

SECTION 02518

VALVES AND HYDRANTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Types of valves specified herein include:
 - a. Gate Valves
 - b. Valve Boxes
 - c. Fire Hydrants
 - d. Anchoring Tees

B. Related Sections

1. Section 02315 - Excavation, Backfill, Compaction and Dewatering
2. Section 02501 – Disinfection of Water Distribution Systems
3. Section 02502 – Testing of Water Distribution Systems
4. Section 02514 - Ductile Iron Pipe and Fittings
5. Section 02519 – Water Services

1.2 REFERENCES

- A. ASTM A126 – Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings
- B. ASTM A276 – Standard Specification for Stainless Steel Bars and Shapes
- C. ASTM A307 – Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
- D. ASTM A536 – Standard Specification for Ductile Iron Castings
- E. ASTM A563 – Standard Specification for Carbon and Alloy Steel Nuts
- F. ASTM A564 – Standard Specification for Hot-Rolled and Cold-Finished Age-Hardening Stainless Steel Bars and Shapes
- G. ASTM B62 – Standard Specification for Composition Bronze or Ounce Metal Castings
- H. ASTM B584 – Standard Specification for Copper Alloy Sand Castings for General Applications
- I. ASTM D429 – Standard Test Methods for Rubber Property Adhesion to Rigid Substrates
- J. ASTM D1784 – Standard Specification for Rigid Polyvinyl Chloride (PVC) Compounds and Chlorinated Polyvinyl Chloride (CPVC) Compounds

- K. ASTM D4101 – Standard Specification for Polypropylene Injection and Extrusion Materials
- L. AWWA C111 - Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings
- M. AWWA C115 – Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
- N. AWWA C207 – Steel Pipe Flanges for Waterworks Service – Sizes 4 Inch Through 144 Inch (100 mm Through 3,600 mm)
- O. AWWA C500 – Metal-Seated Gate Valves for Water Supply Service
- P. AWWA C502 –Dry-Barrel Fire Hydrants
- Q. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service
- R. AWWA C550 - Protective Epoxy Interior Coatings for Valves and Hydrants
- S. NSF/ANSI Standard 61 – Drinking Water System Components

1.3 SYSTEM DESCRIPTION

- A. Furnish all labor, materials, equipment, and incidentals required to install, complete and ready for operation, all valves, hydrant assemblies, and appurtenances as shown on the Contract Drawings and as specified herein.
- B. Buried valves and hydrants for water distribution systems

1.4 SUBMITTALS

- A. Submit to the Engineer complete shop drawings of all valves and hydrants, including but not limited to the following:
 - 1. Product data including body material, valve design, pressure and temperature classification, end connection details, seating materials, trim material and arrangement, dimensions and required clearances, and installation instructions.
- B. Operation and Maintenance Manuals
 - 1. Provide O&M manuals for all valves.

1.5 QUALITY ASSURANCE

A. QUALIFICATIONS

- 1. All valves and hydrants shall be products of well-established firms who are fully experienced, reputable and qualified in the manufacture of the particular equipment to be furnished. The equipment shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these specifications as applicable.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Contractor remains responsible for off-loading delivered valves and hydrants, installation, testing, and disinfection.
- B. Prepare valves for shipping as follows:
 - 1. Ensure valves are dry and internally protected against rust and corrosion.

2. Protect valve ends against damage to threads, flange faces, and weld-end preps.
 3. Set valves in best position for handling:
 - a. Set gate valves closed to prevent rattling;
- C. Use the following precautions during storage:
1. Do not remove valve end protectors unless necessary for inspection; then reinstall for storage.
 2. Protect valves from weather. Store valves indoors. Maintain valve temperature higher than the ambient dew point temperature. If outdoor storage is necessary, support valves off the ground or pavement in watertight enclosures.
- D. Use a sling to handle valves whose size requires handling by crane or lift. Rig valves to avoid damage to exposed valve parts. Do not use handwheels and stems as lifting or rigging points.

PART 2 PRODUCTS

2.1 GENERAL

- A. All valves, hydrants, and appurtenances shall conform to the standards of the Longmeadow Department of Public Works.
- B. Pressure and temperature ratings shall be as scheduled and required to suit the individual valves specified herein.
- C. Accessories including bolts, nuts, glands, and gaskets shall be supplied by the valve manufacturer.
- D. All buried valves shall be supported by a concrete pad across their entire lower bearing surface.
- E. All buried valves shall have mechanical joint ends compatible with the piping systems in which they are installed in accordance with ANSI/AWWA C111/A21.11-85 and Mega-Lug type retainer glands. Mechanical joint accessories, including glands, SBR rubber gaskets, tee head bolts, and nuts shall be provided with the valves. Provide stainless steel bolts and nuts.
- F. All valves and appurtenances shall be of the size shown on the Contract Drawings and as far as possible, all equipment of the same type shall be from one manufacturer.
- G. All valves, hydrants, and appurtenances shall have the name of the manufacturer, flow directional arrows, and the working pressure for which they are designed cast in raised letter upon some appropriate part of the body.
- H. All valves for water distribution systems shall be certified to NSF 61.
- I. Bolts shall be electro-zinc plated with hex heads and hex nuts in accordance with ASTM A-307 and A-563, respectively.
- J. Buried valves shall be provided with standard valve box with tee-handle operator.

2.2 GATE VALVES (RESILIENT SEAT)

- A. Gate valves shall be resilient seat type suitable for underground service complying with the requirements of AWWA C509.
- B. Gate valves shall be designed to be bubble tight for 250 psig water working pressure with no leakage past the seat from either side of the disc, and shall be hydrostatically tested to 500 psig.
- C. Gate valves shall be of the non-rising stem (N.R.S.) design.
- D. Gate valves shall be set vertically (spur gearing).
- E. Gate valves shall open right (clockwise).
- F. Buried gate valves shall be furnished with 2-inch square operating nuts.
- G. Open-left gate valves shall have a black-painted operating nut, and open-right valves shall have a red-painted operating nut.
- H. Gate valves shall be cast iron or ductile iron. Cast iron shall meet the specifications of ASTM A126, Class B. Castings shall be clean and sound without defects that will impair their service. No plugging or welding of such defects will be allowed. Ductile iron shall meet the standards of ASTM A536.
- I. The resilient-seated disc wedge shall be of the resilient wedge fully supported type, either cast iron or ductile iron. Solid guide lugs shall travel within channels in the body of the valve. The disc and guide lugs shall be fully encapsulated in SBR (styrene butadiene rubber) or EPDM rubber. Disc wedges that are not 100% fully encapsulated shall not be acceptable. Provide guide caps of an acetal copolymer bearing material to protect the rubber-encapsulated solid guide lugs from abrasion for long life and ease of operation.
- J. The seat shall be SBR or EPDM rubber, matching the disc encasement. The seating surface (rubber) shall be specially designed so as to provide a smooth waterway, without depressions or cavities, which might trap debris and interfere with tight closures.
- K. The body, bonnet, and gate shall be cast/ductile iron, constructed in accordance with AWWA C-509. The bonnet to body seal shall incorporate a flat neoprene gasket. Bonnet and body flanges shall be fully machined to assure proper sealing of the gasket.
- L. Gate valve stems shall be of bronze rolled bar stock in accordance with ASTM B584, and shall have a forged thrust collar. The thrust collar shall be factory lubricated, and the thrust collar and its lubrication shall be isolated by the O-Rings from the water way and from outside contamination, providing permanent lubrication for long term ease of operation. An anti-friction thrust washer shall be provided both above and below the thrust collar for ease of operation.
- M. Gate valves shall have O-Ring sealed stems with one O-Ring located below the thrust collar and two O-Rings located above the thrust collar. The two O-Rings located above the thrust collar shall be replaceable with the valve still in service in the fully open position.

- N. Coat internal and external exposed ferrous surfaces of the valve with a fusion-bonded, thermosetting powder epoxy coating suitable for potable water service conforming to AWWA C550. Coating shall be non-toxic and shall impart no taste to water. Coating thickness shall be nominal 5/10 mils. Gate valves for water distribution systems shall be certified to NSF 61.
- O. Gate valves shall be as manufactured by U.S. Pipe Metroseal (Model 250), Mueller (Model 2360), American Flow Control (AFC-2500), Clow (2630 Series), equivalent by M&H Valve Company, or approved equal.

2.3 TAPPING SLEEVES / VALVES

A. Ductile Iron Tapping Sleeves for Pipes 12-Inches and Smaller

1. Tapping sleeve shall be MJ, with recessed outlet flange for tapping valve.
2. Tapping sleeve shall conform to AWWA C-207, Class D, with rated maximum working pressure of 200 psi.
3. The side rubber gaskets shall be rectangular in cross-section and fit into grooved channels in the casting. These gaskets shall extend the entire length of the sleeve and shall not require cutting or trimming to match MJ end gaskets.
4. Tapping sleeve shall be AB-CD pattern to permit use of plain rubber and duck-tipped gaskets for various O.D. piping sizes.
5. Mechanical joint with accessories furnished including glands, gaskets, and Cor-Ten T-bolts and nuts, or equal.
6. All flange outlet bolts shall be 304 stainless steel.
7. Interior and exterior to be bituminous coated with a minimum of 4 mils dry film thickness or fusion bonded epoxy coating.
8. The sleeve shall be provided with a ¾ inch F.I.P.T. test port and brass plug.
9. Approved manufacturers:
 - a. AFC
 - b. Mueller Co.
 - c. U.S. Pipe
 - d. Tyler/Union

B. Cast Iron / Ductile Iron Tapping Sleeves

1. Tapping sleeves shall be long body mechanical joint sleeves with standard high strength corrosion resistant alloy nuts and bolts (Cor-Ten or equal). Sleeves shall be ductile iron, designated for working pressures not less than 200 psi. Rubber end gaskets shall be provided for the full area of the sleeve flanges.
2. End seals to conform to AWWA C111.
3. Acceptable manufacturers shall be Mueller, M&H Valve Co., Tyler/Union, U.S. Pipe Metroseal, or approved equal.

4. Tapping sleeves shall be suitable for connection under pressure with no loss of water or interruption of service to flow in the main.
5. Outlet flange and drilling shall comply with ANSI B16.1.
6. The flange shall be A36 carbon steel and drilled in accordance with AWWA C207 Class D ANSI, 150 lb hole pattern. The flange shall be fusion-bonded epoxy coated.
7. Gaskets shall be grade 60 rubber and NSF-61 approved.
8. The bolts and nuts shall be 18-8 stainless steel heavy hex nuts, stud bolts and washers.
9. Tapping sleeve shall have a minimum pressure rating of 200 psi.
10. Pressure rating depends on size of tapping sleeve.
11. Tapping sleeves shall be mechanical joint type sleeves made of ductile iron or cast iron. Sleeves shall contain a ¾ inch N.P.T. test plug for air testing.
12. Asphaltic varnish coat also available.
13. Tapping sleeves shall be rated for a working pressure of 200 psi.
14. Outlet flange dimensions and drilling shall comply with ANSI B16.1, Class 125 and MSS SP-60.

C. Tapping Valves

1. Tapping valves shall conform to the requirements specified above under paragraph 2.2 for gate valves except that one end shall be flanged to attach to tapping sleeve and one mechanical. Tapping valves shall be provided with an oversized opening to permit the use of full size cutters.
2. Tapping valve seat opening shall be larger than the nominal size to permit full diameter cuts to be made.
3. Tapping valves shall be resilient wedge, non-rising stem gate valve type, meeting the requirements of ANSI/AWWA C500 and C509
4. Tapping valves shall comply fully with the specifications for gate valves cited in paragraph 2.2 above except they shall have a flanged end on the inlet side and a mechanical joint end on the outlet side.

D. Stainless Steel Tapping Sleeves

1. Tapping sleeve body shall be 18-8 type 304 stainless steel in two sections that are bolted together around the pipe.
2. Acceptable manufacturers shall include Mueller, Ford, Smith-Blair, Romac Industries, or approved equal.
3. 200 psi working pressure rating.
4. Outlet flange in accordance with ANSI B16.1.
5. Incorporate ¾ inch N.P.T. test plug.

2.4 VALVE BOXES (FOR BURIED VALVES)

- A. Each valve shall be accompanied by a valve box of the adjustable type of heavy pattern, constructed of cast iron and provided with a 6-inch cast iron cover.
- B. Valve boxes shall be manufactured in North America by Clow Corporation, Tyler/Union Corporation, or equal.
- C. Valve boxes shall be round, 2-piece, sliding type, cast iron. The upper Section of each box shall have a flange on top having sufficient bearing area to prevent settling. The bottom of the lower Section shall be belled to enclose the operating nut and stuffing box of the valve without bearing on the valve bonnet. The barrel shall be 5-1/2 inch O.D. minimum.
- D. Boxes shall be of lengths consistent with pipe depths. Boxes shall be adjustable, with a lap of at least 6 inches when in the most extended position.
- E. Covers shall be slotted for easy removal, close fitting, substantially dirt tight, and flush with the top of the box rim.
- F. Covers for valve boxes on water mains shall have the word "WATER" cast in the top along with an arrow indicating the direction of opening.
- G. Valve boxes shall be coated with coal-tar pitch enamel or other approved coating.
- H. Valve boxes shall be suitable for the size valve on which they are used. The length of the lower Section shall be adequate for trench adjustment, no top or mid-Section adapters.
- I. Provide one tee-handled wrench for every four valves installed, unless additional wrenches are required due to variations in valve bury depth. Wrenches shall be field measured to accommodate the depth of bury and provide waist high operation.
- J. Lockable valve box covers shall be provided where indicated on the Drawings. Lockable valve box covers shall be Quality Water Products Lok'n Rise Valve Box Cover, or approved equal.

2.5 FIRE HYDRANTS

- A. Fire Hydrants
 - 1. The hydrant shall meet the requirements of AWWA Standard C-502, latest edition.
 - 2. The hydrant shall open right.
 - 3. Operating nut
 - a. Shall be D.I. or bronze.
 - b. Shall be pentagon in shape with dimensions of Top 1-13/16 inch tapering to 1-7/8 inch on bottom.
 - 4. Nozzles
 - a. 2 each – 2-1/2 inch National Standard Thread
 - b. 1 each – 4-1/2 inch National Standard Thread

5. Port covers shall be supplied without chains and shall have the same size pentagon operator as specified above.
 6. Traffic model hydrant with breakaway feature.
 7. Hydrant shoe or base features
 - a. 6 inch MJ inlet
 - b. 5-1/4 inch valve opening with non-draining bronze seat that is permanently plugged
 - c. Valve seat and sub-seat arrangement shall be bronze to bronze.
 8. Bolts
 - a. All buried MJ bolts and nuts (T-head, etc...) to be Cor-Ten or equal.
 - b. All buried flange joint bolts shall be 304 stainless steel or silicone bronze.
 9. Protective coatings
 - a. All paintings and coatings shall be a minimum of 3 mils total dry film thickness.
 - b. The internal components of the hydrant shall be fusion-epoxy coated.
 - c. All internal and external cast iron or ductile iron components to be coated with an approved bituminous sealer, 3 mils minimum.
 10. Approved hydrants
 - a. Hydrants shall be one of the Longmeadow Department of Public Works standard hydrants, either the American Darling B-84-B or the Mueller Centurion.
- B. The hydrants shall comply with all requirements of AWWA Standard C502-80, and, in addition, shall also comply with the following specific requirements:
1. The hydrant shall be a compression type shut-off with valve opening against the pressure. A negligible loss of water shall occur with breakage of the hydrant, whether breakage occurs in the open position or the closed position.
 2. The main valve seat shall be 5¼ inches in diameter.
 3. The inlet connection shall be 6-inch mechanical joint furnished with gasket, gland and bolts.
 4. Hydrants shall open RIGHT and shall have 1, 4 ½ inch diameter with NST streamer connection, and 2, 2 ½ inch diameter NST hose connections.
 5. The color of the hydrant above ground shall be RED to match the Town's standard color.
 6. Connecting pipe and pipe nipples between the main line tee and hydrant shall be 6-inch ductile iron, Class 52, conforming to the requirements of Section 02514.

7. 1 ½ inch pentagon pattern operating nut.
8. Stainless steel bolts and nuts.
9. 6-inch hydrant valve and valve box shall conform to paragraphs 2.2 and 2.3.
10. Anchoring Tees (also referred to as Hydrant Tees) shall have main run ends as indicated on the plans or as required for the installation. The 6 inch branch shall have a plain end with an integral gland and rotating mechanical joint gland to provide a restrained connection for the valve.
11. Minimum working pressure shall be 250 psi.

C. Hydrant Paint

1. Hydrants shall be thoroughly cleaned and given two shop or field coats of paint in accordance with AWWA C502 and the instructions of the paint manufacturer.
2. If the hydrants are delivered with the Owner's standard color, they shall be given one matching field coat of an alkyd gloss enamel. If the hydrants are not delivered with the Owner's standard color, they shall be given two coats of an alkyd gloss enamel.
3. Alkyd gloss enamel shall be 801 DTM by Sherwin-Williams, 2H-Tneme by Tnemec, or approved equal. Reflective paint shall be Scotchlite #7211 by 3M.
4. Hydrants color will be RED.

D. Additional Hydrant Components

1. A minimum of 2 operating wrenches shall be supplied to the Owner. Operating wrench shall be made to operate the hydrants supplied under this Contract.
2. A minimum of 2 safety flange repair kits shall be supplied. Safety flange repair kit shall be compatible with the hydrant supplied under this Contract.

2.6 ANCHORING TEES

- A. Hydrant tees shall be the "anchoring" type and shall have mechanical joint bells conforming to the requirements of the main pipe. The hydrant tee outlet shall be of 6 inch mechanical joint or equal, suitably equipped to anchor the hydrant valve to the tee.
- B. Anchoring tees shall have mechanical joint main run ends. The branch shall have a plain end with integral gland and rotating mechanical joint gland to provide a restrained connection.

2.7 TIE RODS

- A. Tie rods utilized for joint restraints shall be manufactured by Star National Products, Columbus, OH, and shall consist of Star Figure SST7 tie bolts with Figure SST8 nuts, Figure SST17 tie washers, and Figure SST12 all thread tie rods. Tie bolts, tie washers, tie rods, and nuts shall be COR-TEN type steel.

2.8 MISCELLANEOUS - OTHER

- A. Corporation, adapter couplings, plugs, curb stops, boxes, and copper piping shall be as specified in Section 02519.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine valve interior through the end ports for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks used to prevent disc movement during shipping and handling.
- B. Actuate valve through an open-close and close-open cycle. Examine functionally significant features, such as guides and seats made accessible by such actuation. Following examination, return the valve closure member to the shipping position.
- C. Prior to valve installation, examine the piping for cleanliness, freedom from foreign materials, and proper alignment.
- D. Replace defective valves with new valves.

3.2 HYDRANT INSTALLATION

- A. Excavation, trenching and back filling procedures shall be in accordance with Section 02315.
- B. The hydrant tee shall be designed so that the hydrant valve can be securely attached to the main line.
- C. All hydrants shall be equipped with a thrust block bearing against the foot or bottom of the hydrant and against the vertical face of undisturbed soil behind the hydrant. The bearing areas of the thrust block on the soil shall be at least 2 feet by 3 feet (6 sq. ft.).
- D. Connecting pipe between the valve and hydrant shall be 6 inch ductile iron with plain ends meeting the requirements of Section 02514.
- E. One cubic yard of washed $\frac{3}{4}$ inch stone shall be placed around hydrant drains.
- F. Hydrant breakaway flanges shall be located no higher than 3 inches above-grade or lower than at-grade.
- G. Valves and hydrants, either existing or new, will be operated only by Longmeadow Public Works personnel.
- H. All newly installed hydrant and branch connections must be subject to line pressure in an open trench to determine tightness of joints before backfilling, unless they are part of the overall pipeline pressure and leakage testing.
- I. Fire hydrants shall be installed in accordance with the Drawings and the manufacturer's recommendation.

3.3 VALVE INSTALLATION

- A. Valves shall be installed in conjunction with pipelines in which they are installed.
- B. General Applications - Refer to the drawings and piping system specification Sections for specific valve applications and arrangements.
- C. All buried valves 6 inches and larger shall be supported by a concrete pad.

D. Gate valves to be installed in the vertical position.

3.4 INSPECTION AND TESTING

A. Valves and hydrants shall be inspected and tested in conjunction with the pipelines in which they are installed.

B. Valves shall be inspected and tested in conjunction with the pipelines in which they are installed in accordance with Section 02502 regarding Testing to the extent reasonably possible.

3.5 FINAL ACCEPTANCE AND WARRANTY

A. Final acceptance of all equipment furnished under these Specifications will be withheld until after the installation and field testing by the Engineer. The manufacturer and the Contractor shall guarantee the equipment against defects of any kind for a period of one year after final testing and acceptance.

END OF SECTION

SECTION 02519

WATER SERVICES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Furnish all labor, materials, equipment, and incidentals required to:
 - a. Tap the existing water main and provide a complete water service from the new water main to a new curb stop installed at or near the streetline or where shown on the Drawings.
 - b. Connect new water service to existing water service just past new curb stop.
2. Materials provided under this section include:
 - a. Corporations
 - b. Curb Stops and Boxes
 - c. Unions, Couplings, and Connection Adapters
 - d. Copper Tubing

B. Related Sections

1. Section 02315 – Excavation, Backfill, Compaction and Dewatering
2. Section 02320 – Borrow Materials
3. Section 02501 – Disinfection of Water Distribution Systems
4. Section 02502 – Testing of Water Distribution Systems
5. Section 02513 – Copper Pipe and Fittings
6. Section 02518 – Valves and Hydrants

1.2 REFERENCES

- A. AWWA C651 – Disinfecting Water Mains
- B. AWWA C800 – Underground Service Line Valves and Fittings
- C. ASTM A48/A48M – Standard Specification for Gray Iron Castings
- D. ASTM A536 – Standard Specification for Ductile Iron Castings
- E. ASTM B62 – Standard Specification for Composition Bronze or Ounce Metal Castings
- F. ASTM B68 – Standard Specification for Seamless Copper Tube, Bright Annealed
- G. ASTM B75 – Standard Specification for Seamless Copper Tube
- H. ASTM B88 – Standard Specification for Seamless Copper Water Tube

1.3 SUBMITTALS

- A. Shop drawings for all underground service brass, corporations, curb stops and boxes, unions, couplings, and boxes, service saddles, water meters, and copper tubing shall be submitted to the Engineer.

1.4 QUALITY ASSURANCE

- A. All materials shall be provided by well-established firms who are fully experienced, reputable and qualified in the manufacture of the particular equipment to be furnished. The equipment shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these specifications as applicable.
- B. All components specified in this Section and supplied on the project shall be North American made.
- C. All materials used in conjunction with drinking water distribution systems shall be in accordance with ANSI/NSF 61.
- D. All corporations and curb stops shall meet the requirements of the Longmeadow Department of Public Works standards.

1.5 SYSTEM DESCRIPTION

- A. In all cases, new water services shall be 1-inch diameter and consist of the following:
 - 1. Tapping of the main;
 - 2. Installation of a new corporation having a connection for copper tubing;
 - 3. Copper tubing from the main to the street line / curb stop;
 - 4. Curb stop and box.

PART 2 PRODUCTS

2.1 MATERIALS

- A. General
 - 1. All underground service brass including corporations, curb stops, couplings, fittings, adapters, and any other below ground fittings, shall be red brass (85% copper / 5% tin / 5% lead / 5% zinc) manufactured to ASTM B62, and also meeting the requirements of AWWA C800.
- B. Ball-Type Corporation Stops
 - 1. Maximum working pressures up to 300 psig.
 - 2. Full-size waterway with coated ball for easy turning and full 360-degree stem rotation.
 - 3. 80 durometer Neoprene rubber seats sealing in both directions.
 - 4. Double o-ring stem seals with end piece o-ring providing secondary seal to prevent leakage.
 - 5. Blow-out proof stem design with stainless steel reinforced seat seal.

6. Inlet Connection
 - a. AWWA (CC) tapered threads
 7. Outlet Connection
 - a. Pack joint compression
 8. Valve Operator Orientation
 - a. The corporations shall be easy turning, non-binding and designed to open counterclockwise (left).
 9. Manufacturer
 - a. Ford Meter Box Company, Red Hed Manufacturing Co., A.Y. McDonald Manufacturing Co., and Mueller Company.
- C. Ball Style Curb Stop
1. Shall be designed to withstand 300 psig working pressure.
 2. Solid one-piece tee head and stem.
 3. Double o-ring stem seals and coated brass ball supported by two Buna-N seats.
 4. The curb stop shall have a quarter turn stop (90-degree motion) requiring low turning torque allowing positive shut-off from either direction with check and no waste.
 5. Full round way provides straight through flow.
 6. Minneapolis pattern with threads available for Minneapolis style curb box.
 7. Inlet Connection
 - a. Pack joint compression
 8. Outlet Connection
 - a. Pack joint compression
 9. Valve Operator Orientation
 - a. The corporation shall be easy turning, non-binding and designed to open counterclockwise (left)
 10. Manufacturer
 - a. Ford Meter Box Company, Red Hed Manufacturing Co., A.Y. McDonald Manufacturing Co., and Mueller Company.
- D. Curb Boxes
1. Each curb stop shall be provided with a cast iron curb box and cover weighing a minimum of 15 pounds.
 2. The curb box shall be the extension type with arch pattern base. For valves larger than 1" diameter, the optional foot piece shall be provided.
 3. The inside diameter of the upper section shall be at least 1 inch.

4. Curb box shall be equipped with a 9/16 minimum diameter stationary extension rod (extending to within 18-inches of the top of the curb box) attached to the valve with a stainless steel or brass collar pin.
 5. Boxes shall be completely and thoroughly coated with bitumastic paint.
 6. Cover shall be Plug style with 27/32-inch brass pentagonal nut and the word "WATER" imprinted on it.
 7. Curb boxes and covers shall be as manufactured by Ford Meter Box Company, A.Y. McDonald Manufacturing Co., or Mueller Company.
- E. Unions, Couplings, and Connecting Adapters
1. Brass unions, couplings, and connecting adapters shall be as necessary for the type of piping or tubing being joined.
 2. Provide electrical continuity.
 3. Acceptable manufacturers include Ford Meter Box Company, Red Hed Manufacturing Co., A.Y. McDonald Manufacturing Co., and Mueller Company.
- F. Copper Tubing
1. Copper tubing for water services shall be as specified in Section 02513 (Copper Pipe and Fittings).
 2. Copper tubing for water service connections shall be Type K Heavy Wall Annealed seamless copper tubing conforming to the requirements of ASTM B88.
 3. The name or trademark of the manufacturer and type shall be stamped at intervals along the tubing.

PART 3 EXECUTION

3.1 INSTALLATION

- A. A standard gooseneck (with generous sweeps, both horizontal and vertical) shall be provided at the corporation in conjunction with copper tubing to provide flexibility for settlement that might occur.
- B. The new service pipe shall not have joints or connections other than needed at the corporation and the curb box. Contractor must provide 100-foot coils for services less than 100 feet from the water main. Fittings or unions are not allowed on services less than 100 feet in length.
- C. Curb stop and box shall be installed approximately at the property or street line in front of the property to be serviced.

3.2 TESTING

- A. Testing and disinfection of all water mains and services shall be in accordance with Sections 02501 (Disinfection of Water Distribution Systems) and 02502 (Testing of Water Distribution Systems).

- B. All newly installed service connections shall be subject to line pressure in an open trench to determine tightness of joints before backfilling.
- C. Service connection inspection by a representative of the Owner is required prior to backfilling.
- D. No house services shall be installed or reconnected until the proposed water main has been fully disinfected, tested and flushed.

END OF SECTION

SECTION 02740

BITUMINOUS CONCRETE PAVEMENT

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Bituminous concrete paving.
- B. Related Sections
 - 1. Section 02315 - Excavation, Backfilling, Compaction and Dewatering
 - 2. Section 02320 – Borrow material

1.2 REFERENCES

- A. Commonwealth of Massachusetts Department of Public Works "Standard Specifications for Highways and Bridges", 1988 Edition as amended.
- B. AASHTO Standard Specifications for Transportation Materials and Methods of Sampling and Testing, 1990 Edition, as amended.

1.3 SUBMITTALS

- A. Product information and mix design for each mix specified under this Section.
- B. Product data sheets for all additives proposed in the mix design.
- C. Certificate indicating the mixes specified meet or exceed the requirements specified herein.
- D. Certificate indicating the mix plant conforms to TAI Manual MS-3, Commonwealth of Massachusetts Department of Public Works "Standard Specifications for Highways and Bridges".

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with TAI Manual MS-8., Commonwealth of Massachusetts Department of Public Works "Standard Specifications for Highways and Bridges".
- B. Mixing Plant: Conform to TAI Manual MS-3, Commonwealth of Massachusetts Department of Public Works "Standard Specifications for Highways and Bridges".
- C. Obtain materials from same source throughout.

PART 2 PRODUCTS

2.1 MATERIALS

- A. General
 - 1. Bituminous materials shall conform to the requirements of these Specifications.
 - 2. Bitumen delivered to a project or to a mix plant must be accompanied by a proper certificate signed by the producer's authorized representative.

Shipments of material not accompanied by a certificate will not be accepted for use in the work.

- B. Bituminous Concrete Paving shall be Class I, Type I-1, as specified in Sections 460 and M3.11.0 of the above referenced Massachusetts Department of Public Works "Standard Specifications for Highways and Bridges", 1988 edition, as amended.
- C. Cutback Asphalts: Materials shall be blends of asphalts cements and suitable solvents. They shall be homogeneous, free from water, and conform to the requirements of AASHTO M 81 for the rapid curing type and AASHTO M 82 for the medium curing type.
- D. Asphalt Primer: Material shall be suitable for priming concrete and masonry surfaces prior to the application of waterproofing asphalt. It shall conform to the requirements of AASHTO M 116.
- E. Asphalt Emulsions: Materials shall be homogeneous and shall show no separation after mixing within thirty days after delivery. They shall conform to the requirements of AASHTO M 140 with the following exception: Viscosity determination will not be required for material sampled at the point of delivery.
- F. Cationic Emulsified Asphalt: Material shall be a homogeneous for a minimum of 3 months. The material shall conform to the requirements of AASHTO M 208.
- G. Protective Seal Coat Emulsion: Material shall be a homogeneous emulsion consisting of coal tar pitch dispersed in water by means of a mineral colloid. Any separation or coagulation of its components shall be capable of being overcome by moderate stirring. The material shall contain no asphaltic materials or chemical emulsifiers. When tested according to prescribed methods it shall meet the following requirements:

	Minimum	Maximum
Percent Water (AASHTO T 55)		50
Percent Non-Volatile Matter (ASTM D 2939, Sec. 7)	48	
Percent Ash in Non-Volatile Matter (ASTM D 2939, Sec.9)	20	45
Percent Solubility of Non-Volatile Matter in CS ₂ (AASHTO T 44)	40	
Resistance to Water (ASTM D 446)	No blistering, loss of adhesion or re-emulsification	
Resistance to Petroleum Solvents (ASTM D 446 – with Solvents substituted for water)	No penetration and no loss of adhesion	

- H. Hot Poured Joint Sealer: Sealer shall be composed of a mixture of materials which will form a resilient and adhesive compound capable of effectively sealing joints in concrete and shall conform to the requirements of AASHTO M 173.
- I. Joint and Crack Sealer, Asphaltic-Fiber: Material shall consist of a blend of asphalt cement (AC-20) and polyester fibers. The asphalt-fiber blend shall consist of 6% fiber mass to mass of asphalt.

- J. Calcium chloride shall meet requirements of AASHTO M-144 and shall be spread wherever directed to control dust conditions. The Engineer may direct the Contractor to employ sprinkling of water in lieu of calcium chloride for dust control.
- K. Tack coat shall consist of either emulsified asphalt, Grade MS-1 conforming to Section M3.03.0, or cutback asphalt, Grade MC-70 or MC-250 conforming to Section M3.02.0 of the above-referenced Specifications.

PART 3 EXECUTION

3.1 PAVING – GENERAL

- A. Install bituminous concrete pavement in accordance with Section 460 of the Massachusetts Department of Public Works "Standard Specifications for Highways and Bridges", 1988 edition, as amended.
- B. Place binder course as soon as possible after the gravel base has been prepared, shaped and compacted for Town streets and driveway/sidewalk repair.
- C. Place and compact binder course by steel-wheeled rollers of sufficient weight to thoroughly compact the bituminous concrete.
- D. Maintain pavement under this Contract during the guarantee period of one year and promptly (within 3 days of notice given by the Engineer) refill and repave areas which have settled or are otherwise unsatisfactory for traffic.
- E. All pavement thicknesses referred to herein are compacted thicknesses. Place sufficient mix to ensure that the specified thickness of pavement occurs wherever called for.
- F. In no case will pavement be placed until the gravel base is dry and compacted to at least 95% maximum density at optimum moisture content.
- G. No mix shall be placed on wet or damp surfaces.
- H. Regardless of any temperature requirements, no mix conforming to the requirements of these specifications shall be placed after October 31 or before May 1 of any year.
- I. All manhole frames, catch basin frames and utility boxes are to be set to the grade of the binder course until such time as the top course is placed. Then reset the frames to the grade of the top course. Frames and utility boxes shall not be allowed to protrude above the surface of the binder course. All excavated materials removed for raising of the frames and utility boxes are to be replaced with concrete. This ring of concrete shall be filled flush with the surrounding binder course.
- J. Furnish and spread calcium chloride on disturbed surfaces to control dust conditions.
- K. The contact surfaces of curbs, castings, and other structures shall be painted with a tack coat prior to placement of paving.
- L. Along curbs, structures and all other places not accessible with a roller, the paving mixture shall be thoroughly compacted with tampers. Such tampers shall not weigh less than 25 pounds and shall have a tamping face no more than 50 square inches in size. The surface of the mixture after compaction shall be smooth and true to the established line and grade.

- M. When the air temperature falls below 50°F, extra precautions shall be taken in drying the aggregates, controlling the temperatures of the materials and placing and compacting the mixtures.
- N. No mixtures shall be placed when the air temperature is below 40°F, or when the material on which the mixtures are to be placed contains frost or has a surface temperature ENGINEER considers too low.
- O. No vehicular traffic or loads shall be permitted on the newly completed pavement until adequate stability has been attained and the material has cooled sufficiently to prevent distortion or loss of fines. If the climatic or other conditions warrant it, the period of time before opening to traffic may be extended at the discretion of the Engineer.
- P. Existing drainage patterns shall not be altered by the new pavement construction unless otherwise shown on the Drawings.
- Q. Maintain binder course in a condition suitable for traffic throughout the construction period. Defects shall be repaired within 3 days of notification.
- R. Prepare the binder course for placement of the top course. The binder course shall be regraded, placing additional bituminous concrete where settling has occurred, repairing the existing surface and replacing broken or damaged sections at no additional cost to the Owner. The binder course surface shall be in all respects acceptable to the Engineer before the final pavement is placed. The surface shall then be broom cleaned.
- S. Following preparation of the binder course, apply the tack coat at 0.10 gallons per square yard and place the top course.
- T. Apply joint adhesive to all longitudinal joints for proper adhesion of the new bituminous concrete pavement to the existing.
- U. Pavement markings damaged during the course of the work shall be repaired in accordance with Section 02760.
- V. Following all paving, the area along the edge of all pavements, sidewalks, berms, waterways, etc. shall be backed up with gravel, or loam and seed as required, so that it is flush with the adjacent paving. Whenever possible the final surface of the backup material shall slope away from the surface edge to allow proper sheeting of runoff.

3.2 BITUMINOUS CONCRETE TRENCH REPAIR

- A. Upon completion of the pipe trench backfill as specified in Section 02315, place at a minimum a 12-inch gravel base placed and compacted in 2 even lifts, a 2-inch thick bituminous concrete binder course compacted so the upper surface will provide the proper cross-section with adjacent pavement. **Surface course shall be placed utilizing an approved paving machine by the Engineer.** The Contractor will be allowed to backfill trenches to grade with gravel during the work week, but will be required to install the pavement on these trenches by the end of the work week. Until such time as the permanent pavement overlay is placed, maintain all temporary patch areas by filling in any holes which may develop and adding additional bituminous material to maintain the surface of the temporary patch even with the adjacent pavement.

- B. After a period of 90 days, or such other period as determined by the Engineer, has elapsed since placement of the trench patch, proceed with the permanent pavement overlay.

3.3 FULL-WIDTH MILL & OVERLAY (ONE YEAR AFTER WATER MAIN INSTALLATION)

- A. Prepare the roadway surface (milling) prior to the start of spreading bituminous concrete. This shall include but not be limited to sweeping, repairing, removing of debris, and tack coating the surface of the road to be overlaid.
- B. Prior to the start of spreading the permanent bituminous concrete overlay, prepare the roadway surface by placing a shim coat to eliminate surface rutting and settlement.
- C. Prior to the start of spreading the permanent bituminous concrete overlay adjust all structures for the finish, compacted overlay thickness.
- D. Overlay of Town streets shall be "toed-in" to the existing pavement by sawcutting the width of the street, and installing a 3-foot wide by 3-inch deep groove for the purpose of tying-in the proposed overlay. Cut the existing pavement by means of a saw; jackhammers will then be used to properly remove the pavement within the groove. The groove shall be properly tack coated to provide adequate adhesion to the existing pavement joint.
- E. Immediately after the roadway surface has been prepared, an overlay of Class I bituminous concrete shall be applied to the Town streets to a minimum depth of 1-1/2 inches.
- F. The finished overlay course shall blend smoothly with all rim elevations of catch basins, manhole covers, gate box covers and any other utilities and shall in no way interfere with or alter the existing surface drainage. Driveway aprons which in the opinion of the Engineer are affected by the overlay shall be overlaid in such a manner to maintain current surface drainage along the street gutterline. In no case shall surface drainage from the street be shed onto local driveways.

3.4 BITUMINOUS CONCRETE SIDEWALK AND DRIVEWAY OVERLAY

- A. Prior to the start of the work, sawcut the existing pavement in the vicinity of the work to prevent damage to the pavement outside of the specified paylines and/or the requirements of construction. Sawcut shall be straight and neat in appearance.
- B. Immediately after completing the work, or in no event later than the end of the work day, place and compact a 12-inch gravel subbase in 2 even lifts to a point 2 inches below the surrounding area, or as specified in the Drawings.
- C. A 2 inch thick temporary bituminous concrete top course shall then be placed and compacted so that the upper surface shall provide the proper cross-section for the driveway or sidewalk. Until such time as the final pavement is placed, the CONTRACTOR shall maintain all temporary patch areas by filling any holes that may develop and by adding additional bituminous material to maintain the surface of the trench even with the adjacent sidewalk or driveway.
- D. During the season when hot mixes are not available, 2 inches of cold patch shall be placed and compacted as a temporary surface over the trench. The temporary cold patch repair shall be maintained in good condition until it is excavated and replaced with hot mix.

- E. After a minimum period of 60-90 days after the most recent excavation within the sidewalk or driveway has passed, or longer if a sufficient period has not elapsed for maximum compaction to take place, the CONTRACTOR shall remove a sufficient depth of the temporary surfaces and gravel to provide for the thickness of surface specified. The gravel surface thus exposed shall be fine graded and thoroughly compacted using mechanical tampers. The edges of the existing surface that will abut the repair shall be trued up and cut to smooth and even lines at this time. Cutting shall be done with a saw. The existing paved surface shall be cut back as required by the ENGINEER to firm ground that has not sloughed or sagged into or toward the excavation.
- F. The permanent bituminous concrete shall consist of two (2) 1-1/2" thick courses, furnished and placed as hereafter specified.
- G. A 1-1/2" bituminous concrete binder course shall be installed on the gravel base.
- H. A 1-1/2" bituminous concrete top course shall be installed on this binder course, bringing the repaired trench surface to grade.
- I. The top course shall be placed using a paving box specifically designed for the placement of bituminous concrete.
- J. The mixes shall be placed in accordance with Section 460 of the Massachusetts Department of Public Works "Standard Specifications for Highways and Bridges", 1988 edition, as amended.
- K. Repair shall be neat in appearance and shall blend in with the existing adjoining pavement.

3.5 BITUMINOUS CONCRETE BERM

- A. Install 6" thick compacted gravel base below the area to be repaired.
- B. The berm shall match the existing berm as closely as possible and be either Type 1, 2, or 3 as detailed in the Mass. Department of Public Works Construction Standards 1977.
- C. Closure between berms installed hereunder and existing berm shall be the same shape and texture as the machine installed bituminous concrete berm.
- D. The ends of the existing berm shall be cut with a saw prior to construction of bituminous concrete curb repairs.
- E. Construction methods and procedures for bituminous concrete curb shall be in accordance with Section 500 of the Massachusetts Department of Public Works Standard Specifications for Highways and Bridges", 1988 edition, as amended.

END OF SECTION

SECTION 02920
LAWNS AND GRASSES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Restoration of all vegetated areas disturbed during construction including:
 - a. Lawn areas
 - b. Grass surfaces
 - c. Tree belts
2. Products specified herein include loam, starter fertilizer, lime, and lawn seed.

B. Related Sections

1. Section 01570 – Temporary Erosion Controls
2. Section 02315 – Excavation, Backfill, Compaction and Dewatering
3. Section 02740 – Bituminous Concrete

1.2 REFERENCES

- A. ASTM D5539 – Standard Specification for Seed Starter Mix

1.3 QUALITY ASSURANCE

- A. Seed shall be placed only between the periods from April 15th to June 1st, and from August 15th to October 1st, unless otherwise approved by the Engineer.

1.4 SUBMITTALS

A. Submit the following for approval:

1. Lawn seed mixture including percent by weight of each seed type, and manufacturer/supplier name.
2. Suitable laboratory analysis of the soil to determine the quantity of fertilizer and lime to be applied.
3. Lime and starter fertilizer application rates based on laboratory soil tests.

PART 2 PRODUCTS

2.1 MATERIALS

A. Loam

1. Loam shall consist of fertile, friable, natural topsoil typical of the locality without admixture of subsoil, refuse or other foreign materials and shall be obtained from a well-drained arable site. It shall not be a swampy mulch nor shall it contain excessive quantities of sand or clay. It shall be free of stumps, roots, heavy or stiff clay, stones larger than 1-inch in diameter, lumps, coarse sand, noxious weeds, sticks, brush or other litter.
2. The loam shall have an acidity range, such that its pH ranges from 5.5 to 7.6.

B. Starter Fertilizer

1. Starter fertilizer shall bear the manufacturer's name and guaranteed statement of analysis, and shall be applied in accordance with the manufacturer's directions.
2. Shall be Scott's Starter Fertilizer, or equal, with timed nitrogen release to prevent burning.

C. Lime

1. Lime shall be pelletized type for prolonged time release to soil.
- D. Lawn Seed
1. Lawn seed shall be a fresh, clean, new crop seed. The weed seed content shall be less than 0.5% by weight. The seed shall contain a high percentage of perennial grasses.
 2. Seed shall be Scotts Play Area Mixture, Scotts Pure Premium Sun and Shade Brand (North) Grass Seed Mixture, or equal.

PART 3 EXECUTION

3.1 PREPARATION

- A. The Contractor shall salvage all existing loam, which shall be stockpiled at an acceptable on-site location. Under no circumstances shall existing topsoil be removed from the project site for another use by the Contractor.
- B. The ground surface shall be fine graded and raked so as to prepare the surface of the loam for lime, fertilizer and seed.
- C. The Contractor shall perform a laboratory soil test on the proposed loam before placing any lime, fertilizer, or seed. This work shall be in accordance with ASTM D5539 (Standard Specification for Seed Starter Mix).

3.2 APPLICATION

- A. Fertilizer and lime shall be applied to the surface of the ground in accordance with the manufacturer's instructions, and based on the results of the certified soils test.
- B. The seed shall then be placed using a drop or rotary spreader at the rate recommended by the seed manufacturer for the intended use of the lawn or grass area being restored.
- C. After spreading of the seed, lightly rake the surface to work the seed in. The surface shall then be rolled.

3.3 MAINTENANCE

- A. Maintain loamed and seeded areas by mulching, covering, netting, watering, fencing, etc., until an acceptable stand of vegetation is approved by the Engineer.
- B. Suitable signs and barricades should be placed to protect the seeded areas. After the grass has started, all areas and parts of areas that fail to show a uniform stand of grass for any reason whatsoever, shall be reseeded until all areas are covered with a satisfactory growth of grass.

3.4 SPECIAL CONSIDERATIONS

- A. Following the final top course of paving all pavement edges, waterways, sidewalks, berms, etc. shall be brought to grade with loam, fine graded, raked, seeded, and rolled to the satisfaction of the Engineer. Whenever possible the final surface of the loam backup shall slope away from the surface edge to allow proper sheeting of runoff. The Contractor shall be solely responsible for protecting, maintaining, and repairing this work until a satisfactory start of healthy grass is established.
- B. Upon removal of the haybales and siltation fence, the Contractor shall loam and seed all disturbed areas.
- C. In locations where the project area passes through existing grass, weed brush or tree-surfaced areas that are not covered by a specific lawn repair item, surface restoration shall be as follows:
 1. After completion of backfilling, the existing loam and surface materials, which were salvaged during excavation, shall be returned to the top of the trench.

2. After natural settlement and compaction has taken place, the trench surface shall be harrowed, dragged and raked as necessary to produce a smooth and level surface.
3. The area is then to be sowed with “orchard grass” or “rye grass” or other such materials to hold the soil and produce a growth similar to that existing prior to construction.
4. The cost of repairing the trench surface in this manner shall be included in the Item ‘Loam & Seed’.

END OF SECTION