MDOT P.I.N. 017852.00

CONTRACT DOCUMENTS

SOUTH BERWICK WATER DISTRICT

RTE. #236/WATER MAIN REPLACEMENT

SOUTH BERWICK, MAINE

OCTOBER 3, 2012

Prepared by:

South Berwick Water District
80 Berwick Road
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Job #11-097.00

ROUTE 236 WATER MAIN REPLACEMENT
SPECIFICATIONS

INDEX

SECTION 100 - DESCRIPTION OF WORK

PART 1: GENERAL

100.1 SCOPE

A. The CONTRACTOR shall furnish and install 8 inch water main, related piping and appurtenances, as shown on the drawings and specified herein.

B. The CONTRACTOR shall remove and replace existing water mains and services, as shown on the drawings, to accommodate the changes resulting from the street reconstruction.

C. The CONTRACTOR shall perform leakage and pressure tests and disinfect the installed water main as specified herein.

100.2 DUTIES OF THE OWNER / SOUTH BERWICK WATER DISTRICT:

A. The OWNER / SOUTH BERWICK WATER DISTRICT will locate the terminal points of the work and will also locate any of its facilities lying in close proximity which would in any way be a hazard to the CONTRACTOR'S operations.

B. The OWNER / SOUTH BERWICK WATER DISTRICT will operate any valves or hydrants which may be found desirable or necessary to be used for any purpose.

C. The OWNER / SOUTH BERWICK WATER DISTRICT will obtain location permits and all street opening permits from cities, towns or the Maine Department of Transportation. The OWNER will pay any permit charges, or other fees levied by any of these, which are applicable to the work covered by the Contract.

100.3 DUTIES OF THE CONTRACTOR:

A. The CONTRACTOR will familiarize himself with all obstructions which he can foresee, including but not limited to existing pipes, services, conduits, ducts, sewers, wires, cables, utility poles, signs or any other such obstructions which might interfere with the construction, and he agrees to make arrangements with the owners of such facilities so as to save the OWNER / SOUTH BERWICK WATER DISTRICT harmless from any damages thereto caused by his operations and to make whatever arrangements might be necessary to move or remove and replace these facilities so as to permit the construction, all at his own expense. The CONTRACTOR agrees that there will be no extras charged for this type of work, except by special agreement with the OWNER / SOUTH BERWICK WATER DISTRICT and upon written order from him.

B. The CONTRACTOR will make any changes which may be required, such as the removing or restoring of the property of others in the land through which this line will cross in right-of-way or otherwise. The CONTRACTOR will place all pipe, fittings and all attendant facilities to proper line and grade, as called for in the plans and specifications and to the satisfaction of the OWNER / SOUTH BERWICK WATER DISTRICT.

C. The CONTRACTOR will furnish all fuel, gasoline, oil, etc. for the operation of his equipment, all tools and equipment, and all labor and supervision necessary for the handling of material, for excavation, installation, backfilling and cleaning the site as required. He will dispose of excess spoil and restore the land surface over the entire length of the project. Restoration shall be made to the satisfaction of the OWNER / SOUTH BERWICK WATER DISTRICT.

D. The CONTRACTOR will perform the pressure and leakage test and disinfection of the main as described herein in the presence of the OWNER / SOUTH BERWICK WATER DISTRICT.

E. The CONTRACTOR shall install the water mains to supply the SOUTH BERWICK WATER DISTRICT with a satisfactory, watertight pipeline, laid to proper line and grade in accordance with these contract documents to the satisfaction of the SOUTH BERWICK WATER DISTRICT.

F. The CONTRACTOR shall coordinate and work concurrently with other contractors, who may be working in the same area, to assure completion in a timely manner.

END OF SECTION

SECTION 103 - CONTROL OF WORK

PART 1: GENERAL

103.1 EQUIPMENT

A. The CONTRACTOR shall utilize equipment which will be efficient, appropriate and large enough to secure a satisfactory quality of work and a rate of progress which will insure the completion of the work within the time stipulated. If at any time such equipment appears to the OWNER / SOUTH BERWICK WATER DISTRICT to be inefficient, inappropriate or insufficient for securing the quality of work required or for producing the rate of progress aforesaid, he may order the CONTRACTOR to increase the efficiency, change the character or increase the equipment, and the CONTRACTOR shall conform to such order. Failure of the OWNER / SOUTH BERWICK WATER DISTRICT to give such order shall in no way relieve the CONTRACTOR of his obligations to secure the quality of the work and rate of progress required.

103.2 PIPE LOCATIONS

A. Pipelines shall be located substantially as indicated on the Drawings, but the OWNER / SOUTH BERWICK WATER DISTRICT reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reasons. Where fittings are noted on the Drawings, such notation is for the CONTRACTOR's convenience and does not relieve him from laying and jointing different or additional items where required.

103.3 CARE AND PROTECTION OF PROPERTY

A. The CONTRACTOR shall be responsible for the preservation of all public and private property, and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the CONTRACTOR, such property shall be restored by the CONTRACTOR, at his expense, to a condition similar or equal to that existing before the damage was done, or he shall make good the damage in other manner acceptable to the OWNER.

103.4 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES

A. The CONTRACTOR shall assume full responsibility for the protection of all buildings, structures, and utilities, public or private, including poles, signs, services to buildings, utilities in the street, gas pipes, water pipes, hydrants, sewers, drains, and electric and telephone cables, whether or not they are shown on the Drawings. The CONTRACTOR shall carefully support and protect all such structures and utilities from injury of any kind. Any damage resulting from the CONTRACTOR's operations shall be repaired by him at his expense.

B. Protection and temporary removal and replacement of existing utilities and structures as described in this Section shall be part of the work under the Contract and all costs in connection therewith shall be considered incidental to the bid prices.

103.5 CONTRACTOR'S UTILITIES

A. CONTRACTOR will be responsible for providing his own power, telephone, water and toilet facilities, as needed, during the performance of the Work.

103.6 COOPERATION WITHIN THIS CONTRACT

A. All firms or persons authorized to perform any work under this Contract shall cooperate with General Contactor and his Subcontractors or trades, and shall assist in incorporating the work of other trades where necessary or required.

103.7 HOURS OF WORK

A. Normal hours for the work of this Contract shall be between 7:00 AM and 6:00 PM Monday through Friday. The CONTRACTOR shall request and receive permission from the OWNER / SOUTH BERWICK WATER DISTRICT for any work scheduled outside of these hours.

END OF SECTION

SECTION 115 - MEASUREMENTS AND PAYMENT

PART 1: GENERAL

115.1 METHOD OF MEASUREMENTS AND BASIS OF PAYMENT:

A. All measurements for payments will be based on completed work performed in strict accordance with the drawings and specifications, and on the contract bidding and payment item schedules. All work completed under the contract will be measured by the DISTRICT'S REPRESENTATIVE according to the methods outlined below. In cases where the payment clause in the specifications relating to any unit or lump sum price stated in the contract requires that the said unit or lump sum price cover and be considered compensation for certain work or material essential to the item, this same item will not be measured or paid for under any other pay item which may appear elsewhere in the specifications.

PART 2: PAYMENT ITEMS:

115.2 ASBESTOS CEMENT PIPE REMOVAL – PAY ITEM #202.1913

A. Method of measure: linear feet measured along center line of pipe.

B. Basis of Payment: Payment of the unit price established in the Bid shall be full compensation for clearing, excavating, shoring and bracing, dewatering, (Item #1) removal of asbestos pipe, backfilling, cleanup and associated work as specified and shown on the Drawings and at locations designated by the DISTRICT'S REPRESENTATIVE.

C. Schedule of payment: removal: 100%.

115.3 DISPOSAL OF SPECIAL WASTE (CONTAMINATED SOIL) – PAY ITEM #203.2317

A. Method of Measure: Actual number of cubic yards disposed of.

B. Basis of Payment: Payment of the unit price established in the Bid shall be full compensation for excavating, removal and disposal, backfilling, cleanup and associated work as specified and shown on the Drawings and at locations designated by the DISTRICT'S REPRESENTATIVE.

C. Schedule of payment: Written evidence of proper disposal; 100%.

115.4 WATER MAIN – PAY ITEM #822.34

A. Method of Measurements: Linear feet as measured along the centerline of the pipe for the actual number of linear feet of pipe installed excluding length of gate valves.

B. Basis of Payment: Payment of the unit price established in the Bid shall be full compensation for excavating, shoring and bracing, dewatering, (Item No. 3) 8" ductile iron pipe, bedding, laying and jointing, tying into existing water main, backfilling, cleanup and associated work as specified and shown on the Drawings.

C. Schedule of Payment: Installation -75%, Testing -25%.

115.5 EIGHT INCH (8") GATE VALVE – PAY ITEM #823.3251

A. Method of Measurements: Actual number installed.

B. Basis of Payment: Payment of the unit price established in the Bid shall be full compensation for excavation, shoring and bracing, dewatering,(Item No. 4) 8" gate valve, valve box, thrust blocks, backfill, testing, cleanup and associated work as specified and shown on Drawings.

C. Schedule of Payment: Installation – 75%; Testing – 25%

115.6 ADJUST GATE VALVES – PAY ITEM #823.332

A. Method of Measurements: Actual number adjusted.

B. Basis of Payment: Payment of the unit price established in the Bid shall be full compensation for all equipment, labor and incidental materials necessary to adjust a gate valve box as specified at locations designated by the OWNER.

C. Schedule of Payment: Completion of work – 100%.

115.7 HYDRANT ASSEMBLY – PAY ITEM #824.3021

A. Method of Measurements: Actual number installed

B. Basis of Payment: Payment of the unit price established in the Bid shall be full compensation for excavation, shoring and bracing, dewatering,(Item No. 5) hydrant, 8" X 6"hydrant tee, 6 inch hydrant control valve, valve box, 6 inch ductile iron pipe, thrust blocks, backfill, testing, cleanup and associated work as specified and shown on Drawings.

C. Schedule of Payment: Installation – 75%; Testing – 25%

115.8 ONE INCH (1") WATER SERVICE - PAY ITEMS #825.441 & 825.4411

A. Method of Measurements: Actual number installed. "Short side" refers to services located on the same side of the road as the water main. "Long side" refers to services located on the opposite side of the road from the water main.

B. Basis of Payment: Payment of the unit price established in the Bid shall be full compensation for clearing, excavating, shoring and bracing, dewatering, corporation, (Items Nos. 6 & 7) 1" copper pipe, curb stop, service box and rod,

installation, connection to existing ¾ inch service, backfilling, testing, cleanup and associated work as specified and shown on the Drawings and at locations designated by the OWNER.

C. Schedule of Payment: Installation – 75%; Testing – 25%.

115.9 TWO INCH (2") WATER SERVICE – PAY ITEM #825.442

A. Method of Measurements: Actual number installed. "Short side" refers to services located on the same side of the road as the water main. "Long side" refers to services located on the opposite side of the road from the water main.

B. Basis of Payment: Payment of the unit price established in the Bid shall be full compensation for clearing, excavating, shoring and bracing, dewatering, saddle, corporation, (Item No. 8), connection to existing service (where applicable), 2" copper pipe, curb stop, service box and rod, heavy foot piece, installation, backfilling, testing, cleanup and associated work as specified and shown on the Drawings and at locations designated by the OWNER.

C. Schedule of Payment: Installation – 75%; Testing – 25%

END OF SECTION

SECTION 131 - SUBMITTALS

PART 1: GENERAL

131.1 SUBMITTALS FOR SOUTH BERWICK WATER DISTRICT APPROVAL

A. For all products to be incorporated into the Work submit to the OWNER / SOUTH BERWICK WATER DISTRICT for approval sufficient information in the form of shop drawings, product data and/or samples such that the OWNER / SOUTH BERWICK WATER DISTRICT can determine that the product is in compliance with the technical specifications and drawings.

B. Submit two (2) copies of each submittal. One (1) copy will be returned to the CONTRACTOR. Each copy shall include a cover sheet that clearly identifies the product and corresponding specification section. Each cover sheet shall bear the CONTRACTOR'S stamp and signature certifying that the submittal is in full compliance with the Contract Documents or that any deviations from the Contract Documents are clearly identified on a separate sheet(s) labeled "Deviations From Contract Documents" and attached to the cover sheet.

C. OWNER / SOUTH BERWICK WATER DISTRICT Review: The OWNER / SOUTH BERWICK WATER DISTRICT shall review the submittals and indicate their status as:
    1. NO EXCEPTION TAKEN.
    2. FURNISH AS CORRECTED.
    3. REVISE AND RESUBMIT.
    4. REJECTED.

D. OWNER / SOUTH BERWICK WATER DISTRICT review is only for general conformance with the design concept and general conformance with the information given in the Contract Documents. Corrections or comments made during the review do not relieve the CONTRACTOR from compliance with the requirements of the Contract Documents.

E. Re-submittals: Make re-submittals under procedures specified for submittals; identify changes made since previous submittal.

F. CONTRACTOR shall be responsible for the delays and/or additional expenses that result from the CONTRACTOR'S failure to submit a complete submittal and/or to identify portions of the submittal that does not conform to the specifications.

END OF SECTION

SECTION 172 - PROJECT RECORD DOCUMENTS

PART 1: GENERAL

172.1 SCOPE:

A. The CONTRACTOR shall keep records of changes to the drawings and specifications as outlined below.

PART 2: PRODUCTS

172.2 SECURE AND RECORD DOCUMENTS:

A. Throughout the progress of construction, the CONTRACTOR shall keep a set of current, detailed field record drawings indicating deviations from the contract drawings, shop drawings, and/or installation drawings, and exact location of concealed work, including underground utilities. This requirement does not authorize any deviations without acceptance of the DISTRICT'S REPRESENTATIVE.

B. The field record information shall be marked in a legible manner on prints of accepted shop drawings and/or installation drawings furnished by the CONTRACTOR or, where such drawings do not apply, on two sets of prints of the contract drawings furnished by the OWNER / SOUTH BERWICK WATER DISTRICT. The field information to be so marked shall include:

1. Deviations of any nature made during construction

2. Location of underground mechanical and electrical services, utilities, and appurtenances, referenced to permanent surface improvements and/or marker posts.

C. Upon completion of the work, the field record information marked on prints of accepted shop drawings and/or installation drawings together with the marked prints of the contract drawings shall be delivered by the CONTRACTOR to the OWNER / SOUTH BERWICK WATER DISTRICT.

PART 3: EXECUTION

172.3 METHODS:

A. Keep project record documents current. Do not permanently conceal any work until the required information has been recorded.

B. Use marking pens for showing changes.

172.4 SUBMITTALS:

A. Submit project record documents prior to request for final payment.

END OF SECTION

SECTION 202 - REMOVAL OF UNDERGROUND ASBESTOS CEMENT PIPE

PART 1: GENERAL

202.1 SCOPE:

A. All precautions shall be taken to avoid exposing the existing asbestos cement water main.

B. This section includes the removal, transport and disposal of asbestos cement pipe.

202.2 GENERAL APPLICABILTY OF CODES. REGULATIONS AND STANDARDS:

A. All applicable federal, state and municipal codes, regulations, and standards have the same force and effect (and are made part of the contract documents by reference) as if copied directly into the contract documents, or as if published copies are bound herewith.

202.3 GENERAL REGULATIONS OF MAINE D.E.P. CHAPTER 425 – ASBETOS MANAGEMENT RULES:

A. Regulations apply to any work that impacts greater than 3 square feet or 3 linear feet of asbestos.

B. Requires D.E.P. notification prior to removal of asbestos.

C. Companies performing the removal must be licensed by the D.E.P.

D. Engineering controls such as double polyethylene containment, wet methods and encapsulant application are basic requirements.

202.4 EXEMPTION TO RULES OF CHAPTER 425:

A. The Contractor is not subject to the rules outlined in paragraph 1.3 if the following is met: The removal and containerization (appropriately covering in a dump truck) of intact asbestos cement pipe provided they are not sanded, grinded, abraded or cut with a mechanical cutter. Each section of pipe removed must be removed using best management practices such that a minimum amount of breakage occurs during the initial removal of each length of pipe. For example, best management practices does allow the contractor to cut the pipe away at the manhole connections and allows inadvertent breakage while pulling apart the pipe at the joint. The pipe must remain intact throughout the remainder of the removal, containerization and transport process.

B. Should the Contractor fail to adhere to best management practices, the contractor will be responsible for complying with all regulations associated with Chapter 425. The Contractor will also be responsible for any fines levied by D.E.P. for non compliance of the exemption.

202.5 COMPLIANCE WITH STATE AND FEDERAL REGULATIONS:

A. Federal OSHA and Construction Standards apply to all removal and containerization. Containerization requirements include placing asbestos waste in leak proof containers.

B. The transportation of asbestos-containing materials is governed by Maine's Non-Hazardous Waste Transporters Licenses, 06-096 CMR 411.

C. The disposal of asbestos-containing material in Maine is governed by Maine's Landfill Siting, Design and Operation Rule, 06-096 CMR 410. The Contractor is required to transport the asbestos waste to an approved licensed landfill.

202.6 SUBMITTALS:

A. Plan of action: Submit a plan detailing the removal and transport process in order to comply with the exemption to Maine D.E.P. Chapter 425 – Asbestos Management Rules.

B. Provide name, location and copies of applicable licenses of the landfill for disposal of asbestos containing or asbestos contaminated waste.

C. Within 30 days of receipt of asbestos waste at the approved landfill, the Contractor shall submit to the Owner the original Waste Shipment Record acknowledging disposal of all associated waste material (pipe) from the Contract showing delivery date, quantity, and appropriate signature of Contractor (transporter) and landfill's authorized representative.

	PAY ITEM	PAY UNIT
201.1913	Asbestos Cement Pipe Removal	Linear Foot

END OF SECTION

SECTION 822 - DUCTILE IRON WATER PIPE & FITTINGS

PART 1: GENERAL

822.1 SCOPE:

A. This section includes the furnishing and installing of ductile iron water pipe and ductile iron or cast iron fittings as specified.

822.2 RELATED WORK SPECIFIED ELSEWHERE:

A. Excavation and Backfill for Water Mains -Section 822.16.

B. Bedding and Backfill Material -Section 822.12.

822.3 SUBMITTALS:

A. Submit shop drawings for all material in accordance with the provisions of Section 131 Submittals.

PART 2: PRODUCTS

822.4 MATERIALS:

A. Ductile iron pipe:

1. All ductile iron pipes shall meet the requirements of AWWA Standard C-151 and be cement lined and bituminous coated to meet AWWA Standard C104.

2. The pipe shall conform to the following standards:

a. Ductile Iron Pipe Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids: ANSI Specification A21.51 (AWWA C151). Exterior bituminous coating shall be 2 mils dry film thickness, minimum.
b. Rubber Gasket Joints for Cast Iron Pressure Pipe and Fittings: ANSI Specification A21.11 (AWWA C111).
c. Cement-Mortar Lining for Cast Iron Pipe and fittings: ANSI Specification A21.4 (AWWA C104), except cement lining to be twice the thickness specified, and bituminous seal coated twice. Seal coat shall be bituminous paint, oil cut (emulsion not acceptable), 2 mils dry film thickness, minimum.

3. Pipe thickness Class 51 for 16 inch diameter pipe and larger; Class 52 for diameters 12 inch and smaller.

4. The design of the push-on joint shall allow 5 degrees deflection in any direction without loss of pressure rating or leakage.

5. Acceptable Manufacturers:

a. American Cast Iron Pipe
b. Griffin Pipe
c. U. S. Pipe

B. Ductile Iron fittings:

1. All ductile iron fittings shall be cement lined, bituminous coated inside and outside and shall be mechanical joint.

2. The fittings shall conform to the following standards:

   a. Material shall be ASTM A536 grade 70-50-05, in accordance with AWWA C110 for fittings larger than 24 inches and C153 for fittings 3 inches thru 24 inches.
   b. Fittings shall be cement lined in accordance with AWWA C104.
   c. Interior seal coated in accordance with AWWA C104 with minimum of 4 mils dry film thickness, bituminous paint, oil cut; emulsion not acceptable.
   d. Exterior bituminous coated 4 mils minimum dry film thickness.
   e. Sleeves shall not be cement lined but shall be bituminous coated inside and outside, 4 mils minimum dry film thickness. All sleeves shall be long body type.
   f. Mechanical joints shall be furnished in accordance with AWWA C111 with accessories: ductile iron glands, gaskets, Cor-Ten T-bolts and nuts.
   g. Class 350 pressure rating in accordance with AWWA C153 – 3 inches thru 24 inches.
   h. The “compact design” fittings must provide adequate space for the mechanical joint and accessories to be installed without special tools (i.e. Lowell wrench can be used).

3. Acceptable Manufacturers
   a. Tyler
   b. Sigma
   c. U.S. Pipe

C. Mechanical joint sleeves:

1. Reference specification ANSI A21.1 (AWWA C110)

2. Body: (center ring) -long pattern, ductile iron meeting or exceeding ASTM A536, minimum paint coating exterior finish of 4 mils dry film thickness.

3. Glands: (end rings) -ductile iron meeting or exceeding ASTM A536 to fit AB-CD cast and/or ductile iron pipe, minimum paint coating exterior finish of 4 mils DFT.

4. Gaskets -virgin SBR rubber, compounded for water service, exceeding ASTM D2000.

5. Bolts -Cor-Ten or equivalent T-head bolts and heavy hex nuts, or 316 stainless steel bolts and nuts.

6. Acceptable Manufacturers
   a. Romac
   b. Ford
   c. Smith-Blair

D. Pipe Joint Restraint:

1. The joint restraint ring and its wedging components shall be made of ductile iron conforming to ASTM A536-80.

2. Dimensions of the restrainer must allow use with standard mechanical joint bell conforming to AWWA C111 and AWWA C153.

3. Restrainer must restrain up to 350 psi of working pressure in 3 inch to 16 inch size and 250 psi of working pressure in 18 inch to 48 inch size with a 2:1 safety factor.

4. Acceptable manufacturers:
   a. Romac Grip Ring

E. Bolts and nuts:

1. General description of properties required:
   a. Stainless steel -Type 304 -contains the addition of Molybdenum to the nickel-chromium steels.
   b. High Strength / Low Alloy Steel: Trade name for cold formed T-head bolts containing alloying elements such as copper, nickel and chrome (Cor-Ten)

2. Specific chemical composition:

   i. Carbon -.08% maxi.
   ii. Manganese -2.00% max.
   iii. Silicone -1.00% max.
   iv. Phosphorus -0.04% max.
   v. Sulphur -0.03% max.
   vi. Chromium -16 -18.00%
   vii. Nickel -10 -14.00%
   viii. Molybdenum -2 -3.00%
   ix. SAE No. -30316
   x. ASM No. 5361A, 5524A, 5573, 56488, 5690D
   xi. Cor-Ten steel: Trade name for cold formed T-head bolts containing alloying elements such as copper, nickel and chrome.

3. Specific chemical composition:

i. Carbon -0.2% max.
ii. Manganese -1.25% max.
iii. Sulphur -0.05% max.
iv. Nickel -0.25% min.
v. Copper -0.20% min.
vi. Combined (Ni, Cu, Cr) -1.25% min.

F. Polyethylene encasement:

1. Ductile iron pipe and fittings shall be encased in low-density polyethylene film tubes in accordance with AWWA Standard C105 -latest revision in locations indicated on the drawings.

2. Polyethylene film shall conform to the following requirements of ASTM D1248-89:

a. Raw Material
i. Type: 1
ii. Class: A (natural color)
iii. Grade: E-1
iv. Flow Rate: 0.4g/10 min. (maximum)
v. Dielectric Strength: Volume resistivity, 1015 ohm-cm, (min.)
b. Physical properties:
i. Tensile Strength: 1200 psi (min.)
ii. Elongation: 300%, (min.)
iii. Dielectric Strength: 800V/mil thickness, (min.)

3. Low-density polyethylene film shall have a nominal thickness of 0.008 in. (8 mil.) with a minus tolerance of 10% of the nominal thickness.

G. Stainless Steel Tapping Sleeve

1. Body**:** Grade 18-8 type 304 stainless steel fully passivated welds to restore stainless characteristics.

2. Outlet: 18-8 stainless steel schedule 10 for 4" outlets and schedule 5 for all other size outlets.

3. Flange: 18-8 type 304 stainless steel with recess to accept standard tapping valves. Optional ASTM A36 carbon steel flange available. Flange conforms to AWWAC207 Class D ANSI 150 lb. drilling.

4. Bolts and Nuts: Grade 18-8 type 304 stainless steel UNC threads, flurocarbon coated to prevent galling.

5. Lifter Bar: 18-8 type 304 stainless steel provides a heavy bearing surface for nuts.

6. Gaskets: Gridded virgin SBR or Buna-N compounded for water service ASTM D2000. Full gasket gives 360° pipe coverage. The outlet gasket is Buna-N.

7. Armors: Heavy gauge 18-8 type 304 stainless steel armors are molded flush into the gasket to bridge the gap between lugs.

8. Test Plug: Waterworks brass ." with standard square head. Proper use of the feature assures positive sealing before tapping.

9. Rating: FAST sleeve is recommended for 150 PSI.

10. Approved Manufacturers
    a. AFC
    b. Smith Blair
    c. Romac
    d. Ford

PART 3: EXECUTION

822.5 PIPE LAYING CONDITIONS:

A. The interior of each pipe shall be inspected while being joined to see that the alignment is preserved and to assure that no dirt or debris has entered the pipe after laying and partial backfilling.

B. Pipe fittings and accessories shall be carefully lowered into the trench, piece by piece, by means of derrick, crane, slings and other suitable tools and equipment, in a manner such as to prevent damage to the material or to its protective coating and linings. No chain or slings shall be passed through the inside bore of any pipe or valve or fitting. Under no circumstances shall piping materials be dropped or dumped into the trench.

822.6 LAYING DUCTILE IRON PIPE:

A. As soon as the excavation is completed and the existing trench bottom has been brought to the proper grade, the pipe shall be laid.

B. All pipe, before being lowered into the trench, shall be inspected inside and out. Both ends shall be cleaned and any visible dirt or debris removed from inside the pipe. Care shall be taken to lay the pipe to true lines and grades as shown on the drawings.

C. Coupling holes shall be excavated so that the barrel of the pipe shall bear upon the trench bottom.

D. Blocking under the pipe will not be permitted.

E. Each section shall rest upon the pipe bed for the full length of its barrel.

F. The circular rubber gasket shall be inserted in the gasket seat provided. A thin film of gasket lubricant shall be applied to the inside surface of the gasket. Gasket lubricant shall be a solution of vegetable soap or other solution supplied by the pipe manufacturer.

G. The spigot end of the pipe shall be cleaned and entered into the rubber gasket in the bell, using care to keep the joint from contacting the ground. The joint shall then be completed by forcing the plain end to the seat of the bell. Pipe which is not furnished with a depth mark shall be marked before assembly to assure that the spigot end is inserted to the full depth of the joint.

H. Pipe shall be aligned with the preceding unit and laid so as to form a close joint with the adjoining pipe and bring the inverts continuously to the required line and grade.

I. No length of pipe shall be laid until the previous length has had sufficient material tamped about it to firmly secure it in place so as to prevent any movement or disturbance.

J. Under no circumstances shall pipe be laid in water, and no pipe shall be laid when trench conditions or weather are unsuitable for such work, except by permission of the DISTRICT'S REPRESENTATIVE.

K. The pipe shall be laid with the bell ends facing the direction of the laying, unless otherwise permitted by the DISTRICT'S REPRESENTATIVE.

L. Joints, when made, shall be done in the manner prescribed by the manufacturer of the pipe. In the case of rubber gasket joints, these joints shall be made up in accordance with the American National Standards for the jointing of cast iron pressure pipe and fittings. (ANSI/AWWA C111/A21.11).

M. Thrust blocks shall be used behind tees, bends, or other fittings where shown. Size shall be appropriate for soil conditions and thrust forces acting on the specific fitting.

822.7 TRENCH BOTTOM:

A. Should the trench bottom contain unsuitable material, as indicated in Section 822.16, the CONTRACTOR shall over-excavate and replace with bedding material as required and authorized by the DISTRICT'S REPRESENTATIVE. The quantity of unsuitable material will be measured from the bottom outside of the pipe.

B. Should ledge be encountered, it shall be removed to a depth of 6 inches below the bottom of the pipe, and replaced with bedding material.

822.8 CUTTING PIPE:

A. All ductile iron pipe shall be cut using abrasive wheel cutter, rotary wheel hand cutter (with carbide cutter) or a guillotine pipe saw. All cuts shall be square and even with no ragged rough ends.

B. Field cut pipe lengths shall be beveled and filed to avoid damage to the gasket and facilitate making the joint.

C. When the cut end of pipe is to be used as a joint, the outside of the cut end shall be tapered back about 1/8 inch at an angle of about 30 degrees with the center line of the pipe. This shall be done with a coarse file or a portable grinder.

822.9 TEMPORARY PLUGS:

A. When pipe laying is not actually in progress, the openings of pipes shall be closed by temporary watertight plugs or other accepted means.

822.10 RETAINER GLANDS:

A. Install retainer glands on all mechanical joints of fittings, valves and hydrants.

822.11 POLYETHYLENE ENCASEMENT:

A. Tube type polyethylene encasement shall be installed on all ductile iron pipe and fittings in accordance with AWWA Standard C105 -latest revision, Method. Circumferential wraps of tape or plastic tie straps shall be placed at 24 inch intervals along the barrel of the pipe.

B. The polyethylene encasement shall prevent contact between the pipe and the surrounding backfill and bedding material but is not intended to be a completely airtight or watertight enclosure. All lumps of clay, mud, cinders, and so forth, on the pipe surface shall be removed prior to installation of the polyethylene encasement. During installation, care shall be exercised to prevent soil or embankment material from becoming trapped between the pipe and the polyethylene.

C. The polyethylene film shall be fitted to the contour of the pipe to effect a snug, but not tight, encasement with minimum space between the polyethylene and the pipe. Sufficient slack shall be provided in contouring to prevent stretching the polyethylene where it bridges irregular surfaces, such as bell-spigot interfaces, bolted joints, or fittings, and to prevent damage to the polyethylene due to backfilling operations. Overlaps and ends shall be secured with adhesive tape, string, plastic tie straps, or any other material capable of holding the polyethylene encasement in place until backfilling operations are complete.

822.12 BEDDING AND BACKFILL MATERIAL

PART 1: GENERAL

A. The CONTRACTOR shall furnish, place and compact various types of bedding material and trench sand as called for in the specifications or as directed.

B. The types and quality of bedding and backfill material are specified in this section, but its use for pipe bedding, backfill, replacement of unsuitable material excavated below trench grade, and other uses are as specified elsewhere.

822.13 RELATED WORK SPECIFIED ELSEWHERE:

A. Excavation and Backfilling for Water Mains -Section 822.16.

PART 2: PRODUCTS

822.14 MATERIALS:

A. Bedding Material:

1. Screened or crushed gravel bedding material shall be hard durable particles free from organic matter, lumps of clay and other deleterious substances. The gradation shall meet the requirements of the following table and MDOT specifications Section 703.06 Type B aggregate

Sieve Size Designation	% By Weight
½ inch	35-75
¼ inch	25-60
No. 40	0-25
No 200	0-5.0

2. Select backfill, as specified below, may be used for bedding material.

3. Bedding material shall not contain particles of rock which have any dimensions greater than 4”.

B. Select Backfill:
   1. Sand backfill shall be hard, durable particles of granular material with 100% passing the 1/2" sieve and between 0-15% passing the #200 mesh. All percentages are by weight. Sand shall be graded so as to secure the required compaction.

C. Backfill:

1. Suitable native material that does not contain stone or rock particles with any dimensions greater than 8”.

2. Bank run gravel borrow consisting of uniformly graded granular material having no rocks with a maximum dimension greater than 8" and that portion passing a 3-inch square mesh sieve shall contain no more than 70% passing 1/4 inch mesh sieve and not more than 10% passing a No. 200 mesh sieve.

3. The following or a combination of the following would also be acceptable backfill material:
   a. Excavated material that will compact to the compaction requirements.
   b. Material that does not contain rocks larger than 8 inches in any dimension.
   c. Dry clay backfill free from lumps.
   d. Wet clay that alone would pump but when mixed with sand and/or gravel will be stable and will compact.

PART 3: EXECUTION

822.15 METHODS

A. The materials will be used in accordance with the requirements of the various sections of the specifications, drawings and standard details.

822.16 EXCAVATION AND BACKFILLING FOR WATER MAINS

PART 1: GENERAL

A. This section includes all excavation for water mains, hydrants and appurtenances, including drainage, sheeting and bracing, backfilling, disposal of surplus material, and miscellaneous grading. All work shall be done as indicated on the drawings and as herein specified.

B. Excavation for water mains shall be the width and depth as indicated on the standard details. Excavation for hydrants and appurtenances shall provide suitable room for their installation.

C. The CONTRACTOR shall furnish and place all sheeting, bracing and supports, and necessary dewatering, and shall carry out the excavation in such a manner as to eliminate all possibilities of undermining or disturbing existing pipelines, utilities, roadways, shoulders and/or structures.

822.17 RELATED WORK SPECIFIED ELSEWHERE:

A. Bedding and Backfill Material -Section 822.14

PART 2: PRODUCTS

822.18 EQUIPMENT

A. Equipment shall be at CONTRACTOR'S option.

PART 3: EXECUTION

822.19 EXCAVATION:

A. When any pavement, regardless of type, must be cut, it shall be done in a neat and symmetrical manner by use of a saw, chisel, or other suitable method. In no case shall pavement be torn up with a backhoe bucket except between and inside of cuts previously made as above. Should any further pavement be broken, outside of the cuts, as by blasting, such damaged pavement shall be cut out in a neat and orderly fashion.

B. The CONTRACTOR shall perform all excavation of every description and of whatever substances encountered to the depths shown on the drawings or directed by the DISTRICT'S REPRESENTATIVE.

C. No extras will be allowed for quicksand excavation, muck excavation, or any other type unless specifically provided for in the bidding schedule.

D. Surplus excavated material may be used at other parts of the construction project as required for fill, etc. Excess material shall be disposed of by the CONTRACTOR.

E. The sidewalls of all trench excavation shall be kept as nearly vertical as possible in all roadways, lawns, near homes, etc. by sheeting, bracing, or other means. The width of the trench at a point 6 inches above the top of the water pipe shall not be greater than the width detailed. If the type of excavated material will not allow the width detailed, then the trench shall be properly sheeted and braced. The cost of sheeting, bracing, or other means is included in the cost of the pipelines and no extras will be allowed.

F. The excavation shall be made to secure a flat bottom trench (undisturbed earth bottom) for the full length of the pipe so as to give a uniform support to the pipe and shall be in accordance with ANSI A21.50 (AWWA C150), Type 2 Laying Condition.

G. The bottom of the trench shall be accurately graded to provide support to the full length of the pipe barrel. Excavate at each bell to prevent bell from bearing on trench bottom.

822.20 EXCAVATION BELOW TRENCH GRADE:

A. By mistake of CONTRACTOR: Where the bottom of the trench shall, by mistake of the Contractor, have been taken out to a greater depth than required, it shall be refilled to the proper grade with bedding material, and all to be placed and compacted as specified. The CONTRACTOR shall receive no additional compensation.

B. By instruction from DISTRICT'S REPRESENTATIVE: If, in the opinion of the DISTRICT'S REPRESENTATIVE, existing material below trench grade is unsuitable for properly laying the pipe, the CONTRACTOR will excavate and remove the unsuitable material and replace the same with bedding material as authorized by the DISTRICT'S REPRESENTATIVE and properly compacted to his satisfaction. The CONTRACTOR will be paid under the item titled "Unsuitable Material Excavated Below Trench Grade."

822.21 EXCAVATION NEAR EXISTING UTILITIES, ETC.

A. It will be necessary to excavate near existing pipes, drains and other utilities in certain locations. Some of these have been indicated on the drawings, but no attempt has been made to show all of the services and the completeness and accuracy of the information given is not guaranteed. The CONTRACTOR shall call "Dig-Safe" at least three business days in advance of any excavation to allow utilities to locate underground facilities.

B. As the excavation approaches pipes, conduits, or other underground structures and utilities, digging by machinery shall be discontinued and the excavation shall be done by hand tools.

C. If the utility is of the opinion that at any point sufficient or proper support has not been provided, they may order additional supports placed at the expense of the CONTRACTOR. Compliance with such order shall not relieve the CONTRACTOR from his responsibility for the sufficiency of such supports. It shall be the responsibility of the CONTRACTOR to prevent damage to or displacement of utilities and to consult with and request the concurrence of the utility company's representative in this matter at all locations. The cost of protecting such utilities shall be considered incidental to the cost of laying the pipe.

822.22 TRENCH SURCHARGES:

A. The excavated material shall be placed adjacent to the excavation in a manner to cause no excessive surcharge on the trench bank nor to obstruct free access to hydrants and valves. Should traffic or other conditions make it impractical or unsafe to stack material adjacent to trench, it shall be hauled and stored at a location provided by the CONTRACTOR and at the expense of the CONTRACTOR. When required, it shall be re-handled and used in backfilling the trench by the CONTRACTOR and at his expense.

822.23 SHEETING AND BRACING:

A. The CONTRACTOR shall be responsible for the design, construction, maintenance and safety of all sheeting and bracing required to support the sides of the excavation and to prevent the movement of earth which could in any way damage or endanger adjacent structures, utilities, roadways, increase the width of the excavation to more than that specified, or delay the work.

B. All sheeting, bracing and shoring is to be included in prices bid for several items of work in bidding schedule and will not be paid for as separate items.

C. No shoring shall be left in place unless so directed by the OWNER / SOUTH BERWICK WATER DISTRICT.

822.24 DRAINAGE AND DEWATERING OF EXCAVATIONS:

A. The CONTRACTOR shall conduct his operations so as to prevent at all times the accumulation of water, ice and snow in excavations or in the vicinity of excavated areas so as to prevent water from interfering with the progress or quality of the work. Under no conditions shall water be allowed to rise in unbackfilled trenches after pipe has been placed.

B. Accumulated water, ice and snow shall be promptly removed and disposed of by dewatering. Disposal shall be carried out in a manner which will not create a hazard to public health; nor cause injury to public or private property, work completed or in progress, or public streets; nor cause any interference in the use of streets and roads by the public. Pipes under construction shall not be used for drainage of excavations.

C. During construction, when an unstable condition in the pipe sub-grade has been created due to the CONTRACTOR'S excavation, the sub-grade shall be stabilized by dewatering or other means accepted by the OWNER / SOUTH BERWICK WATER DISTRICT.

822.25 BACKFILLING -GENERAL:

A. In general and unless other material is indicated on the drawings or is specified, material used for backfilling trenches and excavations around structures shall be suitable material which was removed in the course of making the construction excavations or as specified.

B. Frozen materials shall not be placed in the backfill, nor shall material be placed upon frozen material. Previous frozen material shall be removed or shall be otherwise treated as required before new backfill is placed.

C. Backfilling shall be done as soon as practical after the pipe has been laid and jointed.

822.26 BACKFILLING PIPE TRENCHES:

A. As soon as practicable after the pipes have been laid and jointed, backfilling shall begin and shall proceed until it is completed or has sufficient backfill to allow pipe testing.

1. The first layer of suitable backfill material shall be brought half-way up the pipe and compacted to 80% maximum density and then the normal backfilling shall begin and shall be compacted as specified.

2. All backfill shall be thoroughly compacted by hand tamping as placed, by use of mechanical or vibratory compactors, or by other acceptable methods.

3. Remainder of the trench shall be backfilled as follows:

    a. In paved areas, road shoulders and seeded areas, the entire depth of trenches above the center line of the pipe shall be backfilled in eight inch layers with suitable backfill material and each layer thoroughly and carefully compacted as specified. Bring backfill up to bottom of gravel base and/or loam.
    b. In other areas, the trench above the center-line of the pipe shall have suitable backfill material placed and compacted in 18 inch maximum layers as specified.

4. The nature of the excavated materials will govern both their acceptability for backfill and the method best suited for their placement and compaction in the backfill.

B. Both the materials and the methods shall be subject to the acceptance of the OWNER / SOUTH BERWICK WATER DISTRICT.

    1. No stones or rock larger than 8 inches in the greatest dimension shall be placed in the backfill.

C. Backfilling in public right-of-way, along the streets or highways in or along shoulder, berm or backslope shall be done in accordance with the specifications and requirements of the state or municipality, whichever is responsible for the street or highway involved. Responsibility for the fulfillment of permit conditions or any other applicable requirements of the street or highway authority shall be the obligation of the CONTRACTOR. Surface restoration shall be carried out to the satisfaction of the street or highway authority or as shown on the plans.

D. Backfilling shall follow pipe laying as closely as reasonable, so that a minimum of trench shall be open at any time. The regulations of the highway authorities shall be observed as regards the amount of trench to be open at any one time. Over night, and especially over weekends and holidays, the amount of open trench shall be zero. Any caved-in trench, especially after heavy rain and flooding, shall be cleaned out and the bottom consolidated before any additional pipe shall be laid.

822.27 TOP OF BACKFILL:

A. In paved and shoulder areas, backfill shall be carried up to pavement or shoulder sub-grade ready to receive the gravel base. In other areas, backfill shall be

brought up to adjacent finished grade minus the depth of any required topsoil and so as to provide a finished surface slightly mounded over the trench. Any trenches improperly backfilled, or where settlement occurs, shall be reopened to the depth required for proper compaction, and shall then be refilled and compacted with the surface restored to required grade and degree of compaction, mounded over, and smoothed off, at no additional expense.

B. In unpaved, unrevegetated areas, the gravel topping shall be left in a smooth and even condition, with no large stone on or in the surface. In cases where a paved surface has been broken, a temporary bituminous patch and/or a permanent paving restoration shall be made as required by the appropriate local or state road authority.

822.28 COMPACTION:

A. Compaction densities specified herein shall be the percentage of the maximum density obtainable at optimum moisture content as determined and controlled in accordance with AASHTO Standard T-180, Method A or D depending on the material size. Field density tests shall be made in accordance with AASHTO Standard T-147.

B. Each layer of backfill shall be moistened or dried as required and shall be compacted to the following densities, unless otherwise specified in the project specifications.

1. Bedding material 80%

2. Suitable backfill material under paved or shoulder areas 90%

3. Gravel base:
   a. Under paved areas 95%
   b. In shoulder areas 90%
   c. As replacement for unsuitable material excavated below grade 90%

4. Loam areas 90%

5. All other areas 85%

6. Or to approval of Authority having Jurisdiction

C. Compaction generally shall be done with vibrating equipment. Displacement of, or injury to, the pipe and structure shall be avoided. Movement of in-place pipe or structures shall be at the CONTRACTOR'S risk. Any pipe or structure damaged thereby shall be replaced or repaired as directed by the OWNER / SOUTH BERWICK WATER DISTRICT and at the expense of the CONTRACTOR.

D. Testing:

1. Field density tests may be conducted by the OWNER / SOUTH BERWICK WATER DISTRICT for each foot of depth of backfill at an average interval of 200 feet along the trench.

2. The CONTRACTOR shall furnish all necessary samples for laboratory tests and shall provide assistance and cooperation during field tests. The CONTRACTOR shall plan his operations to allow adequate time for laboratory tests and to permit taking of field density tests during compaction.

3. Any costs of retesting required as a result of failure to meet compaction requirements shall be borne by the CONTRACTOR.

822.29 FILL AND GRADING:

A. Excavated material not required for backfilling around pipes or structures may be used for fill in areas which require material for re-grading.

B. The re-grading shall be carried out as directed by the OWNER / SOUTH BERWICK WATER DISTRICT so that all surface water will drain towards brooks or drainage pipes.

C. All material shall be of such nature that after it has been placed and properly compacted, it will make a dense and stable fill.

822.30 PROTECTION OF EXISTING STRUCTURES:

A. All existing pipes, wires, poles, fences, property line markers and other items, which must be preserved in place without being temporarily or permanently relocated, shall be carefully supported and protected from injury by the CONTRACTOR, at no additional cost to the OWNER / SOUTH BERWICK WATER DISTRICT. Should such items be injured, they shall be restored by the CONTRACTOR, without compensation therefore, to at least as good condition as that in which they were found immediately before the work was begun.

822.31 ACCOMMODATION OF TRAFFIC:

A. The CONTRACTOR shall construct and maintain, without extra compensation, such adequate and proper bridges over excavations as may be necessary or as directed for the safe accommodation of pedestrians and vehicles. The CONTRACTOR shall furnish and erect, without cost to the OWNER / SOUTH BERWICK WATER DISTRICT, substantial barricades at crossing of trenches, or along the trench, to protect the traveling public.

B. The CONTRACTOR shall not obstruct active fire hydrants.

SECTION 823 - GATE VALVES

A. This section includes furnishing and installing gate valves, valve boxes, and related appurtenances, replacing gate valve boxes and/or adjusting gate valve boxes as directed by OWNER.

823.1 RELATED WORK SPECIFIED ELSEWHERE:

A. Ductile Iron Water Pipe -Section 822

PART 2: PRODUCTS

823.2 MATERIALS:

A. Gate Valves 16 inch and under shall meet the following requirements:

1. All provisions of AWWA C515 standards for resilient-seated gate valves, latest revision.

2. Be rated for zero leakage at 200 psi water working pressure and have a 400 psi hydrostatic test for structural soundness.

3. Have two "O" rings situated such that the sealing "O" ring above the stem thrust collar can be replaced with the valve under pressure in the full open position.

4. Have stem thrust collar of manganese bronze integrally cast to stem and shall have two thrust washers, placed one above and one below the stem thrust collar, made of a synthetic polymer with physical properties suitable for the application.

5. O-ring packing plate, bonnet and valve body shall be cast iron or ductile iron.

6. Have a grade D,E manganese bronze, non-rising stem which shall turn LEFT to open.

7. Stem nuts shall be grade D,E manganese bronze and shall be independent of the wedge.

8. Ductile iron wedge, less guiding mechanisms, shall be fully encapsulated and permanently bonded with a resilient elastomer. The interior exposed surface of the wedge shall be epoxy coated or painted with two complete coats of bituminous paint. The wedge shall be constructed such as to allow the flushing of the interior exposed surface during operation.

9. Each valve shall have a smooth unobstructed waterway which shall not be less than the full nominal diameter of the valve.

10. The internal and external valve body, including stuffing box and bonnet, and the interior exposed surface of the wedge shall be fusion bonded epoxy coated to a total thickness of at least 8 mils dry film thickness applied by the fusion bonding or electrostatic bonding process. Interior coating shall meet the requirements of AWWA C550.

11. 2 inch square ductile iron operating nut, with a countersunk 316 stainless steel or silicon bronze hold down nut; or the operating nut shall be pinned completely through the stem with a tapered stainless steel pin.

12. Valve ends shall be mechanical joint per AWWA C110 and furnished with Cor-Ten bolts and nuts, or equivalent.

13. Seal plate and bonnet bolts shall be 304 or 316 stainless steel.

14. The following valves have been approved for use by the South Berwick Water District.

    a. AFC Series 2500
    b. Clow Series F6100

823.3 Valve boxes:

A. All valves buried in the ground shall be equipped with a cast iron slide type, two-piece with a top flange and Have a minimum shaft diameter of 5 ¼". Valve boxes shall be sized to completely cover the valve.

1. The valve box bottom section shall be 36 inches long slide-type with bell-type base.

2. The valve box top section shall be slide-type 26 inches long (minimum) with top flange.

3. The valve box cover shall be extra heavy, non tilting, drop style and recessed in the box top. The cover shall have the word WATER clearly cast into the cover.

4. Valve box extensions shall be slide-type with a minimum 3 inch belled bottom.

5. Material shall be cast or ductile iron free from defects and manufactured in North America.

6. Interior and exterior of all components shall be bituminous coated with a minimum of 4 mils dry film thickness.

7. Approved Manufacturers:

a. Tyler
b. Bibby St. Croix
c. QWP

PART 3: EXECUTION

823.4 GATE VALVE INSTALLATION:

A. Valves with boxes are to be placed in the line of the pipe where required.

B. No extra allowance will be made for the extra cost of setting same due to cutting pipe, etc.

C. All nuts on valves shall be checked for tightness before the valve is lowered into the ditch. Valves must be adjusted so they will work easily and properly and must be left with the valves closed.

D. Installation of mechanical joint valves and fittings shall conform with Section 823.

E. Thrust blocks shall be used where shown on the plans.

F. Any gate valve boxes damaged by improper construction methods or handling by the Contractor, as determined by the Department, shall be replaced at the Contractor's expense.

823.5 GATE VALVE BOX REPLACEMENT:

A. Gate Valve Box Replacement shall consist of removing an existing gate valve box, installing a replacement gate valve box, and adjusting the replacement gate valve box as specified above including any lowering and any other adjustments that may be necessary prior to setting the final grade and also including the removal of any foreign material (gravel, rocks, pavement, etc.) as a result of the contractor's operation that would impede access to the operating head.

B. Any gate valve boxes damaged by improper construction methods or handling by the Contractor, as determined by the Department, shall be replaced at the Contractor's expense.

823.6 GATE VALVE BOX ADJUSTMENT:

A. Gate Valve Box Adjust shall consist of breaking loose gate valve box, adjusting gate valve box to the required final grade, including any lowering and any other adjustments that may be necessary prior to setting the final grade and also including the removal of any foreign material (gravel, rocks, pavement, etc.) as a result of the contractor's operation that would impede access to the operating head.

B. Any gate valve boxes damaged by improper construction methods or handling by the Contractor, as determined by the Department, shall be replaced at the Contractor's expense.

	PAY ITEM	PAY UNIT
823.3251	8" Gate Valves	Per Each
823.332	Adjust Gate Valve Box	Per Each

END OF SECTION

SECTION 824 - HYDRANTS

A. This section includes furnishing and installing hydrants, gate valves, gate boxes, tees and related appurtenances.

824.1 RELATED WORK SPECIFIED ELSEWHERE:

A. Ductile Iron Water Pipe -Section 822

824.2 All hydrants shall conform to the following requirements:

1. AWWA C502 standard for dry-barrel fire hydrants
2. Open left.
3. All bronze alloy parts exposed to water shall be made from grade A, D or E bronze.
4. “Traffic” or “Breakaway” barrel. Traffic model hydrant with breakaway feature shall have segmented cast iron flanges, break type rod coupling set equal to, or below, the line of the top flange of the lower barrel, and an approved rubber gasket between the barrels. Frangible bolts not acceptable.
5. One 4-1/2 inch pumper connection and two 2-1/2 hose connections. Hose and pumper connection threads to be National Standard Threads. Nozzles shall be threaded in with positive O-ring sealing mechanism.
6. Valve opened by turning valve in counter clockwise direction. Ductile iron or bronze pentagonal operating nut 1-13/16 inches (top) tapering to 1-7/8 inches (bottom).
7. A travel stop nut shall be provided in the top of the hydrant.
8. Port covers shall be supplied with chains and with pentagonal operating nuts as specified above.
9. Barrel length shall be 6 feet of cover, 6-1/2 feet of bury or 5 -1/2 feet of cover, 6 feet of bury or 5 feet of cover, 5-1/2 feet of bury.
10. Hydrant extensions shall be such that the location of the hydrant valve and seat shall remain in, or at, the shoe.
11. Hydrant shoe or base shall have a 6-inch mechanical joint inlet, a 5-3/8 inch valve opening with non-draining permanently plugged bronze seat, and a bronze to bronze valve seat and sub-seat arrangement. The blocking area on the bottom and back of the shoe shall have minimum bearing areas of 30 in2 and 20 in2, respectively.

12. The hydrant stem shall have a minimum diameter of 1 inch and an approved rust inhibitor from the top valve plate to 12 inches above.

13. Sealing shall be accomplished with rubber O-rings and approved rubber gaskets throughout.

14. All buried mechanical joint bolts and nuts shall be ASTM A325 Type 3 high strength steel (Cor-Ten) or acceptable equivalent. All buried flange joint bolts shall be 304 stainless steel or silicone bronze.

15. Protective coatings shall consist of the following:

    a. All paintings and coatings shall be a minimum of 3 mils dry film thickness.
    b. The internal area of the hydrant base, normally exposed to water, including the internal body of hydrant shoe and lower valve plate, shall be epoxy coated.
    c. All internal and external cast iron or ductile iron components shall be coated with an approved bituminous coating, 3 mils minimum.

16. Acceptable hydrants:
    a. Clow Eddy

824.3 Hydrant flow

1. Shall completely stop with no more than 200 ft.-lbs. of torque applied to the operating nut. Failure to shut completely at no more than 200 ft.-lbs. of torque will be cause for rejection of that hydrant.

	PAY ITEM	PAY UNIT
824.3021	Hydrant Assembly (Including Tee & Gate Valve).	Per Each

END OF SECTION

SECTION 825 - 1” & 2” WATER SERVICES

825.1 SCOPE:

A. This section includes furnishing and installing 1” and 2” water services, curb stops, service saddles, corporations, service rods/boxes, and related appurtenances.

825.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 822 DUCTILE IRON WATER PIPE

825.3 SUBMITTALS:

A. Submit shop drawings for all materials in accordance with provisions of Section 131.

825.4 MATERIALS:

A. Copper Tubing shall conform to the following:

1. Type K conforming to ASTM B88, with compression fittings.

B. Corporation Stops shall conform to the following:

1. 3/4 inch and 1 inch shall be ball valve design with a brass ball that is teflon coated or brass ball with teflon seats. Corporation inlets shall be cc threads and outlets shall be copper pac joint (c.p.j.).

2. 1 ½” and 2 inch shall be ball valve design with a brass ball that is teflon coated or brass ball with teflon seats. Corporation inlets shall be IP threads and outlets shall be copper pac joint (c.p.j.)

3. ON-OFF identification mark on the operating nut.

4. Supported by two seats for watertight shutoff in either direction.

5. The valve shall have a full port opening.

6. The body of the corporation stop shall be of heavy duty design.

7. The valve working pressure shall be 300 p.s.i.

8. Approved Manufacturers:

a. A. Y. McDonald
b. Ford Meter Box Co.

C. Curb Stops shall conform to the following:

1. Valves shall be a brass ball that is teflon coated or a brass ball with teflon seats.

2. The ball shall be supported by seats which are water tight in either direction.

3. The valve shall have a full port opening.

4. The valve shall open with 1/4 turn with a check or stop.

5. The valve shall not have a drain.

6. The valve stem shall have two "O" rings and a bronze ring lock which holds the stem solidly in the valve body.

7. The valve body shall be of heavy duty design.

8. The valve working pressure shall be 300 p.s.i.

9. Approved Manufacturers:

    a. A. Y. McDonald
    b. Ford Meter Box Co.

D. Service Box and Rod shall conform to the following:

1. Service box shall be 1-inch schedule 40 steel pipe with top having 1 inch NPT pipe threads for screw-on cover or coupling. Approved manufacturers: Bibby St.Croix, , QWP.

2. Service box shall be Erie style with 5 foot slide type riser.

3. Service box cover shall be Quincy type (heavy duty) that screws on service box. Approved manufacturers: Bibby, QWP.

4. Service box cover shall be tapped with a 1 inch rope thread with a solid brass plug with pentagon operating head.

5. The standard foot piece shall be heavy duty (Ford style or equal) cast iron design.

6. Approved manufacturer: Bibby St. Croix, Tyler.

7. The large, heavy duty foot piece (for 1-1/2 inch and 2 inch curb stops) shall have an arch that will fit over 2 inch ball valve curb stops.

8. Service rods shall be 24 inches in length for all service.

9. Service rods shall be of circular dimension and 1/2 inch diameter for services 1 inch and smaller, 5/8 inch diameter for services 1-1/2 inch and larger; 304 stainless steel.

10. Service rods shall have a yoke design that is an integral part of the rod.

11. The curb-stop attachment pin shall be a brass cotter pin.

12. The rod “wrench flat” shall have a minimum thickness of 1/4 inch tapered to 1/16 inch and width of 5/8 inches or 1/2 inches.

E. Service Saddles (to be installed with 1-1/2 inch & 2 inch corporation stops):

1. The service saddle shall have the "larger sized" body, the same as associated with the “service repair” saddle, which shall have a minimum diameter of 6 inches. and multiple "O" ringtype sealing.

2. The saddle body shall be constructed of epoxy coated ductile iron.

3. The sealing gasket(s) shall be either Buna-N rubber or SBR rubber (ASTM D2000).

4. There shall be two holding bands, U-bolt type, made of 304 stainless steel.

5. Approved manufacturers:

a. Smith-Blair
b. Ford
c. Romac
d. Rockwell

825.5 PART 3: EXECUTION

G. Valves with boxes are to be placed in the line of the pipe where required.

H. No extra allowance will be made for the extra cost of setting same due to cutting pipe, etc.

I. All nuts on valves shall be checked for tightness before the valve is lowered into the ditch. Valves must be adjusted so they will work easily and properly and must be left with the valves closed.

J. Installation of mechanical joint valves and fittings shall conform with Section 823.

K. Thrust blocks shall be used where shown on the plans.

825.6 SERVICE BOXES

A. All valves shall be fitted with a standard valve box or service box and rod set at the proper elevation on the valve and concentric with the operating nut, straight, square and plumb. The top shall be set to the proper surface grade and, after backfilling and settlement have taken place; these valve box top sections and service boxes shall be straightened, reset or adjusted as necessary. At least two permanent location measurements to the valve must be obtained. Backfill around boxes shall be mechanically tamped within a five-foot radius of the box.

825.7 SERVICES

A. Services will be installed at locations designated by the OWNER. See detail sheet for service connection. The service sizes are indicated on the drawings.

	PAY ITEM	PAY UNIT
825.441	1” Water Service Short Side	Each
825.4411	1” Water Service Long Side	Each
825.442	2” Water Service Short Side	Each

END OF SECTION

SECTION 826 – TESTING AND DISINFECTION

PART 1: GENERAL

826.1 SCOPE

A. Furnish all labor, materials, equipment, gages and related items necessary to complete all pressure and leakage tests of all water mains.

B. Furnish all labor, materials, equipment, and incidentals necessary to disinfect the new water main. Do not disinfect water mains until all testing required by Section 826.1A has been satisfactorily completed.

PART 2: PRODUCTS

826.2 SCOPE

MATERIALS

A. Materials for testing shall be at CONTRACTOR'S option.

B. The CONTRACTOR shall chlorinate the new main in accordance with the continuous feed method specified in Section 5.2 of AWWA Standard C651latest revision, using 5% to 15% sodium hypochlorite solution.

PART 3: EXECUTION

826.3 PRESSURE AND LEAKAGE TESTS OF WATER MAINS

A. After the pipe has been laid and backfilled, it shall be pressure tested and tested for leakage in the presence of the OWNER / SOUTH BERWICK WATER DISTRICT.

B. All tests shall be conducted at a time and in a manner to minimize as much as possible any interference with the operation of the existing water system. The OWNER / SOUTH BERWICK WATER DISTRICT will supply all water necessary for testing. The CONTRACTOR shall supply all labor, materials and equipment necessary to make any necessary connections to the water system and to carry out the tests.

C. The CONTRACTOR shall excavate and provide a corporation tap for pressure and leak testing as directed by the OWNER / SOUTH BERWICK WATER DISTRICT. The CONTRACTOR is responsible for all work associated with the excavation, including proper trench protection, barricades and proper backfilling and compaction upon successful completion of the test.

D. The pipe shall be slowly filled with water and all air expelled from the pipe. If permanent air vents are not located at all high points, CONTRACTOR shall

install corporation stops at such high points to bleed off air as the line is filled with water.

E. A pressure test pump will be connected to the new main at the testing point. The pressure will be slowly increased to 150 psi and allowed to stabilize (+/-2.5 psi) for a minimum of 15 minutes.

F. A reservoir of potable water shall be connected to the test pump and the initial level of water recorded.

G. The pump pressure shall be maintained at 150 psi for two hours with all make up water withdrawn from the reservoir.

H. After two hours, the water level in the reservoir will be measured and the volume of water drawn from the reservoir calculated and compared with the following allowable leakage:

$$\text{Allowable Leakage (gph)} = \frac{\text{Pipe Length (feet) X Nominal Diameter (inches)}}{10{,}876^*}$$

*correct only for 150 psi test pressure

I. If any test discloses leakage greater than that specified above, the CONTRACTOR shall, at his own expense, locate and make repairs as necessary until the leakage is within the specified allowance.

J. Final acceptance of the lines will not occur until satisfactory tests have been passed.

826.4 DISINFECTION OF WATER MAINS

A. . DISINFECTION. Upon satisfactory completion of the pressure and leak test, all new water mains shall be disinfected before they are placed into service in accordance with AWWA Standard C651-latest revision and the procedures specified herein

B. FLUSHING.

1. Section of pipe to be disinfected shall first be flushed to remove any solids or contaminated material that may have become lodged in the pipe. If no hydrant is installed at the end of the main, then a suitably sized tap should be provided.

2. All taps required by the CONTRACTOR for chlorination or flushing purposes, or for temporary release of air, shall be provided by him as part of the construction of the water main.

3. Flushing shall proceed for 4 hours at a flow velocity of 2.5 feet per second.

C. REQUIREMENTS OF CHLORINE. Before being placed into service, the main shall be chlorinated so that a chlorine residual of not less than 10 parts per million remains in the water after standing 24 hours in the pipe. Chlorine residual at start of test shall be at least 25 parts per million.

D. POINT OF APPLICATION. The preferred point of application of the chlorinating agent is at a point not more than 10 ft. downstream from the beginning of the new main and through a corporation stop inserted in the pipe. The water injector for delivering the chlorine solution water into the pipe should be supplied from a tap made on the pressure side of the gate valve controlling the flow into the pipeline extension. Alternate points of application may be used when accepted or directed by the OWNER / SOUTH BERWICK WATER DISTRICT.

E. RATE OF APPLICATION. Water from the distribution system, or other source of supply as accepted by the OWNER / SOUTH BERWICK WATER DISTRICT, shall be controlled to flow very slowly into the newly laid pipeline during application of the chlorine. The rate of chlorine mixture flow shall be in such proportion to the rate of water entering the newly laid pipe that the dosage applied to the water will be sufficient for at least 25 parts per million unless otherwise directed by the OWNER / SOUTH BERWICK WATER DISTRICT.

F. PREVENTING REVERSE FLOW. Valves shall be operated by the OWNER / SOUTH BERWICK WATER DISTRICT so that the strong chlorine solution in the line being treated will not flow back into the line supplying the water. Check valves may be used, if needed.

G. RETENTION PERIOD. Treated water shall be retained in the pipe at least 24 hours. After this period, the chlorine residual at pipe extremities and at other representative points shall be at least 10 parts per million.

H. CHLORINATING VALVES AND HYDRANTS. In the process of chlorinating newly laid pipe, all valves or other appurtenances shall be operated while the pipeline is filled with the chlorinating agent and under normal operating pressure.

I. FINAL FLUSHING AND TESTING:

4. Following chlorination, all treated water shall be thoroughly flushed from the newly laid pipe at its extremity until the replacement water throughout its length shows, upon tests, that the residual chlorine is not in excess of that to be carried in the system. The replacement water shall be allowed to reside in the pipeline for 24 hours (+/-4 hours) prior to sampling for physical, bacteriological and chemical testing.

5. After the retention period, water samples collected from the treated piping system as directed by the OWNER / SOUTH BERWICK WATER DISTRICT, shall show satisfactory bacteriological results. Bacteriological

analyses shall be processed by the OWNER / SOUTH BERWICK WATER DISTRICT.

6. Chlorine residual of water being disposed will be neutralized by treating with one of the chemicals listed in the table below.

AMOUNTS OF CHEMICALS REQUIRED TO NEUTRALIZE VARIOUS RESIDUAL CHLORINE CONCENTRATIONS IN 100,000 GALLONS OF WATER*

Residual Chlorine Concentration(mg/l)	Sulfer Dioxide	Sodium Bisulfate	Sodium Sulfite	Sodium Thiosulfate
1	0.8	1.2	1.4	1.2
2	1.7	2.5	2.9	2.4
10	8.3	12.5	14.6	12.0
50	41.7	62.6	73.0	60.0

*Except for residual chlorine concentration, all amounts are in pounds.

J. REPETITION OF FLUSHING AND RESULTS. Should the initial treatment result in an unsatisfactory bacterial test, the original chlorination procedure shall be repeated by the CONTRACTOR until satisfactory results are obtained.

	PAY ITEM	PAY UNIT
822.34	8” CL 52 Ductile Iron Water Pipe	Per linear foot

END OF SECTION

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