

- L. **Adjustments to Existing Units.** Existing manholes, catch basins, inlets, and utility appurtenances shall be adjusted to the elevation, grade, or dimensions as specified. Castings shall be carefully removed and reinstalled as indicated. Adjustments to the structure walls may be made by the use of brick, solid concrete blocks, precast ring, or Class AE concrete so that a seat of proper dimensions may be reconstructed to receive the casting, grating, or cover. If the top of the existing structure is weak and faulty, it shall be replaced as directed, and the extension completed.

Upon completion of the adjustment, all surplus material shall be removed and the structure and work site shall be left in a neat and clean condition.

722.04 METHOD OF MEASUREMENT.

- A. **Catch Basins and Inlet.** These items will be measured by the Unit. The unit consists of the base, the casting, cover, and grate. Casting lengths are specified in the Plans.
- B. **Manholes and Manhole Risers.** Manholes will be measured as a Unit consisting of the base, the castings, and the cover. Manhole Risers will be measured by the Linear Foot of riser as measured from the base to the precast cover or the casting.
- C. **Adjustment of Manholes, Catch Basins, Inlets, Pipe Junctions, and Utility Appurtenances.** These items will be measured by the Unit complete and in place.

Excavation, embankment, and disposal of unsuitable material will not be measured but will be incidental to the other pay items.

722.05 BASIS OF PAYMENT.

Payment will be made at Contract Unit Prices for the following:

Pay Item	Pay Unit
Manholes (Size)	Each
Manhole Riser (Size)	Linear Foot
Catch Basins	Each
Inlets	Each
Adjust Manhole	Each
Adjust Catch Basin	Each
Adjust Inlet	Each
Adjust Utility Appurtenance	Each

This payment will be full compensation for all labor, equipment, and materials necessary to complete the work.

SECTION 724 WATER MAINS, WATER LINES, AND SEWER LINES

724.01 DESCRIPTION.

This work consists of furnishing and installing water and sewer lines and appurtenances of the types and sizes required, in full compliance with the requirements of the

North Dakota State Plumbing Code, the North Dakota State Health Department, and all City ordinances.

724.02 MATERIALS.

A. Pipes.

1. **Reinforced Concrete Sewer Pipe** shall meet Section 830.01 B.
2. **Ductile Iron Pipe** shall meet Section 830.02 A.
3. **Polyvinyl Chloride Pipe** shall meet the requirements of American Water Works Association (AWWA) C 900 with latest revisions and as specified in Section 830.03. The PVC pipe shall be SDR-18, Class 150.
4. **Copper Pipe** for water service shall be type "K" and shall meet ASTM B-88.

B. **Joints and Fittings** shall be as shown on the Plans and shall meet to the requirements of AWWA. Copper services shall have flared or compression fittings as required by the City involved in the Contract.

C. **Rubber Gaskets** shall meet ASTM C-443.

D. **Gate Valves** shall meet AWWA C-500, and shall have nonrising stems, O-ring seals, and 2-inch operating nuts that open counter-clockwise.

E. **Butterfly Valves** shall meet AWWA C-504, and shall be as specified in the Contract.

F. **Valve Boxes** for gate valves shall be as specified in the Contract.

G. **Hydrants** shall be equipped as shown in the Contract.

H. **Tapping Saddle and Tapping Valve or Tapping Sleeve and Tapping Valve** shall be as shown in the Contract.

I. **Aggregates.** Bedding and backfill shall be a granular material with 100% passing a 2-inch sieve and no more than 35% passing a No. 200 sieve.

J. **Concrete** for cradles, anchors, and thrust blocks shall be Class AE.

K. **Corporation Stops (Cocks), Curb Stops, and Curb Boxes** shall be as specified on the Plans or Standard Drawings.

All materials must be approved by the Engineer before incorporation into the work.

724.03 CONSTRUCTION REQUIREMENTS.

A. **General.** Water mains shall not be constructed in the same excavated trench as sanitary sewer pipes. At least 10 feet of horizontal clearance should be maintained between water mains and sewer pipes. When it is not possible to maintain the 10 feet horizontal clearance, or when it is necessary for the main and pipe to cross over, a minimum vertical distance of 18 inches shall be maintained.

B. Excavation and Trenching. Trenches shall be excavated to a width of 24 inches wider than the outside diameter of the pipe with a minimum width of 30 inches. Sheathing and bracing shall be provided to support the excavation.

1. **Excavation.** Trenches shall be excavated so the water main or sewer pipe can be laid on 3 inches of bedding material. If unstable material is encountered, it shall be removed and replaced with backfill acceptable to the Engineer. Rock, shale, or hard pan shall be removed to a depth of one foot below the bedding elevation.
2. **Bedding.** The bedding material shall be shaped so that after the pipe is laid, the bedding extends up the sides of the pipe a distance of 1/3 the pipe diameter. The bedding shall be tamped to provide uniform bearing along the entire length of the pipe.
3. **Backfilling.** Backfill material shall be as specified in Section 724.02 I, and placed to a depth of 3 inches over the top of the pipe. The backfill material shall be placed and compacted without lateral displacement of the pipe. The remainder of the trench shall be backfilled with suitable material excavated from the trench. This material shall be placed in 12" layers and each layer compacted to a density of not less than 85% maximum dry density at optimum moisture according AASHTO T-180, or as specified.

C. Water Main Requirements.

1. **Laying Water Mains.** Each joint or fixture shall be inspected and the interior cleaned before lowering into the trench. Dirt and other contaminants shall be prevented from entering the pipe during installation. Water encountered during laying operations shall be drained or pumped so no water enters the pipe.

Each joint shall be centered, pushed completely home, and the joint fastened using the manufacturer's recommendations.

Where connections to existing lines are required, the Contractor shall notify the line owners at least 24 hours in advance, so arrangements for temporary service can be made, or agreement reached on when the service can be interrupted.

2. **Testing and Disinfecting Lines.** All joints shall be tested before backfilling. Where dictated by construction requirements, the line may be tested in segments. After the pipe trench has been partially backfilled, all new pipe or valve sections shall be subjected to a hydrostatic pressure test. The necessary taps shall be provided without charge by the city. The test section shall be filled with water and the pressure shall be gradually increased. Any defects found shall be repaired at the Contractor's expense. The final pressure test shall be at 150 psi and held for one hour. The Contractor shall furnish all equipment and material necessary to make the pressure test. After all leaks have been repaired, all water lines that carry water for human consumption shall be disinfected. Lines to be disinfected shall be completely filled with a water solution containing a residual chlorine level of at least 100 parts per million and allowed to stand full for a period of not less than one hour. After the disinfecting period, the solution shall be drained or flushed from the line.

3. **Thrust Blocks.** Major fixtures or fixtures that could blow off the line under pressure shall be braced by a cast-in-place concrete thrust block. The block shall be cast between the fixture and the undisturbed vertical trench wall with a minimum bearing surface of 2 square feet against the vertical wall.
4. **Hydrants.** Hydrants shall be placed in approximately 1/2 cubic yard of bedding material to take up all water from drip valves. The hydrants shall be set on a concrete pad 6 inches thick and 18 inches square.
5. **Reset Hydrant.** Hydrants to be reset shall either be furnished by the city or salvaged during construction. Installation shall be according to Section 724.03 C.4.
6. **Backfill.** During backfilling, the hydrants, valve boxes, or other vertical fixtures, shall be held vertical and the top adjusted to the elevation established for the various fixtures.
7. **Marking Tape.** The Contractor shall furnish and install marking tape 2 feet above the top of all water mains installed. The tape shall be non-detectable with a minimum width of 5 inches. The tape shall be blue in color with the words "CAUTION, WATER LINE BELOW" imprinted on the tape in black capital letters.

D. Water and Service Lines.

1. **General.** All connections to water mains shall be made with a corporation stop (cock).
2. **Laying Water Line.** Copper pipe shall be laid in a wavy line in the trench and shall be of a length of at least 2 feet greater than the distance from the corporation stop and the curb stop. The pipe shall not be less than 7 1/2 feet below the grade of the finished street.

The water service shall be well benched and offset on solid ground and all precautions taken to ensure stability. The water service line shall be looped at a 45⁰ angle at the main into a gooseneck which shall be supported from displacement and settlement to prevent any strain on the corporation or connection. The curb stops and curb boxes shall be furnished by the Contractor.

3. **Testing.** All water connections shall be tested in place using city water pressure to determine defects in the water pipe. As soon as the water connection is completed and before any backfill has been placed, the corporation shall be opened and the connection examined for defects. Defects shall be repaired at the Contractor's expense.

- E. **Sanitary Sewer Pipe Requirements.** The sewer pipe shall be laid from the lower end with the spigot ends pointing in the direction of flow. Each length shall be fully supported between joints and checked for line and grade before placing the next length. Each length shall be inspected and all dirt removed from the pipe and bell before being placed. Any defective pipe laid or any pipe that has its joint disturbed after laying shall be removed and replaced. Earth or other substances shall be prevented from entering the lines during construction.

Joints shall be tight and secure. Sewer pipe with pre-molded gaskets shall be pushed completely home and the gasket checked for proper positioning.

Where connections to existing lines are required, the Contractor shall notify line owners at least 24 hours in advance, so arrangements for temporary service can be made, or agreement reached on when the service can be interrupted.

724.04 METHOD OF MEASUREMENT.

- A. **Water Mains.** Water mains of the various types and sizes specified will be measured by the Lineal Foot through fittings and from centerline of pipe to centerline of pipe complete and in place.
- B. **Butterfly Valves and Gate Valves.** These items will be measured by the unit complete and in place.
- C. **Hydrants and Reset Hydrants.** Hydrants of the types and sizes specified will be measured on an individual basis (Each) complete and in place.
- D. **Excavation.** Excavation will be measured by the Cubic Yard.
- E. **Aggregates.** Aggregates will be measured by the Ton or Cubic Yard complete and in place.
- F. **Tapping Saddle (or Sleeve) with Tapping Valve and Box.** These units will be measured on an individual basis (Each) complete and in place.
- G. **Exceptions.** Excavation, bedding and backfill material, marking tape, etc., not listed on the Plans as pay items, will not be measured for payment but will be incidental to other bid items.
- H. **Sewer Lines.**

Sewer lines of the various sizes and types will be measured by the Linear Foot in place with no deduction for lengths through manholes. Where 2 different sizes enter or leave a manhole, each size will be measured to the center of the manhole.

Branch connections, bends, or other fixtures will be included in the length measurement.

- I. **Water Service Lines.** Water service lines will be measured by the Linear Foot of water service in place. The water service lines will be measured horizontally from the centerline of the water main to the end of the service. The unit price is to include furnishing corporation stop, curb stop, and curb box; and connecting, placing, and testing the complete connection from the corporation to the curb stop. In the event the Contractor is installing PVC water main, the double strap bronze saddle will also be included in the unit price bid per Linear Foot of water service.
- J. **Fittings.** Ductile fittings will be measured by the pound.

724.05 BASIS OF PAYMENT.

Payment will be made at Contract Unit Prices for the following:

Pay Item	Pay Unit
Water Mains	Linear Foot

Butterfly Valves	Each
Gate Valves	Each
Hydrants	Each
Reset Hydrants	Each
Excavation	Cubic Yard
Aggregates	Ton, Cubic Yard
Tapping Saddle (or Sleeve) with Tapping Valve and Box	Each
Sewer Lines	Linear Foot
Water Service Lines	Linear Foot
Fittings (Ductile Iron)	Pound

This payment will be full compensation for all labor, equipment, and materials necessary to complete the work.

Items not listed as pay items on the Plans and Proposal Forms shall be incidental and included in the price bid for other items.

SECTION 740 DAMP-PROOFING AND FABRIC WATERPROOFING

740.01 DESCRIPTION.

This work consists of furnishing materials and placing damp-proofing and fabric waterproofing on surfaces and areas specified.

740.02 MATERIALS.

Materials shall meet the following:

Item	Section
Primer	824.01
Asphalt	824.02
Woven Cotton Fabric	824.03
Black Polyethylene Membrane	824.04

740.03 CONSTRUCTION REQUIREMENTS.

- A. **General.** Damp-proofing and waterproofing shall be done in dry weather and when the air temperature is above 40°F. The asphalt shall be heated to a temperature between 300°F. and 350°F, and shall not be locally overheated. The heating kettles shall be equipped with thermometers. The fabric shall be stored in a dry protected place. Damaged fabric shall not be used.
- B. **Damp-proofing.** The surface on which the damp-proofing is applied shall be dry and clean.