

Item No. 511
Water Valves & Fire Hydrants

511.1 Description

This item shall govern the valves furnished and installed as indicated on the Drawings. Unless otherwise indicated on the Drawings, all valves 4 inches and larger shall be AWWA-type valves of suitable design and fully equipped for service buried in the earth, without need for further modification and shall be wrapped with 8-mil polyethylene film with all edges and laps securely taped to provide a continuous wrap. Where not indicated, the Contractor may use valves with any type end-joint allowed for fittings of the pipe class being used. Unless otherwise indicated on the Drawings, all valve stems shall be adjusted to situate the operating nut not more than 24 inches below the proposed ground or paving surface of the finished project.

This item shall govern the furnishing of labor, materials, equipment and incidentals necessary to install fire hydrant and appurtenances, operators, bolts, nuts and gaskets.

511.2 Submittals

The submittal requirements of this specification item must include:

- A. Test Data.
- B. Product Catalog Data.
- C. Shop Drawings.
- D. Operation and Maintenance Manuals.
- E. Hydrant cut sheets and Certification of Compliance with AWWA C502 as record data.
- F. Hydrant and flow results from hydrant flow testing in section 511.7 for approval.

511.3 Standards

The applicable provisions of the following standards shall apply as if written here in their entirety:

- A. American National Standards Institute (ANSI) Standards:

ANSI B16.1	Cast Iron Pipe Flanges and Flanged Fittings
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- B. American Society for Testing and Materials (ASTM) Standards:

ASTM A126	Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings
ASTM A307	Carbon Steel Bolts and Studs, 60,000-psi Tensile Strength
ASTM A325	Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A536	Standard Specification for Ductile Iron Castings
ASTM D2000	Classification System for Rubber Products in Automotive Applications

- C. American Water Works Association (AWWA) Standards:

AWWA C105	Polyethylene Encasement for Ductile-Iron Pipe System
AWWA C111	Standard for Rubber-Gasket Joints
AWWA C500	Metal-Seated Gate Valves For Water Supply Service
AWWA C502	Standard for Dry-Barrel Fire Hydrants
AWWA C504, Class 150B	Rubber-Seated Butterfly Valves
AWWA C507	Ball Valves, 6 in. Through 60 in.
AWWA C509	Resilient Seated Gate Valves for Water and Sewerage Systems
AWWA C512	Air-Release, Air/Vacuum, and Combination Air Valves for Waterworks Service
AWWA C514	Air Valve and Vent Inflow Preventer Assemblies for Potable Water Distribution System and Storage Facilities
AWWA C515	Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service
AWWA C530	Standard Specification for Pilot-Operated Control Valves
AWWA C540	Standard for Power-Actuating Devices for Valves And Slide Gates
AWWA C550	Standard for Protective Interior Coatings for Valves and Hydrants
AWWA M51	Air Valves: Air-Release, Air/Vacuum, and Combination

D. NSF International

NSF 61	Drinking Water System Components – Health Effects
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511.4 Materials

The Contractor shall submit descriptive information and evidence that the materials and equipment the Contractor proposes for incorporation in the Work is of the kind and quality that satisfies the specified functions and quality. New Braunfels Utilities' Standard Products Lists (SPL) are considered to form a part of these Specifications. Contractors may, when appropriate, elect to use products from the SPL; however, submittal to the Engineer/Architect (E/A) is still required. If the Contractor elects to use any materials from these lists, each product shall be completely and clearly identified by its corresponding SPL number when making the product submittal. This will expedite the review process in which the E/A, decides whether the products meet the Contract requirements and the specific use foreseen by the E/A in the design of this engineered Project.

The SPL's should not be interpreted as being a pre-approved list of products necessarily meeting the requirements for a given construction Project. Items contained in the SPL cannot be substituted for items shown on the Drawings, or called for in the specifications, or specified in the Bidding Requirements, Contract Forms and Conditions of Contract, unless approved by the E/A. The Standard Product List current at the time of plan approval will govern.

A. Samples, Inspection and Testing Requirements:

All tests and inspections called for by the applicable standards shall be performed by the manufacturer. Upon request, results of these tests shall be made available to the purchaser.

B. Other Requirements:

Each submittal shall be accompanied by:

1. Complete data covering:
 - a. the operator, including type and size, model number, etc.,
 - b. the manufacturer's name and address of his nearest service facility,
 - c. the number of turns to fully open or close the valve
2. Detailed instructions for calibrating the limit stops for open and closed positions, and
3. Any other information that may be necessary to operate and maintain the operator.
4. Complete dimensional data and installation instructions for the valve assembly as it is to be installed, including the operator.
5. Complete replacement parts lists and drawings, identifying every part for both the valve and operator.

511.5 Valves

A. All valves shall be of the close right type.

B. Gate Valves

Gate Valves 4" through 36", including Tapping Valves, shall be resilient wedge type with non-rising stem in strict conformance with AWWA C509/C515 unless otherwise indicated. All valves for potable water service must comply with NSF 61 standards.

Gate Valves larger than 36", including Tapping Valves, shall be double disc, parallel seat internal wedging type valves meeting the requirements of AWWA C500.

1. Quality Assurance

- a. Acceptable Manufacturers
 - i. American Flow Control.
 - ii. M&H.
 - iii. Mueller.
 - iv. Clow.
 - v. U.S. Pipe.
 - vi. Kennedy Valve
- b. Experience Requirements: The manufacturer shall have at least 10 years of experience in the manufacture of valves used in the water and wastewater treatment environment. References and installation list shall be provided on request.

2. Functional Requirements

- a. Stem Seals: All valves shall have approved O-ring type stem seals. At least two O-rings shall be in contact with the valve stem where it penetrates the valve body.
- b. Operation: All valves shall have non-rising stems with a 2" square operating nut, or with a spoke type handwheel when so ordered, turning clockwise to close.
- c. Gearing: Gate valves in 16 inch and larger sizes shall be geared and, when necessary for proper bury depth and cover, shall be the horizontal bevel-geared type enclosed in a lubricated gear case.
- d. Bypass: Unless otherwise indicated, 36 inch and larger gate valves shall be equipped with a bypass of the non-rising stem type which meets the same AWWA standard required for the main valve.
- e. Valve Ends: Valve ends shall be push-on, flanged, mechanical joint, ALPHA restrained joint, as indicated or approved.
- f. Tapping valves shall have inlet flanges conforming to MSS SP-60, with bolt holes drilled per ANSI B16.1 Class 125. Seat rings and body casting shall be over-sized as required to accommodate full size cutters; the outlet end shall be constructed and drilled to allow the drilling machine adapter to be attached directly to the valve.
- g. Gear Case: All geared valves shall have enclosed gear cases of the extended type, attached to the valve bonnet in a manner that makes it possible to replace the stem seal without disassembly and without disturbing the gears, bearing or gear lubricant. Gear cases shall be designed and fabricated with an opening to atmosphere so that water leakage past the stem seal does not enter the gear case.
- h. Valve Body: Double disc gate valves in 36 inch and larger sizes installed in the horizontal position shall have bronze rollers, tracks, scrapers, etc.
- i. Gate: Gate for resilient wedge gate valves shall be ductile iron with rubber-seat compound bonded to the valve gate. Gate for double disc valves shall be ductile iron with bronze mounted wedges and seats.

C. Butterfly Valves:

Unless otherwise indicated, all valves shall conform AWWA C-504 and AWWA C-550 and comply with NSF61 standards, except as modified or supplemented herein.

1. Quality Assurance:

- a. Acceptable Manufacturers
 - i. DeZurik.
 - ii. M&H.
 - iii. CMB/K-Flo.
 - iv. Pratt.
 - b. Experience Requirements: The Manufacturer shall have had successful experience in manufacturing tight-closing, rubber-seated butterfly valves for this type service in the sizes indicated. The Manufacturer shall have at least 10 year's experience in the manufacture of valves.
 - c. Manufacturer's Representative for Startup and Testing: The Valve Vendor or Manufacturer shall provide the services of a competent manufacturer's representative for an indefinite period of time as required to insure proper adjustment, installation, and operation of the valve.
2. Functional Requirements
- a. Valve Bodies: Valves shall be the short body design and shall have flanged connections on both ends unless otherwise called for. Valve bodies shall be constructed of cast iron ASTM A126, Class B or ASTM A48, Class 40 or ductile iron in accordance with ASTM A536, Grade 65/45/12. Valve class shall be suitable for the pressure class of the adjacent pipe in which it is installed or as shown in the valve list herein.
 - b. Valve Discs: Valves shall be of such design that the valve discs will not vibrate or flutter when operated in a throttled position. Valve discs shall be secured to the shafts by means of keys or pins so arranged that the valve discs can be readily removed without damage thereto. All keys and pins used in securing valve discs to shafts shall be stainless steel or monel. Valve discs shall be stainless steel or ductile iron, ASTM A536, Grade 65-45-12 (448-310-12); seating edge shall be stainless steel or other corrosion resistant material.
 - c. Valve Shafts: Valve shafts shall be constructed of wrought stainless steel conforming to ASTM A276 or monel. The ends of the shaft shall be permanently marked to indicate the position of the disc on the shaft.
 - d. All buried valves shall have approved manufacturer's O-ring type or split V type "Chevron" shaft seals. When O-ring seals are used, there shall be at least two O-rings in contact with the valve shaft where it penetrates the valve body.
 - e. On 24 inch and larger valves, the seat shall be completely replaceable and/or adjustable with common hand tools without disassembling the valve from the pipeline. Rubber seats located on the valve disc shall be mechanically secured with stainless steel retainer rings and fasteners.
 - f. Unless otherwise indicated, valves shall be provided with manual operators with vertical stems and 2 inches square operating nut turning clockwise to close and equipped with a valve disc position indicator. All keys or pins shall be stainless steel or monel. Buried valves shall have the valve stems extended or adjusted to locate the top of the operating nut no more than 24 inches below finish grade.
 - g. Unless otherwise indicated, motorized butterfly valves shall be equipped with 460/230 VAC, 3-phase reversing motor operators, extended as required to locate

the center line of the operator shaft approximately 4 feet to 4 feet, 6 inches above finish grade. Operators shall be equipped with cast iron or malleable iron manual override hand wheel with a valve position indicator, local push button controls, lighted status/position indicator, torque and travel limit switches and all switches, relays and controls (except external power and signal wiring) necessary for both local and remote operation.

3. Performance Requirements

- a. Unless otherwise indicated, valve operators shall be sized to seat, unseat, open and close the valve with 150 psi shutoff pressure differential across the disk and allow a flow velocity of 16 fps past the disc in either direction.
- b. Motorized valve motors shall be capable of producing at least 140% of the torque required to operate the valves under conditions of maximum non-shock shutoff pressure without exceeding a permissible temperature rise of 131°F over 104°F ambient (55 degrees Celsius over 40 degrees Celsius ambient); they shall have a duty rating of not less than 15 minutes and shall be capable of operating the valve through 4 1/2 cycles against full unbalanced pressure without exceeding the permissible temperature rise. Motors shall be suitable for operating the valve under maximum differential pressure when voltage to motor terminals is 80% of nominal voltage. Motor bearings shall be permanently lubricated and sealed.

D. Ball Valves:

Unless otherwise indicated, Ball Valves, shall conform to AWWA C507.

Ball valves shall be brass, bronze, stainless steel or PVC as indicated on the Drawings or Details or as approved by the Engineer or designated representative.

E. Air-Vacuum Release Valves:

Unless otherwise indicated, Air-Vacuum Release Valves, Combination Air Valves, shall conform to AWWA C512 and C514. Valves in potable water applications must adhere to NSF 61 requirements.

1. Quality Assurance

- a. Acceptable Manufacturers:
 - i. Vent-O-Mat
 - ii. Vent-Tech
 - iii. A.R.I. Flow Control

2. Air-Vacuum Release Valves

- a. Shall be air-vacuum units having small and large orifice units contained and operating within a single body or assembled unit.
- b. The small orifice system shall automatically release small volumes of air while the pipe is operating under normal conditions. The large air-vacuum orifice system shall automatically exhaust large volumes of air while the pipe is being filled and shall permit immediate re-entry of air while being drained.
- c. Valve body, float, and assembly shall be designed for the pipeline's overall maximum working pressure and shall seat at the minimum pressure.

3. Combination Air Valves

- a. Shall be designed to exhaust large volumes of air as the pipeline is being filled; permit large volumes of air to enter the pipeline during pipeline drainage; release accumulated pockets of air while the pipeline is in operation and under pressure; and dampen surge pressures caused by water column separation or rapid air discharge.
- b. Combination air valves shall be heavy-duty, single-chamber air and vacuum valves with disc floats. Floats shall include discs drilled with the small and large orifices, and an anti-surge float. Internal clearances around the floats shall be equal to the inlet/outlet area. The anti-surge float should be normally opened and have drilled orifices to throttle water flow.
- c. Combination air valve inlet/outlet cross-sectional area shall be equal to the nominal size of the valve. CAV outlet for raw water use shall be fitted with a cover or with a vent pipe where indicated on the Drawings. Combination air valves outlets for treated water use shall be connected to piping to vent air out of the manhole. The vent piping shall extend to 4 feet above the ground or as indicated on the Drawings.

4. Material Requirements

- a. Interior components should be stainless steel. Interior components that are not stainless steel shall be coated in accordance with Specification Item No. 530 "High Performance Coatings."
- b. Valve exterior bodies and covers shall be 316 stainless steel.
- c. Internal bushings, hinge pins, float guide and retaining screws, pins, etc., shall be stainless steel.
- d. Orifice seats shall be Buna-N rubber.
- e. Floats shall be stainless steel, rated at 1000 psi.
- f. Unless otherwise indicated, these valves shall be as included in the Standard Products List.

F. Control Valves:

All control valves to regulate pressure, flow, pump, etc., in New Braunfels Utilities' lines shall be models listed in the Standard Products List (SPL).

511.6 Fire Hydrants

All fire hydrants shall be Dry Barrel, Traffic Model (break-away), Post Type having Compression Type Main Valves with 5 1/4" or 6" opening, closing with line pressure. Approved models are listed on Standard Products List.

New Braunfels Utilities reserves the right to limit purchases of fire hydrants to traffic models equipped with safety flange on the hydrant barrel and stem, manufactured by the following manufacturers providing such products conform to the provisions contained here in:

- A. Mueller Company (Mueller A423 Super Centurion 200)
- B. American-Darling Valve and Manufacturing Company (American-Darling 6-inch B-84-B)
- C. Clow Valve Company (Clow Medallion)

D. EJ (East Jordan Iron Works)

All fire hydrants shall be provided with (1) 5" Harrington Integral Hydrant Storz, "HIHS" or equivalent (approved by NBU engineer).

- A. Mueller – Harrington # HIHS-MLR-50-45 (or Mueller's 5" Quick Disconnect, part # 287304)
- B. American Darling – Harrington # HIHS-WAT-50-45
- C. Clow – Harrington # HIHS-Clow-50-45
- D. EJ (East Jordan Iron Works) – Harrington # HIHS-EJIW-50-45

Applicable Specifications

- A. AWWA C-502 current: "AWWA Standard for Dry-Barrel Fire Hydrants".
- B. NFPA 1963: "Standard for Fire Hose Connections".
- C. ANSI A-21.11 current: "American National Standard for Rubber Gasket Joints for Cast Iron and Ductile Iron Pressure Pipe and Fittings".

Functional Requirements

- A. Design Working Pressure shall be 250 psi or greater.
- B. Inlet shall be side connection hub end for mechanical joint (ANSI A-21.11-current). Shoe shall be rigidly designed to prevent breakage.
- C. Lower Barrel shall be rigid to assure above ground break at traffic feature. Bury length of hydrant shall be four (4) feet minimum, five (5) feet maximum (hydrant lead pipe may be elbowed up from main using restrained joints; flanged joints in lead pipes are not allowed). Flange type connections between hydrant shoe, barrel sections and bonnet shall have minimum of 6 corrosion resistant bolts. Barrel shall have an inside diameter of not less than 7 inches. Hydrant shall have non-rising stem.
- D. Hydrant Main Valve shall be 5 1/4 or 6-inch I.D. Valve stem design shall meet requirements of AWWA C502, with Operating Nut turning clockwise to close. Operating Nut shall be pentagonal, 1 1/2-inch point to flat at base, and 1 7/16 inches at top and 1-inch minimum height. Seat ring shall be bronze (bronze to bronze threading) and shall be removable with light weight stem wrench. Valve mechanisms shall be flushed with each operation of valve; there shall be a minimum of two (2) drain ports.
- E. Traffic Feature shall have replaceable breakaway ferrous metal stem coupling held to stem by readily removable type 302 or 304 stainless steel fastenings. Breakaway flange or frangible lugs shall be designed to assure aboveground break. Breakaway or frangible bolts will not be acceptable.
- F. Outlet Nozzles shall be located approximately 18 inches above ground. Each hydrant shall have two (2) 2 1/2 inch nozzles 180 degrees apart with National (American) Standard Fire Hose Coupling Screw Thread NFPA 1963 and one (1) 5-inch Harrington Integral Hydrant Storz Nozzle, Harrington, Inc. model "HIHS" or equivalent (approved by NBU engineer). Nozzles shall be threaded or cam-locked, O-ring sealed, and shall have type 302 or 304 stainless steel locking devices. Nozzle caps (without chains) and cap gaskets shall be

furnished on the hydrant. The cap nut shall have the same configuration as the operating nut, with exception to the Storz Cap, which shall not have a pentagon-operating nut and shall be attached by cable to the hydrant.

- G. Hydrants shall be Dry-Top Construction, factory lubricated oil or grease with the lubricant plug readily accessible.
- H. Hydrant shall have double O-ring seals in a bronze stem sheath housing to assure separation of lubricant from water and shall have a weather cap or seal, or both, as approved by the Owner, to provide complete weather protection.

Material Requirements

- A. All below ground bolts shall be corrosion resistant. The hydrant valve shall be Neoprene, 90 durometer minimum. The seat ring, drain ring, operating nut and nozzles shall be bronze, AWWA C-502 current, containing not over 16 percent zinc. Break-away stem coupling shall be of ferrous material; its retaining pins, bolts, nuts, etc. of type 302 or 304 stainless steel.
- B. Coatings shall be durable and applied to clean surfaces. Exterior surfaces above ground shall receive a coating of Sherwin Williams' silver metallic paint or approved equal. The coating shall be applied according to coating manufacturer's specifications. Other exposed ferrous metal shall receive asphalt-based varnish, or approved equal, applied according to the coating manufacturer's specifications. Bonnets and caps shall be painted based on NFPS Standard 291 recommendations shown in Figure 1 below per flow testing results after approval by the Engineer.

Bonnet and Cap Colors

Color Name	Code	Color	Available Flow
Red	C		Less than 500 GPM
Orange	B		500-999 GPM
Green	A		1,000-1,499 GPM
Light Blue	AA		1,500 GPM & above

Figure 1: Bonnet and Cap Color Based on Flow Rate Calculated at 20 psi Residual Pressure

511.7 Water Flow Testing for Fire Hydrants

A. Guidelines

These guidelines are to be followed when a building, facility, residential subdivision, or multi-family dwelling units, within the City of New Braunfels or its Extraterritorial Jurisdiction, ETJ, is required to have a water (fire) flow test completed.

All water flow testing criteria for the purposes of these guidelines and any other guidelines shall conform to the International Fire Code as adopted by the City of New Braunfels, NFPA 291.

This guide does not replace, nor supersede any codes and/or ordinances adopted by the City of New Braunfels, or determinations and positions of the Fire Chief or Fire Marshal.

Fire flow testing is the determination of actual flow conditions within a hydrant system. A hydrant system is the system of mains, whether looped or not, capable of providing fire flow to a site. A site may have one or more hydrant systems with different flow and pressure characteristics.

Available fire flow is measured in gallons per minute (gpm) at a residual pressure of 20 psi.

The water system shall pass all construction acceptance testing (bacteriological and hydrostatic) prior to flow testing.

B. Hydrant Requirements

Following is a list of requirements for fire hydrant acceptance.

1. Water system (water mains, valves, services, hydrants and all appurtenances) must be in place and have passed all NBU acceptance testing.
2. Fire hydrant spacing must be in compliance with International Fire Code and local city ordinance for new construction.
3. All fire hydrants must have a 5-inch Storz connection with a standard Storz cap (not a pentagon nut). The cap must be tight fitting so that it cannot be turned or taken off by hand.
4. All fire hydrants must be at a level so that the center of the 5-inch (Storz) connection will be a minimum of 18 inches above the planned finished grade.
5. All fire hydrants must be flow tested following the guidelines set forth in NFPA 291. Flow testing may only be done by a fire sprinkler company (licensed by the State Fire Marshal's Office), fire protection engineer (licensed by the Texas Board of Professional Engineers), or civil engineer (licensed by the Texas Board of Professional Engineers). Flow testing costs and coordination are the responsibility of the Contractor.
6. Engineer to provide NBU with updated CAD file (preferably GPS located, at the very least geospatially located) 3 business days prior to flow testing. NBU will number the new hydrants that will be used for the numbering on the flow testing form.

C. Flow Testing Requirements

Following is a list of steps for fire flow testing.

1. All valves in open position.
2. Follow flow testing procedures listed in NFPA 291 "Recommend Practice for Water Flow Testing and Marking of Hydrants."
3. Input information using NBU's *Fire Hydrant Flow Test Form (Appendix C)*.
4. Results of the flow test will be given to the New Braunfels Fire Marshal's Office, a copy to NBU and the Engineer. (NB Fire Marshal's Office – 424 S Castell Ave; NBU – 355 FM 306)
5. A copy of the state issued engineer license or fire sprinkler license of the person/company who performed the test must be included with the results which are turned in to the Fire Marshal's Office.
6. Flow tests must be able to be duplicated prior to final acceptance by NBU or New Braunfels Fire Department (NBFD).
7. Acceptance of the constructed water system will depend upon NBFD's and NBU's approval of the fire flow(s) of the hydrant(s), among other criteria.
8. NBU field inspector should be consulted prior to testing for observation and coordination purposes. Contractor should give NBU field inspector 48-hour notice prior to any flow testing.
9. NBU field inspector must be on-site during flow testing.

511.8 Construction Methods

A. Setting Valves, Drains and Air Releases

Unless otherwise indicated, main line valves, drain valves and piping, air and vacuum release assemblies and other miscellaneous accessories shall be set and jointed in the manner described for cleaning, laying, and jointing pipe.

Unless otherwise indicated, valves shall be set at the locations shown on the Drawings and such that their location does not conflict with other appurtenances such as curb ramps. Valves shall be installed so that the tops of operating stems will be at the proper elevation required for the piping at the location indicated above. Valve boxes and valve stem casings shall be firmly supported and maintained, centered and aligned plumb over the valve or operating stem, with the top of the box or casing installed flush with the finished ground or pavement in existing streets, and installed with the top of the box or casing approximately 6 inches below the standard street subgrade in streets which are excavated for paving construction or where such excavation is scheduled or elsewhere as directed by the Engineer or designated representative.

Drainage branches or air blowoffs shall not be connected to any sanitary sewer or submerged in any stream or be installed in any other manner that will permit back siphonage into the distribution system. Every drain line and every air release line shall have a full sized independent gate valve flanged directly to the main. Flap-valves, shear gates, etc., will not be accepted.

B. Setting Fire Hydrants:

Fire hydrants shall be located in a manner to provide accessibility and in such a manner that the possibility of damage from vehicles or conflict with pedestrian travel will be minimized. Unless otherwise directed, the setting of any hydrant shall conform to the following:

Hydrants between curb and sidewalk on public streets, shall be installed as shown on standard, with outermost point of large nozzle cap 6" to 18" behind back of curb. Where walk abuts curb, and in other public areas or in commercial areas, dimension from gutter face of curb to outermost part of any nozzle cap shall be not less than 3 feet, nor more than 6 feet, except that no part of a hydrant or its nozzle caps shall be within 6 inches of any sidewalk or pedestrian ramp. Fire hydrants shall not be installed within nine feet vertically or horizontally of any sanitary sewer line regardless of construction.

All hydrants shall stand plumb; those near curbs shall have the 5-inch Storz nozzle facing the curb and perpendicular to it. Hydrants shall be placed with no obstructions within 3' of the pentagonal operating nut. The hydrant bury mark shall be located at ground or other finish grade; nozzles of all new hydrants shall be approximately 18 inches above grade. Lower barrel length shall not exceed five (5) feet. Ground to bottom of connection pipe shall be 4 feet. Barrel extensions are not permitted unless approved by the Engineer or designated representative. Each hydrant shall be connected to the main by 6-inch ductile iron pipe; a 6-inch gate valve shall be installed in the line for individual shutoff of each new hydrant.

Fire hydrants on mains under construction (or out of service) shall be securely wrapped with a poly wrap bag (5 mils or greater) or envelope taped into place. When the mains are accepted and placed in service (or hydrant repaired or replaced) the bag shall be removed.

C. Pressure Taps: Refer to Section 510.3 of Standard Specification, "Pipe".

D. Plugging Dead Ends:

Standard plugs shall be inserted into the bells of all dead ends of pipes, tees or crosses and spigot ends shall be capped. All end plugs or caps shall be secured to the pipe conforming to Section 510.3 of Standard Specification, "Pipe".

E. Protective Covering:

Unless otherwise indicated, all flanges, nuts, bolts, threaded outlets and all other steel component shall be coal tar coated and shall be wrapped with standard minimum 8-mil low density polyethylene film or a minimum 4-mil cross laminated high-density polyethylene meeting ANSI/AWWA Specification C-105-current, with all edges and laps taped securely to provide a continuous and watertight wrap. Repair all punctures of the polyethylene, including those caused in the placement of bedding aggregates, with duct tape to restore the continuous protective wrap before backfilling.

F. Valve Box, Casing and Cover:

Stems of all buried valves shall be protected by valve box assemblies. Valve box castings shall conform to ASTM A48, Class 30B. Testing shall be verified by the manufacturer at the time of shipment. Each casting shall have cast upon it a distinct mark identifying the manufacturer and the country of origin.

G. Air Release Assemblies:

Shall be installed as directed by the engineer.

H. Pressure/Flow Control Valves:

Assemblies shall be installed as indicated.

I. Connections to Existing System:

Refer to Item No. 510, "Pipe" for connections to the existing system.

J. Shutoffs:

Refer to Item No. 510, "Pipe" for shutoffs.

K. Abandonment:

Refer to Item No. 510, "Pipe" for abandonment.

511.9 Measurement

All types of valves will be measured per each. Fire hydrants and drain valves will be measured per each. Pressure/Flow control valve assemblies and both manual and automatic air release assemblies will be measured per each.

Unless indicated otherwise in the Drawings, bury depths that exceed 5.5 feet shall be considered subsidiary to the completed unit.

511.10 Payment

Payment shall include full compensation, in accordance with the pay item established in the bid, for excavation, furnishing, hauling and placing valves and barrel extensions including anchorage and all incidental and subsidiary materials and work; preparing, shaping, dewatering, shoring of trenches, bedding, placing and compacting backfill materials and for all other incidentals necessary to complete the installation, as indicated in the Drawings, complete in place.

Payment for iron fittings and for wet connections are covered in Section 510.6 of Standard Specification Item 510, "Pipe".

A. Valves: Valves will be paid for at the unit bid price for the size and type valve installed, including valve stem casing and cover, excavation and backfill, setting, adjusting to grade, anchoring in place, and other appurtenances necessary for proper operation.

- B. Fire Hydrants: Fire Hydrants installation (and flow testing) shall be paid for at the unit bid price for all fittings, piping, valves, between the main line and the fire hydrant; setting, adjusting to grade, anchoring in place, installing blue hydrant reflectors, and other appurtenances necessary for proper operation. Flow testing shall be coordinated and results recorded by Contractor;
- C. Pressure/Flow Control Assemblies: Pressure control and flow control valve assemblies will be paid for at the unit bid price, including box or vault, setting, adjusting to grade, anchoring in place, adjusting the control device to the required conditions, providing other appurtenances necessary for proper operation, and placing in operation.
- D. Drain Valve Assemblies: Drain valve installation shall be paid for at the unit bid price, including all fittings, piping, and valves between the main line and the drain valve; setting, adjusting to grade, anchoring in place, and other appurtenances necessary for proper operation;
- E. Manual Air Release: Manual air release installations will be paid for at the unit bid price and shall include valves, fittings, pipe, tapping the main, box and cover, and other appurtenances necessary for proper operation.
- F. Automatic Air-Vacuum Valves: Automatic air-vacuum release assemblies will be paid for at the unit bid price and will include the main line tap or outlet, all pipe, valves, fittings, box or vault and cover, and other appurtenances necessary for proper operation.

Payment, when included as a contract pay item, will be made under one of the following:

Pay Item: Valves, _____ Type, _____ Diameter	Per Each.
Pay Item: Fire Hydrants	Per Each.
Pay Item: Pressure or Flow Control Valve Assemblies	Per Each.
Pay Item: Drain Valve Assemblies	Per Each.
Pay Item: Manual Air Release Assemblies, _____ Diameter	Per Each.
Pay Item: Automatic Combination Air/Vacuum Release Valve Assembly, _____ Diameter	Per Each.

END8