

NATURAL RESOURCES CONSERVATION SERVICE
Wyoming
CONSTRUCTION SPECIFICATIONS
FOR
IRRIGATION PIPELINE
NONREINFORCED CONCRETE PIPE

(Owner/Operator)

(Project/Title)

GENERAL

This specification covers the materials and installation requirements for nonreinforced concrete pipe. Pipelines shall be installed in accordance with a design and construction drawings approved by the responsible technician. Details of construction shown in the design and construction drawings but not included here shall be considered as a part of this specification. Construction activities shall be in accordance with applicable OSHA regulations.

TRENCH CONSTRUCTION

The trench shall be excavated to the lines and grades shown on the drawings and/or as staked in the field. Trench width at any point below the top of the pipe shall be only wide enough to permit the pipe to be easily placed and joined and to allow the initial backfill material to be uniformly placed under the haunches and sides of the pipe. The minimum trench width is shown in Figure 1. The space between the pipe and trench wall must be wider than the compaction equipment used in the pipe zone. Trench banks that are more than 5 feet high shall be shored or sloped. Refer to Figure 1 for typical trench details.

Where rock, hardpan, cobbles or other hard material which might prevent the pipe from being uniformly supported is encountered in the bottom of the trench, the trench shall be undercut a minimum of four inches below final grade. The over cut area of the trench will then be filled with sand or fine-grained soil.

BEDDING

The pipe shall be firmly and uniformly bedded throughout its entire length by either molding the bottom of the trench to fit the outer circumference of the pipe for a minimum of one-tenth the outside diameter of the pipe or placing and shaping granular bedding material to fit the outside diameter of the pipe. Bedding material shall be placed and spread in uniform layers and in such a manner as to fill the trench so there are no unfilled spaces below the haunches of the pipe. For pipe with bell joints, holes shall be dug in the bedding at the bells to permit the body of the pipe to be in contact with the bedding along its entire length. Blocking or mounding shall not be used to bring the pipe up to final grade.

PIPE INSTALLATION

Pipe shall be the diameter, length, type, and pressure class as specified on the drawings. The pipe shall not be dropped into the trench or handled in a manner to cause damage. Individual joints of pipe shall be inspected and any damaged pipe shall be removed and replaced.

Joints and Connections. All joints and connections shall be constructed to withstand the design working pressure for the pipeline without leakage and shall leave the inside of the pipeline free of any obstruction which could reduce the pipe capacity below design requirements.

All fittings, such as couplers, reducers, bends, tees and vents shall be made of material that is recommended for use with the type of pipe specified and shall be installed in accordance with the recommendations of the pipe manufacturer. Fittings made of steel or other materials susceptible to corrosion shall (1) be wrapped with plastic tape meeting the requirements of AWWA C 209 for Type I or

WY-430-Nonreinforced Concrete

II tape, or (2) coated with coal-tar epoxy paint (Kippers-Bitumastic No. 300-M is an approved off the shelf product), or (3) painted with one coat of urethane primer applied at a rate of 2 to 3 mils thick and two or more coats of gloss or semi-gloss Alkyd Enamel to provide a minimum thickness of 6 mils or (4) coated with epoxy paint in accordance with the Steel Structures Council (SSPC) Paint Specification # 16.

Gasket Joints. Gaskets shall be cleaned of foreign material before pipe sections are joined. During the joining of the pipe, care shall be taken to prevent pinching or displacement of the gasket.

Mortar Joints. The pipe ends shall be thoroughly cleaned and wetted with water before the joint is mortared. Cement mortar for joints shall consist of one part by weight Portland Cement, two parts by weight fine sand and water to produce a consistency for mixing and placement. Water shall be free of impurities. Sand shall conform to ASTM C 144. All mortar shall be used within 30 minutes of mixing.

On bell and spigot pipe, stiff mortar shall be placed in the lower half of the bell or groove of the pipe section already laid. Then insert the spigot end into the bell and pull up tight, taking care to see that the inner surfaces of the abutting pipe are flush and even. The remaining annular space in the bell shall then be filled with mortar. After the mortar has set slightly, the joint shall be wiped inside the pipe and left smooth.

On tongue and groove pipe, the tongue end of the pipe shall be covered with mortar and the two sections of pipe snugly pressed together as the groove end fits over the tongue end of the adjoining pipe. Mortar shall be squeezed out on both the interior exterior sides of the joint. After the pipe is set, the interior surface of the joint shall be wiped/brushed smooth and all surplus mortar removed. After the joining of the pipe, an exterior band of continuous mortar shall be placed around the pipe joint.

All external mortar bands and collars shall be protected from the air and the sun by covering with moist earth, sand, and burlap for a minimum of 10 days or until backfilled.

Trench Backfill. Hand, mechanical, or water packing are optional methods for placing and compacting pipe backfill.

Initial Backfill. The initial backfill material shall be soil or sand that is free from rocks, gravels, frozen materials larger than 1 inch or earth clods greater than 2 inch in diameter. This may be the on-site trench excavated materials as long as any unsuitable materials are removed unless otherwise specified on the drawings. The initial backfill materials shall be placed in a manner as not to displace or damage the pipe.

Water packing shall be used whenever possible to consolidate the initial backfill. The initial backfill, before wetting, shall be of sufficient depth to ensure complete coverage of the pipe with backfill after consolidation has taken place. Water packing shall be accomplished by adding water to diked reaches of the trench in such quantity as to thoroughly saturate the initial backfill. After the backfill is saturated, the fill shall be consolidated by rodding or with a vibrator. The wetted fill shall be allowed to dry until firm before completing the final backfill.

When backfilling is done by hand or mechanical means the initial fill shall be compacted firmly around and above the pipe to achieve a soil density equal or greater than the density of the undisturbed side walls of the trench. The thickness of individual lifts prior to compaction shall not exceed 6 inches.

Final Backfill. The final backfill material shall be free of rocks, frozen clods or other debris larger than 6 inch in diameter. The material shall be placed and spread in approximately uniform layers so there are no unfilled spaces in the backfill. Rolling equipment shall not be used until a minimum of 24 inches of compacted backfill material has been placed over the top of the pipe. Final backfill may be mounded over the top of the trench above ground level, but in no case shall the final backfill be lower than the natural ground along the top of the trench.

All special backfilling requirements of the pipe manufacturer shall be followed.

Cover. The minimum depth for backfill over the top of the pipe shall be as specified in the construction drawings.

At low places on the ground surface or at locations where it is shallow to rock, extra fill may be placed over the pipeline to provide the minimum depth of cover. In such cases, the top width of the fill shall be no less than 10 feet and the side slopes no steeper than 6 horizontal to 1 vertical.

Vertical alignment of pipe shall be uniform and such as to maintain the cover requirements unless otherwise noted on the drawings. If irregular grades are required, thrust blocks, air releases, drains and other appurtenances as needed shall be installed.

Thrust Blocks. Thrust blocks shall be formed against a solid trench wall. They shall be of the minimum size and materials as specified on the drawings.

MATERIALS

Concrete pipe shall conform to the requirements of ASTM C 118, “Concrete Pipe for Irrigation or Drainage”, or C 505, “Nonreinforced Concrete Irrigation Pipe with Rubber Gaskets.” Rubber gaskets shall conform to the requirements of ASTM C 505. Gaskets shall be of natural or synthetic rubber compound, extruded or molded with a smooth surface.

Appurtenances. The pipeline appurtenances including pen stands and vents shall be of the size, type, material and pressure rating as shown on the drawings.

TESTING

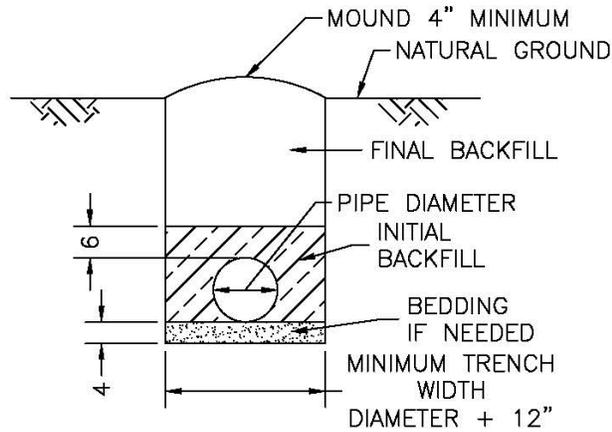
When water is available at the time the pipe is installed the system shall be given an operational test. This test shall consist of filling the pipe with water, taking care to bleed of any air in the pipe. All of the system components shall operate without difficulty. The pressure shall be slowly brought up to the maximum working pressure for the pipeline. Leakage or defects caused by poor materials or workmanship shall be replaced or repaired. When water is not available to complete a test, the installer shall provide a guarantee stating they will return and fix leaks that are found when the pipe is initially filled with water.

GUARANTEE

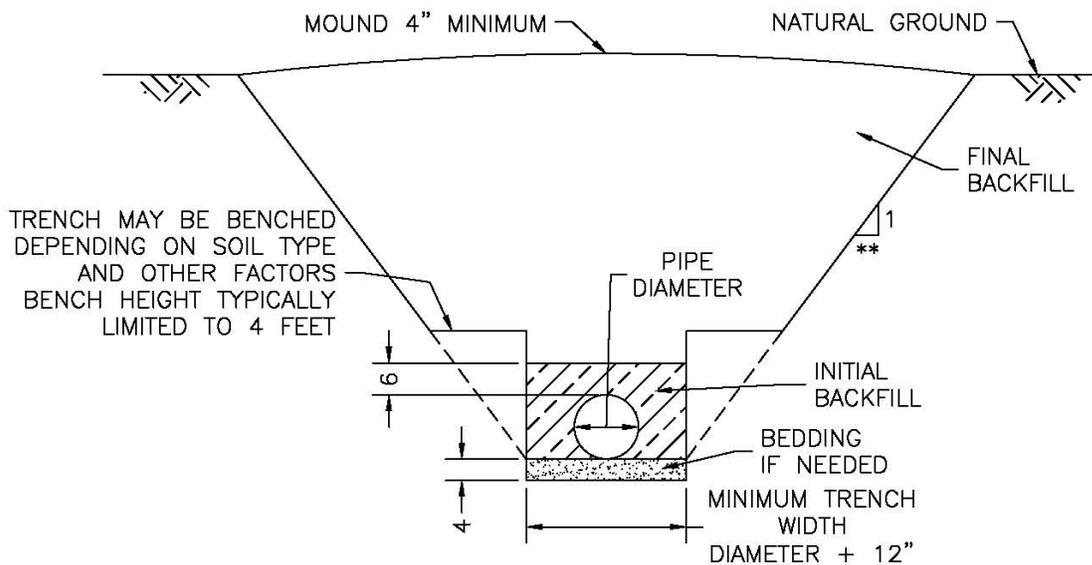
The installing Contractor shall certify that the installation conforms to the requirements of this specification. The certification will list manufacturer of pipe and applicable pipe markings.

ADDITIONAL SPECIFICATIONS

FIGURE 1
TRENCH WIDTH AND BACKFILL REQUIREMENTS



TYPICAL TRENCH DETAIL
5 FEET DEPTH, MAXIMUM



ALTERNATIVE TRENCH DETAIL
DEPTH GREATER THAN 5 FEET

** Slope typically varies from $\frac{3}{4}$ to $1\frac{1}{2}$:1 or greater based upon material classification and other factors such as wetness, vibration, surcharge, etc. Refer to OSHA 1926 Subpart P for details.