

**PART 6
STANDARD SPECIFICATIONS
FOR WATER MAIN CONSTRUCTION**

CITY OF ONALASKA, WISCONSIN

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SECTION 601: GENERAL

601.1 DESCRIPTION

The Contractor is to make the required excavation for laying the water pipe and appurtenant structures; to do all ditching, diking, pumping, bailing, draining, and laying under drain if required, all sheeting, shoring, bracing, and supporting, all fencing, all rock excavation, lighting, and watching; to make all provisions necessary to maintain and to protect buildings and other structures, fences, water pipe, gas pipe, sewers, culverts, conduit, railways, and any other structures; to repair all damage done to such structures at their expense; to provide bridges, fences or other means of maintaining travel on intercepted streets and roads in which the trenches are excavated; to construct all foundation, all brick, concrete, stone and timber work; to set in place all iron work; to build all roadways, refill all trenches; to clear away all rubbish and surplus material, and to furnish all materials, all tools, equipment, and labor required to build and put in complete working order the specified section of water pipe as per plans and these and AWWA Specifications.

It is understood and agreed that the Contractor has, by careful examination, satisfied himself as to the nature and location of the work, the conformation of the ground, the character, quality and quantity of the materials to be encountered, the general and local condition and all other matters which can in any way affect the work under this Contract. It being further understood any expense accrued for such item as de-watering, rock excavation, etc. shall be included in price bid per linear foot of pipe installed.

Contractor shall be responsible for protecting, relaying, or renewing any water main, storm sewer, catch basin, catch basin lateral, sewer lateral, water lateral, sanitary sewer, manholes, and appurtenances which may be lost or damaged during construction. It is further understood any cost for above said items not specifically itemized in bid proposal be charged to cost bid per linear foot of pipe installation.

Contractor shall notify Police, 911 and Fire Department when streets are to be closed.

601.2 APPROVAL TO COMMENCE WORK

The following requirements must be fulfilled before grades are set and approval is given to commence work:

- a. Contract forms to be completely executed.
- b. Notice to utilities given . see %Notification of Utilities.+
- c. Approval from board of Public Works regarding detouring of traffic, closing of streets and alleys, City facilities and services, shall be obtained by the Contractor.
- d. Assignment of inspector.
- e. Setting of line and grade.

601.3 JOB OFFICE

Portable job office shall be furnished by the Contractor during cold weather operations when requested by the Engineer. Suitable desk and bulletin board shall be provided as well as adequate lighting and heating facilities. The office shall be available to City inspectors and other personnel designated, at all times, and shall be placed and kept convenient to the location of the work.

END OF SECTION

SECTION 602: MATERIALS

602.1 PIPE, GASKETS & FITTINGS

All water main pipe, gaskets, fittings, and specials shall conform to AWWA Specifications latest edition.

All piping shall be installed with Class ~~B~~+bedding.

All water main connections and fittings shall require mechanical joints.

The price bid for pipe shall include any sleeves and labor needed to make connections to existing main.

Ductile iron pipe shall meet AWWA C-150 for thickness design and C-151 for material. Pipe thickness shall meet pressure Class 350 PSI for normal service zone, having the following nominal wall thickness for up to 10 feet of bury. For depth less than 3 feet, see plans or Special Provisions. All ductile iron pipe shall be cement lined in accordance with AWWA C-104 (latest designation).

6 inch ductile iron .	0.25 inch wall
8 inch ductile iron .	0.25 inch wall
10 inch ductile iron .	0.26 inch wall
12 inch ductile iron .	0.28 inch wall
14 inch ductile iron .	0.31 inch wall
16 inch ductile iron .	0.34 inch wall
18 inch ductile iron .	0.36 inch wall
20 inch ductile iron .	0.38 inch wall
24 inch ductile iron .	0.43 inch wall

High service zone pipe thickness shall meet thickness Class 52.

All ductile iron fittings shall conform to AWWA C110 latest designation, specifications for the size indicated on plans. All fittings shall have a pressure rating of 350 psi, shall be cement lined in accordance with AWWA C-104, and shall be mechanical joint. All fittings shall have an exterior strap or cable for electrical conductivity.

In lieu of strapping of the joints and fittings, conductivity may be achieved by use of American Conductivity Gaskets. The conductivity gaskets with copper inserts may be installed throughout the system to provide conductivity. The system must pass the conductive tests as specified.

All gaskets for ductile iron pressure pipe and fittings shall conform to AWWA C-111, latest designation specifications. The gaskets and joints shall have the same pressure rating as the pipe or fitting of which they are a part.

All abandoned pipe shall have their ends plugged with brick and mortar.

602.2 POLYETHYLENE ENCASUREMENT

When preliminary soil investigations indicate the existence of potentially corrosive soils, the Contractor shall be required to use polyethylene encasement on all pipe, fittings, valves, and other appurtenances. If no potentially corrosive soils exist on the project site, polyethylene encasement shall not be required.

When called for on the Plans or Special Specifications the encasement shall be applied to all pipe, fittings, valves, and other appurtenances. The encasement shall be in tube or sheet form sized for each pipe diameter, 8 mil. thickness, and conform to AWWA C-105, latest designation, specifications.

The polyethylene encasement shall prevent contact between the pipe and surrounding backfill and bedding material, but is not intended to be airtight or watertight. All rips, punctures, or other damage shall be repaired with adhesive tape or with a short length of new encasement wrapped around damaged area secured in the same manner as overlaps. Overlaps shall be a minimum of 1 foot at the end of each section and shall be secured by use of adhesive tape, plastic string, or other material capable of holding the encasement in place until backfilling operations are completed.

Polyethylene encasement will be paid for at the bid price per lineal foot of pipe covered.

602.3 HYDRANTS

All hydrants shall conform to the AWWA Specifications latest edition ANSI/AWWA C502 Dry-Barrel Fire Hydrants (will be referred to as AWWA C502).

AWWA C550 Protective Interior Coatings for Valves and Hydrants (will be referred to as AWWA C550).

All hydrants shall have 6 inch mechanical joint connections and not less than a 5 inch valve opening. The internal diameter of the standpipe shall not be less than 5.5 inches in any place.

Each hydrant will have one 4 inch steamer nozzle with La Crosse Pattern Threads and two 2 ½ inch brass hose nozzles with National Standard Thread. Hydrants shall be of sufficient length so that the top of the hydrant shall be 3 feet above ground or curb grade and not less than 26 inches from the grade to the center of the hose connection.

Hydrants furnished under this Contract must be self-draining and the valve and stem must be capable of being withdrawn through the barrel. They shall be a type now in use by the City of Onalaska (Waterous Pacer Breakaway Model WB-67 or approved equal) with a 22 inch top extension, with weather shield and 6 inch mechanical joint connections. Hydrants will have a bury of 7 feet, 6 inches unless listed otherwise in the Special Specifications.

All hydrants shall be set vertically plumb and be properly braced in insure against movement during backfilling operations. A minimum of 5 cubic feet of clean gravel (3/4+to 1+size) shall be placed around the shoe and drain of all hydrants and covered with two layers of approved plastic (8 mil. thick) to keep the voids open. Each hydrant shall be connected to the main with a 6 inch branch controlled by an independent 6 inch valve. The branch between the hydrant and valve will be at least 3 feet long and the valve will be installed with a valve box. The valve will conform to AWWA C509 and Onalaska Specifications. All joints on the branch from the main to the hydrant will be restrained using EBAA Iron, Inc. Megalug TM retainer glands or approved equal.

The manufacturer shall furnish the City an affidavit stating that the hydrant and all materials used in its construction conform to the applicable requirements of AWWA C502 and Onalaska Specifications, and that all tests specified therein have been performed and that all test requirements have been met.

602.4 VALVES

All valves shall conform to the AWWA Specifications, latest edition.

ANSI/AWWA C509 Resilient-Seated Gate Valves, 3 inch through 30 inch NPS, for Water and Sewage will be referred to as AWWA C509.

AWWA C550 Protective Interior Coating for Valves and Hydrants will be referred to as AWWA C550.

Valves shall be resilient-seated gate valves. All valves shall have mechanical joint connections unless otherwise approved by the Engineer.

Resilient-Seated Gate Valves:

Valves shall meet or exceed AWWA C509. The resilient-seated gate valve shall have the gate coated with a bonded elastomer, which also forms a seal on the cast iron valve body when the valve is in the closed position. When the valve is closed the seal is to allow no water to pass the valve at rated differential pressure. The valve shall be operated by turning a 2 inch square operating nut attached to a corrosion resistant bronze stem, acting through a bronze stem nut, fixed into the disc.

All internal parts will be accessible without removing the valve body from the pressure line.

All cast iron internal parts shall be coated completely with a corrosion resistant coating.

The internal diameter of the water passageway shall be at least as large as the pipe inside diameter it is intended to be used with.

Each valve shall be tested by the manufacturer per current C509 requirements.

The only resilient-seated gate valves that will be accepted are:

American Darling CRS 80	Clow Corp. F6100
Kennedy Ken-Seal	Mueller Co. A2370 Series
M&H (Dresser) 3067-01	US Pipe Metro Seal
Waterous Co. 500 Series	

The manufacturer or vendor shall furnish the City an affidavit stating that the inspection and all the specified tests have been made and that the results thereof comply with the requirements of AWWA C509 and C550.

Resilient-Seated valves will be installed with valve boxes unless a manhole is called for on the plans or bid proposal.

602.5 VALVE BOXES

Type F (7' bury)

All valve boxes shall be screw type having a 5 ¼ inch shaft diameter.

Valve boxes shall be cast iron similar to the following: Cast Iron-Tyler 6860 Series or Standard #6 Base extension 59A Tyler, center section 60A Tyler, top section 26T, cover #145462 5 ¼ inch Drop Lid marked "Water".

Valve boxes shall be set so that the bottom of the base section is the same elevation as the top of the stuffing box of the valve, shall be centered on the operating nut, and shall not touch the body of the valve in any way with a minimum of 2 inches of clearance.

The Contractor will provide proper length valve boxes and is responsible for checking the plans and determining the lengths needed prior to ordering boxes.

602.6 DEFECTS

Hydrants and valves shall be free from any defects whatsoever. They shall be uniform in size as to bore and thickness of metal and shall have full waterways and easy bends. If defective during the one-year guarantee period, all replacement costs, including the new hydrant or valve, removal of old, labor, and equipment, removal of debris, etc., shall be the responsibility of the Contractor.

602.7 FINISH

All hydrants and valves shall be thoroughly cleaned and with no lumps left in either the barrels or sockets. They shall be free from rust and shall be painted or coated with a material and in a manner conforming to the latest AWWA Specification.

602.8 MANHOLES

Manholes shall be of precast concrete only. Construction with 6 inch solid concrete block shall only be allowed when pre-approved by the Engineer.

Manholes must be built of such dimensions as are represented on the accompanying plans, unless otherwise directed by the Engineer as the work progresses. Shop drawings shall be submitted and will require Engineer approval.

Unless otherwise specified in the Special Specifications, precast manholes will be used and shall conform to ASTM Specifications C478, latest designation. Manholes will have rubber gasket joints or use 1 inch square Butyl joint sealant.

Adjustments to grade are to be made with reinforced concrete precast rings. All manhole castings and Valve Boxes shall be adjusted to final plan grade. Manhole adjustment rings shall be adjusted to final grade using plastic shims. Wood shims shall not be allowed.

Manhole adjustment rings and castings shall not be sealed in place until after curb & gutter is in place, crushed rock is shaped and asphalt pavement elevation is set. Casting rim shall be installed flush with pavement elevation. Contractor may use alternate methods to accomplish this requirement (example: (a) Adjust casting rim to final grade after final shaping of gravel prior to paving, then pave flush with said rim. (b) Place steel plate on manhole cone, pave over plate, come back and saw cut pavement and dig out plate, adjust casting rim flush with pavement, compact area around casting and patch with hot mix asphalt.) 2 ½ inch square strips of preformed Butyl Joint Sealant (or approved equal) shall be used between rings, manhole cone and casting in place of mortar to seal said manhole. If after paving manhole is more than ½ inch lower than a 4 foot straight edge set on pavement, Contractor will reset manhole as specified in (b).

All manholes in which reinforced precast (or poured in place) concrete lids are used the minimum lid thickness shall be as follows:

- 48 inch inside dia. = 6 inch thick
- 60 inch inside dia. = 8 inch thick
- 72 inch inside dia. = 8 inch thick
- 84 inch inside dia. = 10 inch thick
- 96 inch inside dia. = 10 inch thick

Steel reinforcement shall conform to H2O Hwy Loading.

All mortar used in the construction of manholes and grade adjustment shall be composed of one-part cement and two-parts masonry sand. The cement shall be regular Type 1 Portland cement. The masonry sand shall meet ASTM C-144 specifications for grading, composition and soundness. Upon request of the Engineer, the Contractor shall provide test results indicating conformance to the specifications. Openings in manholes for pipe shall allow for not more than 4 inches or less than 2 inch clearance.

The water main is to be kept entirely free from debris of every kind as manhole construction progresses. All refuse and surplus matter must be scraped off and entirely removed before it has time to harden, being left, upon completion, entirely clean. The same provisions are to be complied with in regard to the manhole itself.

No masonry is to be laid in water, and water shall not be allowed to flow against or over masonry or concrete until it has had time to thoroughly set. Any defects in the work discovered at any time shall be immediately corrected, even if it is necessary to take down and rebuild portions of it.

No work shall be done during freezing weather unless the Contractor shall provide the necessary means for protecting the manhole and shall heat the blocks, gravel, sand, and water, and shall comply with all requirements to thoroughly protect the masonry from frost during and after laying; all at the cost and expense of the Contractor and with the approval of the Engineer.

All adjacent precast sections shall have Mastic installed between each section.

602.9 PROPERTY OF THE CITY

If the City furnishes pipe or material, all cuttings and pieces of pipe or other material shall be the property of the City, and at the completion of the work, all such cuttings and pieces or material unused and all salvage from existing City mains or structures shall be delivered to City's supply yard, on 1st Avenue S., just north of Elm Street.

All existing water main pipe and fittings salvaged during completion of the work shall be the property of the Water Utility, unless otherwise stated in the Special Specifications.

All water main fittings shown on the plans but not installed for some reason shall be the property of the Contractor unless the Water Department wants the fitting. Cost of the fittings, as determined from %Shipping Invoice+plus 10% shall be deducted from payment to the Contractor unless the Water Department takes the fitting.

Any water main fittings, and pipe required for the final installation but not shown on the Plans shall be installed, if determined necessary by the Engineer. These fittings shall be paid for on a cost of fitting, as determined from shipping invoice, plus 10% (no labor cost to be included).

END OF SECTION

SECTION 603: CONSTRUCTION

603.1 LOCATION OF UNDERGROUND OBSTRUCTIONS & UTILITIES

The location of pipes, other underground objects, and underground utilities (ex: gas main, power lines, telephone, etc.) are approximately correct as shown on the Plans, but should they be found to be otherwise or should the Contractor encounter quicksand, springs, rock, or other difficulties, he shall have no claim on that account, it being understood that the Board or Engineer do not warrant the plot of underground objects to be correct but only to the best of their knowledge. It shall be the responsibility of the Contractor to contact all utilities and acquire field locations. The City is not to be billed for any utilities not shown on Plans.

603.2 SEWER LATERALS & WATER SERVICES

Replacement of water services and sewer laterals shall be paid for at the bid price where they have to be changed because of interference with the new water line. Those services and laterals damaged by the Contractor through his operations and which do not have to be moved because of interference with the new water line shall be replaced at his own expense. All galvanized or lead services encountered shall be replaced and paid for at the bid price.

For water lateral location the project Engineer and Contractor shall use common sense judgment in field to determine how much sidewalk, if any, is to be removed. Contractor shall make every attempt to save as much sidewalk as possible. The decision of the project Engineer is final . no payment for unauthorized sidewalk and driveway removal and replacement.

All water laterals and mains shall be inspected and measured before being covered.

Curb boxes shall be complete with 1 inch upper section, arch pattern base, and two hole Erie pattern type HS cap. Curb stops shall be ORISEAL or equal (complete).

All water laterals shall be Type ~~MC~~+copper minimum 1 inch diameter.

Water services shall include excavation, tap, corporation cock, curb stop and box, and any other items pertinent to installation.

Existing water laterals, as shown on plan shall be field located by City forces for a more accurate location. When specified in bid, water laterals shall be renewed from the new main to the curb stop, which in most cases is located in the boulevard area. All fittings/adapters necessary for proper connection from new lateral to older existing lateral for a complete job shall be included in unit cost bid for lineal foot of water lateral.

603.3 NOTIFICATION OF UTILITIES

The Contractor shall notify all utilities, both public and private, including gas, electric, telephone, telegraph, sewer and water, etc. of his schedule of operation. The notice shall be given at least forty-eight hours prior to actual date of the commencing of construction. The Contractor shall also check as to any utility facilities which may be encountered during construction and take due notice of same.

The same notice and determination of facilities, which may be encountered, as well as to proposed blocking of streets or alleys, shall be given to the Fire and Police Departments so as to enable them to maintain and plan their operations.

Access to all existing hydrants and valves must be provided at all times because of emergency requirements of Water and Fire Departments.

The Contractor shall give special attention to safeguarding and protecting all utilities, public and private, and he shall be held liable for any damage thereto encountered during construction of the entire project. Relaying or relocating of gas mains to expedite construction of the water main will be permitted providing it is done at no additional cost to the City, following approval of such change by the Xcel Energy Company and their Agreement with the Contractor as to payment of cost incurred and specifications for the work. A notarized copy of such Agreement signed by the Contractor and the Xcel Energy Company shall be filed with the Board of Public Works before work is started.

603.4 RAILROADS

Notice shall be given in writing to the proper officials of the railroad company, at least three days, or as required by the railroad permit, in advance of construction, whenever it is necessary to lay pipe under any railway tracks or within the railroad right-of-way. All work shall comply with the railroad permit.

603.5 PRIVATE LANDS

The Contractor shall not, unless written authority has given by the proper parties, enter or occupy with men, tools, equipment or material any private land or City-owned property adjoining the work. Storing of materials and equipment on the boulevards or sidewalks shall be at the discretion of the Engineer with the Contractor liable for any and all damage resulting therefrom.

603.6 CLOSING OF STREETS

All streets, alleys, and street intersections shall be kept open to travel as much as possible, and at night all trenches and dangerous places shall be protected by means of barriers and flashing lights. Each day the Contractor shall notify the Chief of the Fire Department and the Police Department as to the streets he will close to travel and also of such streets that are again open to travel.

603.7 SHUTTING OFF & TURNING ON WATER

As residents exist in homes along all the streets, sewer and water service shall have to be maintained throughout the project duration (a few hours are permissible to switch connections, etc, as long as residents, Water Department and Fire Department are notified). Contractor to bid accordingly. Contractor shall notify property owners when utilities are to be shut off/turned on and driveways closed.

Whenever any work is to be done in connection with the present system of mains, the Contractor shall give notice to the Water Utility 24 hours in advance of the time he expects to begin such work of the time that will be required, and of the place where he expects to do said work. The Water Utility will close such valves as would be required to shut off the water from

the place designated and the Contractor must prosecute the work with such diligence and dispatch that the water will be off therefrom for the least possible time. The Contractor shall provide assistance to the Water Utility in the notifications of all properties affected by the shutoff. Shutoffs shall be made with adequate time allowed so that the work may be accomplished and the water turned on before 4:00 P.M. of the same day.

603.8 COVERING

All pipes shall have 7 foot covering unless otherwise specified. This covering shall be measured from the established grade of the street to the top of the pipe. Pipe laid where grades have not been established shall be laid to the grade determined by the Engineer.

The Contractor shall safeguard engineering stakes; and points of reference; and resetting, made necessary through carelessness of workmen, shall be by City at Contractor's expense.

603.9 EXCAVATION

The Contractor shall be in full compliance with the terms and conditions of OSHA Standard 24 C.F.R. ss. 1926.650, excavations and AWWA C600 for Installation of Ductile Iron Water Mains and Their Appurtenances subject to such specific additions as are incorporated in the plans and specifications.

The Contractor shall not deviate from the type of excavation indicated on the plans without written approval of the Engineer, except in case of driveways and surface obstructions requiring short tunnel sections, which have been indicated on the plans as open trench sections.

The trench in which the water pipe and appurtenances are to be constructed shall be excavated in such manner and to such depths and widths as will give suitable room for the building of the structures they are to contain, and for bracing and supporting, pumping and draining, and for removing from the trench peat, silt or other material which may not be deemed proper for foundations.

Where rock is encountered, it shall be removed to a minimum of 1 foot below the invert of the pipe, and the excavated area filled with clean sand up to the invert.

Not more than one City block of trench shall be opened in advance of the completed water main, except by permission of the Engineer, nor shall the limits of such open trench extend simultaneously across two streets intersecting the street in which the work is being done; nor in the case of a sheathed trench shall the opening in the street extend farther in length than the amount of sheathing physically present on the site.

The Contractor shall furnish, put in place, and maintain at his expense such sheeting, bracing, etc., as may be necessary to support the sides of the excavation, whether above or below the grade of the water pipe, and to prevent any movement which could in any way injure the masonry, diminish the width necessary for proper drainage, or otherwise injure or delay the work; all slides and cave-ins are to be at his expense and cost.

If the Engineer is of the opinion that at any point sufficient or proper supports have not been provided, he may order additional supports at the expense of the Contractor, and the compliance with such orders shall not relieve or release the Contractor from his responsibility for the sufficiency of such supports.

The bottom of the trench is, in general, to be excavated to the exact form and size of the lower portion of the water pipe, which is to be laid in it so that the bearing shall be continuous and the pressure shall be equally distributed.

All construction material shall be so placed as not to endanger the work, and so free and ready access may be had at any time to all parts of the trench and all hydrants and valves in the vicinity. Materials shall be kept neatly piled so as to minimize inconvenience for public travel to the adjoining tenants. Reasonable provision shall be made for travel on the streets, road, railroads, and private ways. If detours are required, the Contractor shall furnish, at his own expense, approved type barricades properly lighted and protected. Layout of detour must be coordinated with the Board of Public Works, the Fire Department, the Police Department, and the State Division of Highways where State and Federal highways are involved. Marking and signing will be done by the Contractor with all costs.

The Contractor is to furnish adequate pumping equipment to maintain essential ground water level for particular construction involved. Water is not to be allowed to rise in the trench until all joints are completed, conductivity tests run, lines pressure tested, and approved, concrete thrust blocks have set, or until such time as the Engineer may direct.

All water pumped or bailed from the trench shall be conveyed to a suitable point of discharge, subject to approval of the engineer.

Care shall be taken not to move, without consent of the Engineer, any sewers, drains, water or gas pipes, utility conduit, or other structures; and in crossing these, and in running parallel or near them, they shall be sustained securely in place until the work is completed.

Whenever it is necessary to interfere with said structures, the Contractor shall maintain their respective services, and if necessary for that purpose, shall lay temporary water, gas, or other pipes. He shall repair all damage done to any of said structures, and he shall leave them in as good condition as they were previous to the commencement of the work. If so directed by the Engineer, permanent changes of location not indicated on the plans nor in the Specifications shall be made by the Contractor to meet the requirements of the water pipe appurtenances, and new work shall be added, when necessary, to leave all in good working order. The cost of such permanent changes not indicated on the Plans nor in the Specifications is to be paid for as extra work on valuation of the Board of Public Works, and depending on the decision of the Engineer as to whether the work done is or is not included in the work required by the Contractor under his Contract. Any damage done or caused to said pipes or other existing structures by act or neglect on the part of the Contractor is to be paid by him.

The Contractor shall be responsible for disposing of all excess dirt and debris resulting from construction. The City will not furnish a disposal site unless otherwise stated on the Plans or in the Special Specifications.

Cost shall be included in bid price for pipe laid unless a bid item is included in the Bid Proposal.

No stone monuments, bench marks, etc., of any description, located in line of the work shall be removed or taken up unless it be in the presence of the Engineer or his authorized representative. All lots corners, pipe monuments, etc., that are located outside the ditch area shall be preserved, and if any are disturbed or removed, the Contractor shall hire a registered land surveyor to replace them.

603.10 TRENCHES – OPEN CUT & SHEATHED

Trenches shall be back-sloped or sheathed and braced as required by the OSHA Standard 29 C.F.R. ss. 1926.650 . Excavations, the Plans and Specifications and as may be necessary to protect life, property or the work. When tight sheathing is required, it shall be driven so as to prevent adjacent soil from entering the trench from over, below, or through the sheathing.

Maximum trench width at the pipe elevation shall be 2 feet plus the diameter of the pipe. This maximum width shall apply except where otherwise specified on the Plans or in the Specifications.

Where sheathing is specified on the plans, no excavation of more than 3 feet in depth shall be permitted before sheathing is installed in loose or sandy soils, 4 ½ feet in depth in hard or solid soils.

603.11 PIPE LAYING

The labor consists of laying water mains and appurtenances together with all specials, valves, hydrants, connections, street crossings, etc., for each size of pipe.

Also the cutting in of new valves, and the connecting together of the new system with the present system as shown on plans, so that in the end it shall form and be a continuous part of the water system of the City of Onalaska.

Pipe and specials shall be carefully handled at all times. They shall be placed in proper alignment in the trenches and evenly bedded before the joint is made. Each pipe shall be carefully inspected and cleaned as specified in Section 26 before being laid. Those pipes not meeting the Specifications shall be rejected. No pipe shall be laid except in the presence of the Engineer or his authorized inspector, and the Engineer may order the removal and relaying of any pipe not properly laid. Care must be taken to compact the earth solidly under and around the pipe and specials before the filling of the trench begins. No loose rock backfill or rubbish will be allowed within 2 feet of the pipe or specials. Thrust blocks shall be provided as shown on the detail sheet and included in the cost bid for pipe.

No water main or water system shall be constructed, replaced or relocated in a flood-prone area unless designed and constructed to minimize or eliminate the infiltration of floodwaters into the system.

603.12 JOINTS

All joints shall be slip type Bell & Spigot except at fittings and valves where mechanical joints will be used. Mechanical joints shall be made according to manufacturer's specifications.

For slip type bell and spigot pipe, a single rubber gasket shall be used to affect the joint seal. The gasket, gasket seat, and the plain end must be wiped clean to affect a good joint. Only rubber gasket lubricant furnished by the manufacturer shall be used.

603.13 DISINFECTION

Before placing in service, all new mains or extensions to existing mains shall be chlorinated so that a chlorine residual of not less than 10 PRM remains in the pipe at the end of twenty four hours, and meet AWWA C600 Section 4 requirements. Any of the following compounds and methods of procedure shall be followed subject to approval of the Engineer:

<u>Compound</u>	<u>Amount</u>	<u>Quantity of Water</u>
Calcium Hypochlorite (HTH) (6-70% cl)	1 lb.	7.5 gal.
Chlorinated Lime (bleaching powder) (30-35% cl)	2 lbs.	7.5 gal.
Sodium Hypochlorite (liquid laundry bleach) (5.25% cl)	1 gal.	4.25 gal.

The above preparation will produce a 1% chlorine solution (10,000 PPM), and shall be applied to the new mains in the following amounts.

REQUIREMENTS FOR 100 FT. LENGTHS OF PIPE

<u>Pipe Diameter</u>	<u>100% Chlorine</u>	<u>1% Chlorine Solution</u>
6	0.06 lbs.	3/4 gal.
8	0.10 lbs.	1-1/3 gal.
10	0.17 lbs.	2 gal.
12	0.24 lbs.	3 gal.

The point of application of the chlorinating agent shall be at the beginning of the extension through a corporation stop furnished by this Contractor, and installed in the top of the pipe, at a valve manhole or place designated by the Engineer.

During the disinfecting operation, valves shall be manipulated by the Water Utility personnel so that the strong chlorine solution in the line being treated will not flow back into the line supplying water.

Following chlorination and successful completion of a hydrostatic pressure test, all water shall be thoroughly flushed from the new mains. Before placing in service a sample or samples shall be collected and shall be tested by ~~Standard Methods~~ Standard Methods for bacteriological quality and shall show the absence of coliform organisms.

The City shall furnish sterile bottles, collect all samples, and deliver to a certified testing laboratory. The Contractor shall pay all cost for bottles, transportation and testing with costs included in the unit prices bid. City personnel will provide the Contractor with an Affidavit of Compliance from a Sate certified laboratory, certifying the water sampled to be free of coliform bacteria contamination.

Should the initial treatment fail to produce a bacteriologically safe sample, the disinfecting and sampling procedure shall be repeated at the Contractor's expense. The City will furnish the water for the first flushing, up to 8 hours. If additional flushing is required, the Contractor shall pay all associated costs including water used for flushing.

603.14 CLEANING WATER MAIN

Pipe will be cleaned immediately before placement in the trench by removing any large particles by hand and as deemed necessary, swabbing the entire length of all pipe and fittings with a 5% hydrochlorite solution.

A temporary watertight plug will be placed over the open end of pipe to prevent dirt or other contamination from entering the main during trenching for placement of the next pipe. When breaks are taken and at the end of construction for the day, a watertight plug will be installed in the end of the pipe.

Section 603.13 of the Standard Specifications regarding main disinfection is still required in addition to the above

603.15 HYDROSTATIC TESTING

Those portions of mains connected to existing systems which cannot be separated from the mains in place without subjecting the existing piping to test pressures, and any other portions of systems so designated by the Engineer, shall stand with the joints exposed and under ordinary main pressure for a minimum period of six hours after which time they shall be inspected by the Water Utility upon notification by the Contractor. If any leaks or damage become apparent, repairs shall be made by the Contractor and testing shall begin again.

The hydrostatic test and leakage test of the system beyond the point of initial valving shall consist of raising the water pressure in the main to 1.5 times the normal operating pressure of the main for two hours, as per Section 5, AWWA C-600, latest designation specifications. Any leaks or damages that may develop during test due to improper materials or workmanship shall be repaired and the testing begun again. The Contractor shall furnish a hand pump and gauge for this test (air pressure will not be used for this test). The Engineer may require that the whole or any part of the system be tested as a unit.

No request for a test shall be made of the Water Utility after 1:00 P.M. for a test on the same date.

The Contractor may split up the pressure testing of the water main he installs into sections or test it all at once as he sees fit. Any temporary valves, plugs, piping, etc. necessary for the tests is the Contractors responsibility to furnish at no extra cost.

The Contractor shall install all temporary air release corporations as necessary to release all the air in the main for obtaining an adequate pressure test. Costs of these air releases are to be included in the bid for pipe installation.

603.16 ELECTRICAL CONDUCTIVITY

Ductile iron pipe shall be mechanical joint or push-on joint furnished with integrally installed conductors. Each joint, including fittings, shall be electrically banded with an external copper jumper capable of carrying 500 amps of current for an extended period of time to provide integral electric thawing capabilities. These copper jumpers can be either shop or field applied in accordance with these Specifications. For field applied copper jumpers, either the %Burndy - Thermoweld+ as manufactured by Burndy Corp. Norwalk, Conn., or %Gadweld+ by Erico Products Co., Cleveland, Ohio, will be permitted (American Conductive Gasket shall be considered as an approved equal to copper jumpers).

Contractors or suppliers shall submit the method they propose to use for approval prior to construction.

Copper jumpers shall be a minimum 1/16 inch by 1/2 inch wide flat strip or equal cross section round copper wire in annealed condition conforming ASTM Specs. B152-58 Type DHP. All copper jumpers shall be welded to the pipe fittings by the metal arc welding process if shop applied, or by the exothermic welding process if field applied.

On mechanical joints, fittings shall be attached to the bolts. The copper jumpers can be applied as a single strip welded at each end across the joint, or by multiple strips with bolted connections in the middle. Silicon bronze bolts and nuts shall be used on all bolted connections.

All welded connections shall be made on a clean metal surface, which has been ground to remove coating and oxide. The area at the connection, including weld, shall be refinished with its original coating, or other approved protective coating.

The assembled copper jumper across the joints shall be so installed that expansion, contraction, or relative pipe movement will not damage or sever the connection.

603.17 DETERMINATION OF CONDUCTIVITY

The Contractor shall perform a conductivity test on all iron pipe he installs to establish that electrical thawing may be carried out in the future. Conductivity must be carried out in the engineer's presence and approved before backfilling of trenches.

The entire system including pipeline, valves, fittings, and hydrants shall be tested, after the hydrostatic pressure test, and while the line is at normal pressure, for electrical continuity. The test shall be a direct current of 300 amperes passed through the pipeline for five minutes.

Insufficient current, or intermittent current, or arcing as indicated by large fluctuation of the ammeter needle, shall be evidence of defective electrical contact in the pipe and shall be corrected and retested.

Sources of D.C. current for these tests may be motor generators, arc welding machines, etc., equipped with controls for regulating current output. All such equipment shall be furnished by the Contractor subject to the approval of the Engineer.

Cables from the power source to the section of system under test should be sufficient size to carry the test without overheating or excessive voltage drop. Usable sized will probably be in the range of 2/0 to 4/0 A.W.G.

In using arc-welding machines, the current control should be set at minimum before starting. After starting the machine, advance the control until the current indicated on the ammeter is at the desired test value. Caution: In case of open circuits at joints or connections, the voltage across the defective connection will be in the order of 50-100 volts.

603.18 BACKFILLING TRENCHES & CLEANUP

All trenches and excavations should be backfilled as ordered by the Engineer unless other protection of the pipeline is directed. The backfill should be solidly tamped about the pipes up to a level at least 1 foot above the top. This material shall be deposited in uniform layers of 6 inches; each layer shall be solidly tamped or rammed with proper tools so as not to disturb the pipeline. Backfill material shall be clean and free from rocks or broken concrete exceeding 2 inches in size. The remainder of the trench shall be backfilled in compacted layers not exceeding 12 inches in depth to a point 6 inches below finished grade or as directed by the Engineer.

All trenches shall be compacted with use of vibratory compactor in 12 inch layers and compacted to 95% modified proctor. City will have an independent testing laboratory make selected tests for compaction at various locations and depths. Contractor shall help in digging holes and refilling holes at no cost to the City. Contractor shall pay for areas that fail and have to be retested.

Compaction of trenches by use of water flooding, in lieu of mechanical compaction, for the backfilling starting 1 foot above the pipe to the surface shall be allowed ONLY if approved by the Engineer. Approval by the Engineer will be given only if special circumstances warrant it. For water flooding, puddling, or jetting for consolidating granular backfill, the Contractor shall provide at his expense an approved setup that shall prevent backflow or back-siphonage into the water supply, said setup shall conform to State and Local Plumbing Codes and Chapter 145 of the Wisconsin Statute and be approved by the Engineer.

The Contractor shall obtain a wrench, valve, and meter for a temporary water supply from a hydrant or approved source, from the Water Utility. The Contractor shall be responsible for any damage to or loss of Water Utility equipment. Final payment to the Contractor will be withheld until these costs are paid in full.

Contractor shall have sufficient adequately sized hose on hand to accomplish the required watering of the ditch and shall exercise caution in the operation of the City hydrants.

Where water flooding, puddling, or jetting is approved for consolidating backfill, the first flooding should be applied after the backfilling has been compacted by tamping up to 1 foot above the top of the pipes, and the second flooding during or after the subsequent filling of the trench. An excess of water should be avoided in order to prevent disturbance of the earth under and around the pipes and also to prevent an undue excess of pressure upon them.

As the work progresses, all excess dirt and debris, all unused materials, equipment and tools, shall be removed at once from the entire street right-of-way. Whenever this cleanup or the repairing of the street surfaces, fences or other damage is neglected, notice may be given to the effect to the Contractor; and,

If said cleanup or said repairing is not done within two days thereafter, or if the Contractor does not at once take the necessary precaution to insure safety of public travel, the Engineer may employ other parties to do such work and the expense thus incurred will be deducted from any moneys due or that may become due the Contractor.

When, for any reason, the work is left unfinished, all trenches and excavations shall be filled if so required and the roadways and sidewalks left unobstructed, and with the surfaces in a safe and satisfactory condition. All trenches left open over night shall be barricaded and fenced.

No excavated materials, except the road surfacing and a limited amount of sand and gravel to be used for masonry, shall be left on the streets; but such material shall be backfilled into the trench or carted away.

Compaction of trenches by use of water flooding, in lieu of mechanical compaction, for the backfilling starting 1 foot above the pipe to the surface shall be allowed ONLY if approved by the Engineer. Approval by the Engineer will be given only if special circumstances warrant it.

603.19 TREES DAMAGED BY CONTRACTOR

The Contractor will be held responsible for any and all trees damaged during the course of construction. The Contractor will make a pre-bid investigation of the job site to familiarize himself with existing conditions and the potential for tree damage. Inspection of the work in progress will be made periodically by the Parks Department for the Board of Public Works to insure proper protection to trees and full compliance with ordinances affecting them.

The Contractor shall minimize tree damage by exercising due caution in the operation of any equipment used for installation of the water main, backfilling operations, and cleanup of the area. Work may be suspended if gross negligence or carelessness in operations is noted.

When damage to trees required trimming or other corrective measures, the Contractor shall hire a tree trimming service or Contractor experienced in trimming and treating trees that are damaged. This tree service shall be acceptable to the Engineer, and all cost of such service paid by the Contractor.

Corrective measures shall meet approval requirements of the Park Board and the Engineer and be done within two weeks of when the damage occurred.

If the specified damage is not taken care of within the time limit of two weeks, the Parks Department may do the work billing the Contractor for any and all expenses incurred. The Board of Public Works shall receive a copy of such billing and payment receipt before allowing final estimate for the project involved.

603.20 THRUST BLOCKING & JOINT RESTRAINT

Concrete thrust blocks shall be installed at all bends, plugs, wyes, tees, and hydrants as shown on the Standard Water Main Details and included in the cost bid for pipe installation except as follows:

In lieu of concrete thrust blocks the Contractor MAY install mechanical joint restraint.

Mechanical joint restraint shall be incorporated in the design of the follower gland and shall include a restraining mechanism which, when actuated, imparts multiple wedging action against the pipe, increasing its resistance as the pressure increases.

Flexibility of the joint shall be maintained after burial. Glands shall be manufactured of ductile iron conforming to ASTM A536. Restraining devices shall be of ductile iron heat treated to a minimum hardness of 370 BHN. Dimensions of the gland shall be such that it can be used with the standardized mechanical joint bell and tee-head bolts conforming to AWWA C153/A21.11 and ANSI/AWWA C153/A21.53 of latest revision.

Twist-off nuts, sized same as tee-head bolts, shall be used to insure proper actuating of restraining devices. The mechanical joint restraint device shall have a working pressure of at least 250 PSI with a minimum safety factor of two: one and shall be EBAA Iron, Inc., MEGALUG TM or equal.

If the Contractor chooses to use the MEGLUG TM or approved equal restraint in lieu of concrete thrust blocking, the mechanical joint restraint must be installed at the fitting and also at all pipe joints within 10 feet laying length for 12 inches and smaller pipe and within 18 feet for larger than 12 inch pipe.

The MEGALUG TM or approved equal mechanical joint restraint may also be utilized on vertical bends to replace the concrete blocks and straps detailed on the standard detail sheet.

The MEGALUG TM or approved equal mechanical joint must be installed in lieu of concrete thrust blocks whenever a concrete thrust block cannot bear against undisturbed soil. Examples of such cases would be in fill areas, where excavated trench width is excessive, or where installation of other utilities has, or will in the near future, disturb the area thrust blocks would bear against.

All joints on the branch from the main to all hydrants **MUST** be restrained using the MEGALUG TM or approved equal retainer gland. The concrete thrust block behind the hydrant is eliminated. The concrete thrust block behind the main line tee is still required unless a MEGALUG tee is used.

For high pressure zone mains, all joints on the branch from the main to all hydrants **MUST** be restrained using the MEGALUG TM or approved equal retainer gland **and concrete thrust block behind the hydrant shall be installed**. The concrete thrust block behind the main line tee is also required.

603.21 EROSION CONTROL

See Part 7 of the Specifications.

603.22 LANDSCAPING

See Part 8 of the Specifications.

603.23 ROCK EXCAVATION

See Part 2 of the Specifications.

603.24 MEASUREMENT & PAYMENT

The Contractor shall provide assistance to inspector or Engineering Department, on request, for necessary measurements during construction. Final measurements shall be made by Engineering Department with assistance of inspector.

Contractor's representative shall be present, if possible, during period of such measurements. In order to be considered, claims relative to disputed quantities must be filed by the Contractor within one week from date of final inspection.

All payments, on unit cost basis, shall be made as per final measured units and contract unit bid price unless exceptions are formally approved and evidenced by written order. Verbal orders or changes will not be recognized. Estimates shall be prepared for all work completed as of two Fridays prior to the second Thursday of each month.

In the absence of special payment provisions, all costs of repairing, replacing or otherwise restoring surface improvements to original conditions shall be included for payment in the per foot bid for pipe installation.

The footage to be paid will include construction into and through manholes. Measurements, in this case, shall be from centerline to centerline of structures named, with deduction for valves and cut-in specials.

These Standard Specifications together with the Plans, General and Special Specifications are acknowledged to be a part of the Contract.

END OF SECTION