***NATURAL RESOURCES CONSERVATION SERVICE***

***CONSTRUCTION SPECIFICTION***

***North Dakota***

**WATER WELL**

**(Code 642)**

# Scope

The work consists of well drilling, along with furnishing and installing all materials for the well as shown on the drawings and specified herein. The installation of the well must adhere to all state and local laws, rules, and regulations.

# Utilities and Permits

The landowner and/or contractor is responsible for locating all buried utilities in the project area, including drainage tile and other structural measures. The landowner is responsible for obtaining all necessary permits for the work prior to construction.

# Alignment

Drilled vertical wells must be round, plumb, and aligned to permit satisfactory installation and operation of a pump of the proposed size and type to the greatest anticipated depth of setting.

When an oversized drill hole is constructed for installation of the casing, the diameter of the drill hole must be a minimum of 3 inches greater than the outer diameter of the casing or coupling, whichever is greater.

# Materals

**Casings**Casings can be made of steel, copper, plastic, fiberglass, or other materials of equivalent strength and durability in drilled wells. Only steel pipe casings may be used in driven wells. Used steel pipe can be utilized for well casings if it is of good quality and has a wall thickness equal to or greater than that of Schedule 40 pipe.

If the water is to be used for human consumption, plastic casings for transporting potable water supplies must be approved by the National Sanitation Foundation.

Plastic casings must be made of acrylonitrile-butadiene-styrene (ABS), polyvinyl chloride (PVC), or styrene-rubber (SR) and shall conform to the requirements specified in ASTM F 480. Plastic pipe manufactured for water or irrigation pipelines can be used if the quality of the pipe equals or exceeds that specified in ASTM F 480.

Fiberglass casings can be used if tests indicate that:

1. The material meets the requirements specified in ASTM D 2996. Tests for long-term cyclic pressure strength, long-term static pressure strength, and short-term rupture strength as required in ASTM 2996 are not needed because the pipe is to be used for well casing.
2. The joints meet the requirements specified in section 3.8, ASTM F 480.
3. The modulus of elasticity is certified for use in determining maximum depth.

Concrete casings must be reinforced and shall meet or exceed the requirements specified in ASTM C 76. The minimum 28-day compressive strength must be 4,000 lb/in2.

Reinforced plastic mortar casings must equal or exceed requirements specified in ASTM D 3517.

Steel well casings must equal or exceed requirements specified in ASTM A 589. Steel pipe manufactured for other purposes can be used if the quality of the pipe meets the above standard.

**Joints**Joints for well casings must have adequate strength to carry the load due to the casing length and still be watertight or provide mechanical supports during installation to maintain joint integrity. Terminate such mechanically supported casings on firm material that can adequately support the casing.

**Gravel pack**Provide the gradation and thickness of gravel pack specified in the design and carefully place the gravel pack to prevent segregation and bridging. Gravel pack material must extend a minimum of 10 feet above the top of the perforated or screened section and through the length of the water-bearing formation.

# Installation

In consolidated formations, the casing must extend from above the ground surface through the overburden material to an elevation of at least 2 feet into the consolidated material.

In unconsolidated formations, the casing must extend from above the ground to the screen.

For artesian aquifers, the casing must be sealed into the overlying impermeable formations to retain the artesian pressure.

If a water-bearing formation known to contain or suspected of containing poor quality water is penetrated, seal the formation to prevent infiltration of poor quality water into the well and the developed aquifer.

# Protection

Case the well to a sufficient height (minimum 12 inches) above the ground surface to prevent entry of surface and near-surface water.

Fill the annulus surrounding the permanent well casing at the upper terminus of the well with mortar containing expansive hydraulic cement (ASTM C 845), bentonite-based grout, or bentonite chips and pellets, in accordance with State requirements. The depth/length of the grout seal must be no less than 10 feet and not less than the minimum specified in state or locally applicable construction codes.

Compact, mound, and slope earthfill away from the wellhead. Install a sanitary well seal at the top of the well casing to prevent the entry of contaminated water or other objectionable materials.

# Workmanship

The well casing pipe, couplings, and screens must be homogeneous throughout and free of visible cracks, holes, foreign materials, or other injurious defects. The well casing pipe, couplings, and screens must be as uniform in color, density, and other physical properties as is commercially possible.

# Markings

The well casing pipe must be marked according to the ASTM specification for the material used.

# Developing

Develop the well until it stops producing detrimental quantities of solid particles and when the continuous discharge rate is approximately 20% greater than the anticipated normal production rate. Do not use the permanent pump to conduct any well development work.

# Well water testing

If local water quality conditions are unknown or questionable, test the well water for suitability for its intended usage.

# Disinfection

Prior to final chemical disinfection, remove foreign substances such as grease, soil, sediment, joint dope, and scum from the well and near the wellhead. Clean all pump parts before placing them into the well. Disinfect the well using a chlorine compound at a concentration of no less than 100 milligrams per Liter (100 ppm) available chlorine in solution to treat the entire well.

# ITEMS OF CONSTRUCTION DETAIL