Trenching, excavation, pipe laying, bedding, backfilling and disposal of unsuitable materials for utility construction are included in the contract price for the applicable utility item and no separate measurement or payment will be made.

The following work and items are included in the contract price for the applicable utility item and no separate measurement or payment will be made for items (A) through (F) below:

(A) Undercut or Wet Excavation,

(B) Dewatering of Excavation,

(C) Shoring and Sheeting (except temporary shoring for maintenance of traffic covered elsewhere in the contract),

(D) Thrust Restraint,

(E) Bedding Material, or

(F) Select Material for Backfill.

Payment will be made under:

Pay Item	**Pay Unit**
Class B Concrete for Encasing Utility Lines	Cubic Yard

SECTION 1510
WATER LINES

1510-1 DESCRIPTION

Provide water lines suitable for use in transporting potable water.

1510-2 MATERIALS

Refer to Division 10.

Item	**Section**
Water Pipe and Fittings	1036

The Contractor may use any of the water pipe specified under Section 1036 except where a particular type pipe is specified in the plans or required by environmental regulations or Departmental policy. The Contractor shall verify that the pipe is appropriate for the test pressure of the system and the external loading.

Use ductile iron fittings on water lines 4" or larger.

Use #12 AWG solid-copper wire with blue insulation for the utility locator wires.

Use 2" plastic marking tape colored blue with “Caution Water Line” or similar wording, permanently printed at 36" centers.

Protect steel rods and other metal clamps and lugs by galvanizing or painting with approved bituminous paint.

1510-3 CONSTRUCTION METHODS

(A) General

Meet the installation standards of AWWA or ASTM for water line construction.

Apply Section 1505 for excavation, trenching, pipe laying and backfill to water line installation.

Install small diameter pipe (4" or less) under existing pavement by a trenchless method at no additional cost to the Department.

Connect the ends of the water service piping using AWWA C800 type couplings or fittings. Make NPT screw joints with a double wrap of a polytetrafluoroethylene (PTFE) tape and torque as required by the manufacturer.

Store plastic pipe out of direct sunlight until burying. All plastic pipe showing discoloration or deterioration will be rejected for use and replaced with suitable pipe as specified under Article 106-9.

Install water lines with 36" to 42" of cover to finished grade unless otherwise directed or approved. Install water lines with greater cover for short distances to accommodate utility controls, to make tie-ins to existing facilities, to eliminate high points in the pipeline or to provide clearance between existing and proposed utilities, drainage, other obstacles or actual field conditions.

(B) Testing and Sterilization

Perform pressure and leakage tests and sterilization on newly installed water mains and altered water mains prior to placing such pipelines into service. Provide all equipment, piping, controls, pumps, water and safety devices necessary for performing the tests and sterilization.

Obtain clean water for cleaning, testing and sterilization from approved sources. Provide connections to potable water sources with approved backflow preventors until acceptance of all test results.

Perform tests using clean water and provide certified results demonstrating leakage less than the following amount when pressurized at 200 ± 5 psi for 2 hours.

$$\mathbf{W} = LD\left(\sqrt{P}\right) \div 133{,}200$$

Where:

W	=	allowable leakage in gallons per hour
L	=	length of pipeline tested, in feet
D	=	nominal diameter of the pipe, in inches
P	=	average test pressure during the leakage test, in lb/sq.in.

Repair using approved methods or replace pipe, controls or appurtenances as necessary to reduce leakage below acceptable levels. Additionally, repair any leaks that are visible after 2 hours duration.

Clean water lines by flushing with water at least 2.5 ft/s velocity. Remove all debris and dirt from water mains larger than 4" by passing a medium density foam pig with abrasive strips through the lines.

Sterilize water lines according to NCDENR requirements and AWWA C651. Provide certified bacteriological and contaminant test results from an approved independent testing laboratory in accordance with NCDENR requirements. Operate all valves and controls to assure thorough sterilization.

Testing, cleaning and sterilization may be performed concurrently or consecutively.

Dispose of waste water in accordance with all environmental regulations.

For short sections (less than 100 ft) and tie-in sections of water lines perform visual tests for leakage after installation instead of separate pressure and leakage tests. Sterilize according to AWWA C651 Sections 4.6 and 4.7.

Provide copies of the test results to the Engineer and to the water line owner.

Flush with clean water until the residual chlorine is reduced to the same level as in the existing water mains.

Place new water lines into service after approval of all testing and flushing and authorization by the Engineer.

1510-4 MEASUREMENT AND PAYMENT

Water lines of the various sizes will be measured from end to end in place with no deduction for length through valves or other fixtures and paid by the horizontal linear foot. Water lines smaller than 2" and branch lines or service lines to fire hydrants, water meters and backflow prevention assembly will not be measured or paid.

If the contract does not include such pay items, measurement will not be made and the work will be incidental to other contract pay items.

Payment will be made under:

Pay Item	Pay Unit
__" Water Line	Linear Foot

SECTION 1515
UTILITY CONTROLS

1515-1 DESCRIPTION

Provide appropriate control devices, valves, meters, backflow prevention assembly and hydrants on water lines and force main sewers.

1515-2 MATERIALS

Refer to Division 10.

Item	Section
Sanitary Sewer	1034
Water	1036

Deliver only approved materials to the project.

Air release valves shall meet AWWA C512. In addition, air release valves for sanitary sewer force mains shall have long bodies, shall be equipped with back flushing connections and shall have a hood over the outlet.

Double check valves (DCV) backflow prevention assembly shall meet AWWA C510. Reduced pressure principle (RPZ) backflow prevention assembly shall meet AWWA C511.

Line stops consist of a sleeve, temporary valve and closure cap. The sleeve and cap shall meet applicable AWWA standards, shall be made of cast iron or stainless steel, shall be pressure rated at 200 psi and shall be sized for the type pipe to be tapped. The temporary valve shall be suitable for contact with potable water with NSF certification and designed to match the actual field conditions.

Line stop bypass pipe shall be pressure rated at 200 psi, shall be NSF certified and shall be adequately restrained.

Use screw or slip type valve boxes with a base to fit the valve yoke and a removable plug cap with the word “Water” or “Sewer” cast therein.

Precast manholes in accordance with Section 1525.

1515-3 CONSTRUCTION METHODS

Apply Section 1505 for excavation, trenching, pipe laying and backfill.

Place two 4" x 8" x 16" concrete blocks beneath valves and fire hydrants for support.