all the shop drawings in the O & M manual. Include all the well log data and well testing data.

1.5 MATERIALS

1.5.1 Well Casing. New sections of nominal 6-inch diameter, schedule 40 steel well casing conforming to ASTM A 53 shall be used. Joints shall be either threaded and coupled or field welded in accordance with AWWA C206. Welded portions of the casing shall have a resistance to corrosion equal to or greater than un-welded portions. Joints shall be constructed in a manner which will support the weight of the well casing as it is lowered into the borehole. Centering guides shall be attached in sufficient numbers to insure that the well casing is installed straight and plumb.

1.5.2 Cement Grout. Neat cement grout shall conform to Wisconsin state standards as described in Wisconsin Administrative Code, Chapter NR 812.20. Grout shall be tremmied or forced through the casing-borehole annulus from the bottom of the well casing to the ground surface. Grout must be allowed to set a minimum of 36 hours prior to putting the well into service. Additional grout shall be added as necessary to the upper part of the well due to settling and/or shrinkage of the grout column. The grouting shall be done continuously and in such a manner as will ensure filling the entire annular space

in one operation. In addition to satisfying Wisconsin State codes, the casing shall be grouted a minimum of 10 feet into the dolomite/limestone bedrock (see enclosed well drawing).

1.5.3 Pump shall be rated at 25 gallons per minute. Compute final head requirement after development of the well. The pump shall develop a minimum of 75 psig (173 feet head) above the top of the well. Add to this value the well draw down and any friction losses in the pump column. Use Grundfos submersible pump Model 25S or equal. Pump shall be 3600 RPM. Pump voltage shall be 240 volt, single phase.

1.5.4 Pump Discharge. Provide a total of 50 feet of discharge piping from the pump to the curb stop. Piping shall be 1-1/2" diameter. Discharge pipe shall be galvanized steel or copper tubing, Type K. If using copper tubing, provide dielectric fittings as required. Galvanized piping shall be coated and wrapped.

1.5.5 Curb Stop. Use cast iron, Minneapolis pattern base, extension type curb box. Size shall be 1 1/2" to match the pipe. Valve shall be manufactured by Mueller to match the curb stop. Provide copper or steel ends to match discharge pipe.

1.5.6 Starter and Disconnect. Provide NEMA 3R, weather proof, starter and disconnect for the pump. Size to match horsepower requirement of the pump. Starter and disconnect shall be UL listed. Provide all necessary conduit and wiring between the pump and starter/disconnect. The starter and disconnect shall be pole or pedestal mounted. Install pole or pedestal in concrete footings below frost depth. Coordinate the location with the incoming electrical service and electrical meter.

1.5.7 Pump Panel. Panel can incorporate the starter and disconnect. Panel shall be NEMA 3R. Panel shall be galvanized, minimum 14 gauge, with a gasketed weather door.. Pump control shall be push button on or off.

1.5.8 Conductors. All conductors shall be copper. No aluminum conductors shall be allowed.

1.5.9 Pit Less Adaptor. Size to match pump. Unit shall be integral with the submersible pump and pump discharge.

1.6 WELL ALIGNMENT

1.6.1 The new well shall be installed sufficiently straight and plumb to enable the installation of the permanent well pump, as well as any temporary pumps used for testing and development. Should faulty alignment and plumbness not be correctable, as determined by the Contracting Officers Representative, the well shall be abandoned as specified in paragraph 1.4.1 (SUBMITTALS – General), and a new well drilled at no additional cost to the Government.

1.7 WELL DEVELOPMENT

1.7.1 After construction, the well shall be developed in accordance with the drilling plan. The uncased portion of the well may be developed by any of the following methods: bailing, surging with a plunger or compressed air, jetting, or an approved alternate method submitted by the Contractor. If pumping methods are used, such pumping will not be considered as test pumping of the well. The final installed well pump shall not be used for developing the well. The well shall be thoroughly agitated, fully cleaned, and developed by extracting all free sand, silt, or other foreign matter from the well. The development shall continue until the sand/sediment content is less than 5 ppm. The well shall be thoroughly developed prior to completing well capacity or water quality testing.

1.8 WELL CAPACITY TEST

1.8.1 The Contracting Officers Representative shall be notified at least 48 hours before the test is performed. The Contractor shall furnish all labor, tools, and equipment necessary to perform the required test. Upon completion of the capacity test, the Contracting Officers Representative shall be furnished 3 copies of the capacity test records within 72 hours.

1.8.2 The Contractor shall conduct an uninterrupted well capacity test for six (6) hours. The Contractor shall furnish and install an approved temporary test pump, with discharge piping of sufficient size and length to convey water away from the well as it is pumped. Disposal of the pumped water shall not cause damage to the surrounding property. All personnel and equipment to take water level and flow measurements (in gpm) shall be provided by the Contractor. The pumping rate shall begin at the rate of expected well capacity (at least 25 gpm) and at least that rate maintained throughout the duration of the test. If this rate cannot be maintained throughout the duration of the test, the pumping rate shall be reduced, and the capacity test re-performed in order to determine the capacity of the well. Following the capacity test, the Contractor shall remove any sediment from the well, then complete the well as shown. The permanent pump placement depth will be determined from the results of the capacity test. The drawdown, recovery, and pumping rate readings shall be taken at the following minimum frequency:

- 1) Static water level in the well prior to starting test.
- 2) Drawdown readings from 1 to 10 minutes – every minute.
- 3) Drawdown readings from 10 to 20 minutes – every 2 minutes.
- 4) Drawdown readings from 20 to 30 minutes – every 5 minutes.
- 5) Drawdown readings from 30 to 120 minutes – every 10 minutes.

- 6) Drawdown readings every hour for remainder of pumping.
- 7) Recovery readings every minute for first 30 minutes following end of pumping.
- 8) Recovery readings every 30 minutes for next 2 hours following end of pumping.
- 9) Recovery readings every hour for next 3 hours following end of pumping.

1.9 WATER QUALITY TEST

1.9.1 When the capacity test in the well has been completed, the Contractor shall secure samples of water in suitable containers, and of sufficient quantity to have bacterial, physical, and chemical analysis made by a recognized testing laboratory. Water quality analysis shall address each item specified in the "Water Quality Analysis Table" at the end of this section. Expenses incident to this task shall be borne by the Contractor and the results shall be furnished to the Contracting Officers Representative. All sampling and analyses shall be performed using EPA and State approved methods, procedures, and holding times.

WATER QUALITY ANALYSIS TABLE

Physical Characteristics

Color	Resistivity in ohms per cubic cm. and 25 degrees Celsius.
Taste	
Threshold odor number	
Turbidity	
pH value	
Turbidity	

Chemical Characteristics

Arsenic	Total hardness as CaCO (3)
Barium	Endrin
Cadmium	Lindane
Chromium	Methoxychlor
Copper	Toxaphene
Lead	2-4-D
Mercury	2, 4, 5, TP Silvex
Selenium	Total organic halogens
Silver	TOC
Zinc	Suspended solids
Fluoride as F	Total dissolved solids

Manganese as Mn	Nitrates as NO (3)
Iron as Fe	Carbonates as CO (3)
Calcium as Ca	Bi-carbonates as HCO (3)
Magnesium as Mg	Alkalinity
Sodium and Potassium as Na	Sulfates as SO (4)
Chlorides as Cl	Silica as SiO (2)

2. DISINFECTION

2.1 Following installation of the well and completion of well tests, but prior to permanent pump placement, the well and pumping equipment shall be disinfected with chlorine per Wisconsin Administrative Code Chapter 812. The disinfectant shall be dispersed throughout the entire water column, as well as inside of the casing above the static water level. The disinfectant shall remain inside the well for at least 2 (two) hours. The well shall be thoroughly flushed after disinfection. The well shall be retreated if water quality testing indicates that levels of coliform bacteria are in excess of state drinking water standards.

2.2 CLEAN-UP

2.2.1 Upon completion of the well construction, testing, and other incidentals, all debris and surplus materials resulting from the work shall be removed from the jobsite.

3.0 MEASUREMENT AND PAYMENT

3.1 Payment will include full compensation for equipment, materials, and labor for drilling and grouting; removal and disposal of temporary casing, cuttings and drill fluid; preparation of borehole logs; sample handling, containers, storage, and testing. Depth, logging, installation, casing, riser pipe, and well screen shall be by linear distance. Separate payment will not be allowed for cleanup of the site. Payment will not be allowed for wells abandoned due to faulty construction practices or for the convenience of the Contractor.

3.2 Water Well. Compensation for the water well shall include mobilization and demobilization, preparation of submittals and required permits, materials, equipment, and labor required to drill, grout, develop, perform tests, and complete the permanent well and cleanup the site. Depth shall be measured as the total linear distance between ground surface and the bottom of hole. If the total well depth is greater than that specified in the contract for "Water Well", the additional depth will be paid for at the contract unit price.

3.3 Site Cleanup. Separate Payment shall not be made for cleanup of the site. Cleanup will consist of restoring the site to its pre-construction condition. Cleanup will

be considered part of and incidental to the drilling, testing, and construction of the new well.

3.4 Pump and Electrical Work. Include costs for providing a complete electrical design. Include costs for a complete pumping system up to the curb stop.

4.0 INSTALLATION

4.1 General. Pump and pit less adaptor shall be installed per the manufacturer's recommendation. Provide a complete and operable system. The Contractor shall install 50 feet of discharge line from the well to the curb stop. The location of the curb stop shall be coordinated with the Government.

4.2 Discharge Line Installation. Bury pump discharge line below frost depth per Wisconsin State Plumbing Code.

4.3 Electrical. All work shall conform to the National Electrical Code (NEC). The entire electrical system shall be grounded per the NEC. Pump panel shall be pedestal mounted near the incoming service pole.