SECTION LS 638

WATER DISTRIBUTION SYSTEM

PART 1 – GENERAL

1.1 SUBMITTALS

A. General: Submit the following in accordance with the General Conditions

1. Manufacturers' product data for valves and hydrants.

1.2 OVERALL REQUIREMENTS

A. Comply with requirements of the Lakewood Division of Water for water system operation. A hydrant permit must be obtained from the Lakewood Division of Water. There will be no charge for the permit.

B. Comply with Lakewood Fire Department standards pertaining to hydrant materials, color, hose threads and installation.

PART 2 – PRODUCTS

2.1 DELIVERY, STORAGE AND HANDLING

A. Preparation for Transport: Prepare valves and fire hydrants for shipping as follows:

1. Ensure valves are dry and internally protected against rust and corrosion.

2. Protect valves against damage to threaded ends, flange faces and weld ends.

3. Set valves in best position for handling. Set gate valves and fire hydrants closed to prevent rattling.

4. All valves with stainless steel trim should be checked for loose bolts and tightened if necessary.

B. Storage: Use the following precautions for valves and fire hydrants, during storage:

1. Do not remove 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.

C. Handling: Use a sling to handle valves, including fire hydrants, whose size requires handling by crane or lift. Rig valves to avoid damage to exposed valve parts. Do not use hand wheels or stems as lifting or rigging points.

2.2 MANUFACTURERS

A. All proposed products must comply with specifications herein. Proposed products shall be made by the specified manufacturer or an approved equal.

B. All products shall be of domestic (United States of America) manufacture.

2.3 PIPE AND PIPE FITTINGS

A. The contractor shall submit manufacturer's information that demonstrates that pipe and pipe fitting materials shall be compatible with each other.

B. Pipe & Fittings

1. All ductile iron pipe shall conform to specifications as manufactured by the following: American Cast Iron Pipe, US Pipe & Foundry, Clow Water Systems Co. or approved equal.

2. Pipe and fittings shall have a design thickness in accordance with C-150 A-21.50-76 wall thickness Class 56.

3. Bell and spigot push-on type joint ductile cast iron pipe shall be used, except where specified otherwise. Pipe joints shall conform to Rubber Gasket Joint for Ductile Iron Pressure Pipe & Fittings C-140-A21-11-80.

4. Ductile iron fittings shall conform to AWWA C153/A21.53-00, and shall have a standard wall thickness, cement lined and seal coated in accordance with C-104/A21.4.

5. Bends, tees, crosses and all other fittings shall be cement lined, ductile iron, 350# working pressure.

6. Mechanical joints shall conform to AWWA, C-111 A21.11-85 and be made with manufacturer's own joint lubricant. The Contractor shall furnish and install retained type mechanical joints via Megalug, or equal, on all pipe and fittings at bends, tees, crosses, special fittings, between vertical offsets or bends, on hydrant branches, on valves and hydrant base elbows, up to and including 16-inch (16") size.

7. All bolts and nuts shall be Ductile Iron (ASTM A 536 Grade 65-45-12) or Korten A, or approved equal. No plated bolts shall be permitted. All bolts and nuts shall have three (3) coats of bitumastic coating field applied prior to polyethylene encasement using "Black Dragon" as manufactured by J.C. Witlam, or approved equal. Automotive undercoat shall not be accepted.

8. Polyethylene encasement shall be used on all mechanical joints, retained mechanical joints, flanges, victaulic and compression type bolted sleeved couplings and all pipe and fittings having bolts or other type of fasteners in joint construction and pipe and fittings, as shown on the Contract Drawings, or where required, shall be polyethylene encased. Pipe, fittings and other joints that are bonded joints need not be polyethylene encased. Requirements contained in "POLYETHYLENE ENCASEMENT FOR DUCTILE-IRON PIPING FOR WATER AND OTHER LIQUIDS," and all subsequent amendments thereto, shall be followed. Mechanical Joints, Retained Mechanical Joints and all bolted joints shall have double Polyethylene Encasement of Class "C" (black) film, method "C" doubling sheet and providing one foot (1') minimum overlap on pipe or fitting on both sides of joint. All pipe and fittings, where shown on the drawing, or where otherwise required to be polyethylene encased, shall be encased using Class "C" film, Method "C".

9. All exposed or damaged coatings, and all bolts for mechanical joints, retained mechanical joints, flanges, victaulic or compression type bolted sleeved couplings are to be field painted with three (3) coats of bitumastic coating field applied prior to polyethylene encasement using "Black Dragon" as manufactured by J.C. Witlam, or approved equal. Automotive undercoat will not be accepted.

10. All sleeve couplings shall be Dresser – style or approved equal.

11. Copper Service Branch pipe shall be Type K in accordance with ODOT Item No. 748.05.

C. Pipe Requirements

1. Pipe shall be cement mortar lined, ductile-iron, mechanical joint or push-on joint fittings with rubber gaskets in accordance with AWWA C600.

2. Damaged coatings and all bolts and nuts for mechanical joints, retained mechanical joints, flanges, victaulic or compression type bolted sleeved couplings shall be cleaned and painted with three (3) field coats of "Black Dragon" as manufactured by J.C. Witlam, or approved equal. Polyethylene Encasement shall be securely taped shut around pipe and fittings.

3. All bolts and nuts shall have three (3) coats of "Black Dragon" as manufactured by J.C. Witlam, field applied, prior to polyethylene encasement.

4. The outside of the spigot and inside of the bell shall be clear of excess coating, wire-brushed and dry before jointing.

5. Any pipe dropped during unloading or installation shall be marked with paint and immediately removed from the project. Dropped pipe will not be accepted.

2.4 VALVE AND VALVE BOXES

A. Gate valves shall be manufactured in full compliance with the standard specifications for "Gate Valves for Water and Sewerage Systems" of the American Water Works Association (AWWA) C500-86 or latest revision thereof. Valves shall be resilient wedge gate valves, open right, mechanical joint type, Mueller A-2360, American 2500, and East Jordan Flowmaster.

B. Water Valve Boxes: All water boxes shall meet City of Cleveland standards. Square #3 boxes for main line valves. Round #2 boxes for hydrant valves.

C. Corporation valves, curb boxes and curb valves: The Contractor shall furnish and install the appropriate size brass compression fittings for copper tube type corporation valves. They shall either be Hayes No. 5200 CF or Ford No. FB1000, or Mueller "300" No. 25008 ball type Corporation Valve. The Contractor shall also furnish and install the appropriate size brass compression fittings for copper tube type curb stops. They shall be Hayes 5045 CF x CF or Ford No. B44-333 or Mueller No. B25209 Curb Stop. The Contractor shall furnish and install matching cast

iron curb boxes with threaded shaft capable of telescoping 50” to 70: and adjusted to final grade.

2.5 TAPPING SLEEVES AND VALVES

A. Tapping Sleeves

1. The tapping sleeves shall be properly sized to fit the existing cast/ductile iron pipe to be tapped. The outside diameter of the existing pipe shall be determined by the field measurements made by the Contractor.

2. Tapping sleeves shall have a minimum working pressure rating of 175 psi with a flanged outlet to receive the tapping sleeve. The tapping sleeve shall have a Mechanical Joint Bell outlet.

3. Tapping sleeves shall be of the size indicated on the Drawings and shall be made of:

   a. Ductile Iron two-part bolted compression seal type, with sealing gasket of rubber type, with maximum outlet size one (1) nominal pipe diameter less than pipe to be tapped; or

   b. Gray or Ductile Iron two-part bolted mechanical joint type; or

   c. Stainless steel tapping sleeves with full circumferential gasket, similar to Smith-Blair 665 (w/all 304 stainless steel hardware, 304 stainless steel flange).

4. All bolted mechanical joint type tapping sleeves and mechanical joint bell outlet tapping sleeves shall be polyethylene wrapped in accordance with AWWA C105/A21.5-82, Class “C”, Method “C”.

5. Mechanical Joint Type Tapping Sleeve – Tapping sleeves for cast/ductile pipe shall be of Gray or Ductile Cast Iron two-part bolted type having Ductile-Iron Split-Gland Mechanical Joint Ends. Stainless steel tapping sleeves with full circumferential gaskets are permitted.

6. Tapping Sleeve Outlet – Outlet of tapping sleeve shall be flanged to receive flange end of tapping valve and shall be designed to safely withstand a working pressure of 150 psi and test pressure of 225 psi. Outlet of tapping sleeve shall be furnished with a drilled and tapped iron pipe thread and plugged in the shop with Gray or

Ductile-Iron threaded plug, before shipment. Iron pipe threaded outlet shall be for tapping sleeve installation pressure test before tapping. Bolting material for tapping sleeve shall meet the requirements for valves.

B. Tapping Valves

1. Tapping valves on pipe sizes through 16-inch (16") shall meet the specifications for Gate Valves, except that oversized seat rings shall be provided to permit the use of full-sized cutters through the valve. One end of the tapping valve shall be flanged to mate with the tapping sleeve. The outlet end of the tapping valve shall be provided with special provisions for bolting onto the tapping machine. Outlet end of tapping valve shall have a retained mechanical joint.

2. Tapping valves for use in buried locations shall be operated with wrench nuts and shall open by clockwise rotation of the operating nut. Bolts for flanged joints shall conform to specifications.

2.6 FIRE HYDRANTS

A. The Contractor shall provide all excavation, sheeting, shoring and backfilling and the furnishing of all labor, materials, tools and appliances necessary for the installation of each hydrant. Hydrants shall be Mueller A-463 Centurion, Lakewood/Cleveland Standard Option 060, 5¼" x 5'6" hydrant traffic model. All hydrants shall meet or exceed AWWA C502, Latest Revision, one 4" and two 2½" Cleveland spec. nozzles.

2.7 CONCRETE BLOCKING

A. Items noted as concrete blocking shall consist of solid concrete masonry units rated for structural use and shall include hardwood wedges as required to insure no joint movement when system is under test and operating pressure.

PART 3 – EXECUTION

3.1 PROJECT CONDITIONS

A. Site Information: Perform site survey, research public utility records and verify existing utility locations. Verify that water service piping can be installed in compliance with the original design and referenced standards.

3.2 SEQUENCING AND SCHEDULING

A. Coordinate service connections to public water mains with City.

B. Coordinate with other utility and paving work.

3.3 INSTALLATION OF WATER LINE PIPE AND PIPE FITTINGS

A. Execution of Pipe Trench

1. All excavation machinery shall be appropriate for the confines of the work site. Damage to surrounding trees, walks, aprons or any other structure or landscaping not scheduled for removal is UNACCEPTABLE. Hand methods may be required to prevent such damage. The City shall have the right to cause the contractor to change excavation equipment if such damage has occurred or will occur at no charge to the City. All damage caused by the contractor's actions shall be replaced in kind at no charge to the City. All required tree trimming shall be as approved by the City Forester.

2. The trench shall be excavated to the alignment and depth required and only 50 feet in advance of pipe laying, or as The City of Lakewood shall permit. The contractor is responsible for trench shoring design that complies with all OSHA requirements. The contractor shall supply and maintain at the site dewatering equipment. Dewatering discharge shall be directed to natural drainage channels, or to sewers and shall include all EPA required silt barriers and filters.

3. Bedrock, boulders and stones shall be removed to provide a clearance of at least nine inches (9") on each side of all ductile iron pipe and water system fittings.

4. Excavations below trench subgrade in bedrock or boulders shall be filled to subgrade elevation with approved material and thoroughly compacted at no additional charge to the City.

5. Provide minimum cover over pipe of 60 inches below finished grade and as detailed in the plans. Provide minimum separation from catch basin structures of 36 inches.

6. Trenches shall in every case be of sufficient width to allow for specified pipe clearances, to permit solid compaction of fill under and around pipes, to permit satisfactory construction of all appurtenances and for such sheeting and shoring, pumping and draining as necessary.

7. The maximum trench width shall not exceed forty inches (40”).

8. The trench shall have a flat bottom conforming to the grade to which the pipe is to be laid. Grade trench bottom to provide a smooth, firm, stable foundation throughout the length of the piping.

9. When the trench bottom at subgrade is soft or unstable as determined by the City, the trench shall be undercut and filled to pipe foundation grade with approved compacted backfill material.

10. Any part of the trench undercut without City authorization shall be corrected at the contractor’s expense with approved fill and thoroughly compacted.

11. Adequate clearance for properly jointing pipe laid in rock and soil shall be provided at all bell and fitting locations.

B. Bedding and backfill shall be placed per Item LS 2300, Earthwork

C. Laying of Pipe

1. Proper implements, tools and appliances for the safe and convenient handling and laying of the pipes and fittings shall be used. Great care shall be taken to prevent the pipe coating and fittings from being damaged, particularly on the inside of the pipes and fittings, and any such damage shall be remedied as directed. All pipes and fittings shall be carefully examined by the Contractor and the City’s representative for defects just before laying, and no pipes or fitting shall be laid which are known to be defective.

2. If any defective pipe is discovered after having been laid, a new piece shall be furnished and installed by the Contractor at the site of the work at no cost to the City.

3. Each pipe shall be jointed as it is placed in its permanent position and as each fitting is attached.

4. The pipe shall be laid to grade for full bearing of the barrel of the pipe upon the bedding material.

5. Adjustments to nominal alignment shall be made as necessary to place and adjust fittings, to secure proper alignment, to deflect pipe from a straight line as required to avoid obstructions and to plumb stems or for other reasons. The degree of deflection shall be within the tolerances stated by the material manufacturers.

6. At times when pipe laying is not in progress, the open ends of the pipe shall be closed by approved means, and no trench water shall be permitted to enter the pipe. No pipe shall be laid in water or when conditions or the weather are unsuitable for such work, except by permission of The City of Lakewood. Pipe interior shall be kept clean of all foreign matter before lowering, and the inside shall be kept clean by approved means during and after jointing.

7. The Contractor shall take every precaution against movement of the installed pipe due to water coming into the trench, through trench caving or any other event. In case of such movement, the Contractor shall take all measures necessary to replace damaged materials.

8. Provide a minimum horizontal separation of ten (10) feet, measured outside to outside, between new watermain and sanitary or combined sewer if field conditions permit.

3.4 TIE-IN OF NEW MAIN TO EXISTING MAIN(S)

A. All Tie–Ins shall be performed between the hours of 10:00 P.M. and 7:00A.M. unless otherwise approved by The City of Lakewood

3.6 INSTALLATION OF VALVES AND FITTINGS

A. Operation of the valve through the valve box shall be maintained throughout the project. City crews shall verify valve operation at conclusion of the project. Contractor shall adjust or repair all valve boxes that are inoperable. This item includes adjusting the valve box, excavation, tamping earth under the boxes, backfill and, for all labor, equipment, tools and incidentals necessary to complete this item.

B. Opening and closing of all line valves on existing mains for making connections, tests or any other causes shall be done by the City of Lakewood Water Department. Sufficient notice shall be given to the City by the Contractor so that the work may be done with a minimum of inconvenience to the public and delay to the Contractor.

C. Mechanical (locked) joints shall be used on all buried valves three-inch (3") size or larger. A locking gasket (ANSI/AWWA C111/A21.11) will be used when a push-on joint is within 25 feet of a mechanical joint. Use threaded and flanged end valves for installation in pits and inside building.

D. AWWA-Type Gate Valves shall comply with AWWA C600; open right (clockwise). Valve box lid shall be flush with surrounding pavement. Install buried valves with stem pointing up and with cast-iron valve box.

E. Curb box installation will be accepted when the City, the Contractor and the inspector have removed the top and actuated the valve following concrete installation or lawn restoration.

1. The City of Lakewood's representative will designate damaged curb boxes that shall be replaced in kind by the Contractor.

2. No concrete shall be placed on top of a curb box. Contractor shall demonstrate that all curb box lids and valves function properly before final payment will be made.

3. Whenever a curb box is in a driveway apron, the Contractor shall remove and replace the affected area with ODOT Item 304 to provide temporary access to residents, until such time as permanent repairs can be made.

4. The Contractor shall remove all existing curb boxes as part of new water service connections. If circumstances should exist where curb boxes cannot be removed, they shall then be broken off at least eighteen inches (18") below grade and filled with sand or other suitable material.

3.7 INSTALLATION OF CONNECTIONS TO WATERMAIN

A. Size and location shall be as indicated on the plans.

B. The opening and closing of all line valves on existing mains for making connections, tests or any other causes shall be done by the City of Lakewood Water Department and sufficient notice shall be given to the City by the Contractor so that the work may be done with a minimum of inconvenience to the public and delay to the Contractor.

C. Residents shall be given twenty-four (24) hours' notice by the Contractor's forces prior to service interruption for the purpose of connecting existing house connections to new main.

1. Under no circumstances shall the contractor leave any residences without water supply through their supply lines overnight.

D. The ductile iron pipe shall be thoroughly cleaned in the area to be covered by the tapping sleeve. The sleeve shall be installed horizontal for two-inch (2") size and above and 45 degrees for sizes below two inches (2"). All bolts shall be tightened.

E. All exposed ferrous metal surfaces of buried tapping sleeves and valves shall, after installation, be cleaned and painted with two (2) field coats of "Black Dragon" as manufactured by J.C. Witlam, Painting shall be according to the manufacturers specifications. Mechanical joint type tapping sleeve and valve shall be polyethylene encased.

F. Installation of a Tapping Valve shall include furnishing and installation of a valve stem extension, if required, and valve box complete.

G. All water service connections shall be accomplished by using trenchless methods unless otherwise approved by the City of Lakewood. In no case shall any portion of the new copper service line from the corporation tap to the curb stop be less than four feet (4'0") below finished grade.

3.8 FILLING ABANDONED VALVE BOXES

A. The Contractor shall remove all abandoned line valve and hydrant valve boxes a minimum of one foot (1') below finished grade, fill with concrete and cover valve box rims.

3.9 INSTALLATION OF CONCRETE BLOCKING

A. Provide thrust blocking for tees, plugs and caps, bends, crosses, valves and hydrant branches and as shown on the plans. The adequacy of all such blocking installations to prevent joint movement while system is under test or operating pressure is the sole responsibility of the contractor.

3.10 INSTALLATION OF FIRE HYDRANTS

A. Hydrants shall be located so as to provide complete accessibility and in such a manner that the possibility of damage from vehicles or injury to pedestrians shall be minimized. Hydrants shall be set 300 feet apart or as close to 300 feet as possible. Unless otherwise directed, the setting of any hydrant shall conform to the following:

1. When placed behind a curb, the hydrant barrel shall be set so that the center of the barrel will be not less than three feet (3') nor more than four feet (4') from the gutter face of the curb.

2. When set in the tree lawn space between the curb and the sidewalk or between the sidewalk and the property line, no portion of the hydrant or nozzle cap shall be within six inches (6") of the sidewalk.

3. Each hydrant shall be installed immediately following the installation of each hydrant tee.

4. The hydrant shall stand plumb with the primary nozzle pointing toward curb. The Contractor shall release swivel head bolts and adjust hydrant nozzles to face curb at proper angle. Hydrants without swivel heads shall be adjusted by the Contractor, where necessary, to correct angle of nozzle with curbing.

5. The hydrant shall be provided with proper drainage by filling around the base with crushed limestone to at least sixteen inches (16") above the drain opening. If necessary, the trench shall be widened and deepened on each side of the hydrant base and such space shall be filled with a sufficient quantity of #57 crushed limestone to absorb all water to be drained from hydrant when valve is closed.

6. Then hydrant shall be set on concrete blocking or similar approved foundation and the base of the hydrant well braced against unexcavated earth at the pipe with Megalug retainer glands.

7. The hydrant shall be thoroughly cleaned of dirt or foreign matter before setting and thoroughly flushed after all testing of the main has been completed.

8. Valves shall be set plumb and located as directed by the City. Valves shall be protected from freezing. See construction drawings for details.

9. Contractor shall loosen all caps and re-tighten finger tight.

3.11 WATERMAIN TESTING AND DISINFECTION

A. Water system disinfection shall conform to AWWA C651.

1. Pressure Testing of Main: All pressure testing shall conform to AWWA C600.

a. After the pipe has been installed, the valved section shall be subjected to a minimum hydrostatic pressure of 175 pounds per square inch for a period of 2 hours.

b. The Contractor shall provide temporary restraints, blocking, etc., necessary to ensure proper pressure testing of the main without damaging the installation.

c. Any visible joint leaks shall be tightened and any defective material shall be removed and replaced with sound material at the Contractor's expense. The hydrostatic pressure test will then be repeated.

d. After pressure tests, the Contractor shall depressurize the main and all appurtenances and protect from freezing. The 48 hour chlorine contact exposure time will commence after all pressure testing is complete.

2. Final Flushing and Testing:

a. After the pipe has been pressured tested and received a final flushing, bacteriological sampling will be performed by the City. Initial sampling shall not be scheduled for days preceding weekends or holidays.

b. Chlorine tablets will be provided by the Contractor and shall be administered in a manner consistent with AWWA 651-05 Sec. 4.4.2.2.

c. Filling and contact time to be in conformance with AWWA C651-05 Sec. 4.4.2.3, except that heavily chlorinated water shall remain in the pipe no less than 48 hours.

d. The Contractor shall thoroughly flush all chlorinated water from the newly laid main and from its extremities. Special attention is called to AWWA C651-05 Sec. 4.5.2, *Disposal of heavily chlorinated water*. The flushing velocity in the main shall be a minimum of 2.5 ft/sec. The flushing shall be done until the tests prove that the flushing replacement water throughout its length is equal to the water quality served to the public from the existing water supply system, both chemically and bacteriologically. There will be no testing cost to the Contractor for sections of main that pass these tests.

e. Samples shall be taken from specifically installed flush and sample points.

PART 4 – PAYMENT

4.1 METHOD OF MEASUREMENT

A. City of Lakewood will measure and pay for Ductile Iron Pipe and Copper Service Branch by the actual length of pipe installed. Payment for these items shall be considered full compensation for all labor and material including all pavement removal, trench cut-back removal, excavation, removal of all temporary backfill and/or pavement, open-cut or boring/jacking operation, temporary backfill, permanent backfill testing and the installation of all connections unless itemized separately. Measurements of pipe will not include the length of valves, fittings, or hydrants, etc. Fittings are paid under a separate item.

B. The City of Lakewood will measure and pay for Water Service Connections by the number of each installed. Payment for these items shall be considered full compensation for all labor and material including all Corporation Valves tapped and installed into the new main, Curb Valves connected to existing service line and Curb Valve Riser Boxes installed and adjusted to final grade after all construction is complete.

C. The City of Lakewood will measure and pay for Fire Hydrants, Tees, Anchoring Tees, Caps, Sleeve Couplings, Reducers, Offsets, Valves and Elbows by the number of each installed. Payment for these items shall be considered full compensation for all labor and material necessary to ensure a complete installation and shall include the making of all connections.

D. The City of Lakewood will measure and pay for Tie In, As Per Plan as the extra labor, time and equipment required to perform the connection of the new watermain to the existing main on an adjacent street. Payment for this item shall be considered full compensation for all labor, equipment and extra time including all resident notification, pavement removal, trench cut-back removal, excavation, exposing, shoring and avoiding existing utilities, removal of all temporary backfill and/or pavement, cutting or tapping the existing water main, open-cut or boring/jacking operation, temporary backfill and permanent backfill. All fittings, valves, hydrants, etc., shall be itemized and paid under a separate item.

4.2 BASIS OF PAYMENT

A. The City will pay for accepted quantities at the contract unit prices as follows:

Item	Unit	Description
LS 638	Foot	___ inch Ductile Iron Pipe
LS 638	Foot	___ inch Copper Service Branch
LS 638	Each	___ inch Water Service Connection
LS 638	Each	___ inch Tee
LS 638	Each	___ inch x ___ inch Anchoring Tee
LS 638	Each	___ inch Cap
LS 638	Each	___ inch Sleeve Coupling
LS 638	Each	___ inch Valve and Box
LS 638	Each	___ inch x ___ inch Reducer
LS 638	Each	___ inch 45-degree Elbow
LS 638	Each	___ inch Offset
LS 638	Each	6” Fire Hydrant, Complete, as per plan
LS 638	Each	Fire Hydrant Assembly Removed and Salvaged
LS 638	Each	Valve and Valve Box Removed and Salvaged
LS 638	Lump Sum	___ Tie In, as per plan
LS 638	Lump Sum	Concrete Block for blocking and bracing
LS 638	Lump Sum	Hardwood Lumber for blocking and bracing
LS 638	Each	Hydrant Riser

END OF SECTION LS 638