STANDARD SPECIFICATIONS

for

WATER MAIN CONSTRUCTION

City of La Crosse, Wisconsin

Revised April, 2006

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FOR
WATER MAIN CONSTRUCTION

1. WORK TO BE DONE:

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, 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; to provide all 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.

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 of 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.

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.

4. PIPE, GASKETS, AND FITTINGS:

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

Ductile iron pipe shall meet AWWA C-150 for thickness design and C-151 for material. Pipe thickness shall meet pressure Class 350 p.s.i. having the following nominal wall thickness for up to l0 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	"	0.25	"
10 inch	"	0.26	"
12 inch	"	0.28	"
14 inch	"	0.31	"
16 inch	"	0.34	"
18 inch	"	0.36	"
20 inch	"	0.38	"
24 inch	"	0.43	"

All ductile iron fittings shall conform to AWWA C-110 latest designation, specifications for the size indicated on plans. All fittings shall have a pressure rating of 350psi, 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.

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.

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.

5. POLYETHYLENE ENCASEMENT:

Polyethylene encasement shall be applied to all pipes, 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 one 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.

6. 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 six-inch mechanical joint connections and not less than a five-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 2.5-inch brass hose nozzles with National Standard Thread. Hydrants shall be of sufficient length so that the top of the hydrant shall be three feet above ground or curb grade and not less than twenty-six 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. Hydrants shall be Waterous Pacer Breakaway Model WB-67-250 with a 22-inch top extension and with weathershield and 6" mechanical joint connections. Hydrants shall have a bury of 7' 6" unless listed otherwise in special specifications.

All hydrants shall be set vertically plumb and be properly braced to 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 three feet long and the valve will be installed with a valve box. The valve will conform to AWWA C509 and La Crosse Specifications. All joints on the branch from the main to the hydrant will be restrained using EBAA Iron, Inc., MEGALUG TM retainer glands or American Flow Control hydrant B-84-B.

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 La Crosse Specifications, and that all tests specified therein have been performed and that all test requirements have been met.

7. VALVES:

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

ANSI/AWWA C504 Rubber-Seated Butterfly Valves (will be referred to as AWWA C504).
ANSI/AWWA C509 Resilient-Seated Gate Valves, 3" through 12" 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 10 inch diameter and less shall be resilient-seated gate valves. Valves 12 inch diameter and larger shall be butterfly valves. All valves shall have mechanical joint connections unless otherwise approved by the Engineer.

BUTTERFLY VALVES:
Valves shall meet AWWA C504 specifications for Class 150B valves. The valves shall be constructed for buried service, with a sealed operating mechanism that can withstand 300 ft.-lb. input torque to a 2" square operating nut. Shaft seals shall be o-rings. All valves shall open left. The only butterfly valves that will be accepted are:

American Darling 150B,	American Darling 250B
Kennedy Adapt Torque,	M & H (Dresser) 450
Mueller Co.,	Pratt Ground Hog

The valve manufacturer or vendor shall furnish the City an affidavit stating that the valves furnished for this order comply with all applicable Provisions of AWWA C504 for Class 150B valves. Butterfly valve manholes (required on 12" and larger valves) shall have a FLAT TOP in lieu of eccentric cone section. The manhole shall be offset such that the valve operator can be operated through the manhole opening.

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 200psi differential pressure. The valve shall be operated by turning a 2" 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 form 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 to have no leakage across the seat in either direction with 200psi differential pressure and to have no bulkhead, stem or joint leakage when tested at 400psi with the gate in the open position.

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 set inside manholes when used as main line valve and be installed with valve boxes when used as a hydrant control valve.

8. 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.

9. 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.

10. VALVE BOXES:

All valve boxes shall be screw type having a 5-1/4" shaft diameter.

Valve boxes shall be cast iron similar to the following: Cast Iron-Clow, Base F-2465 or F-2484, extension F2475, center section F-2460, top section F-2455, cover F-2490.

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 two 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.

11. MANHOLES:

Manholes must be built of such dimensions as are represented on the accompanying plans, unless otherwise directed by the Engineer as the work progresses.

Manholes shall be constructed of six inch solid concrete block by a competent stone mason and shall be subject to rejection if not constructed satisfactorily in the estimation of the Engineer. Footings must be of 6-bag mix 3,000-pound concrete and cured a minimum of 24 hours prior to construction of the manhole on it.

Unless otherwise specified in the special specifications, precast manholes may be used and shall conform to ASTM Specifications C478, latest designation.

Adjustments to grade are to be made with solid brick or reinforced precast rings. Mortar shall be placed between the top of the precast manhole, the casting and each adjustment ring used. Mortar bed shall be the full width of adjustment ring.

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 specification.

Openings in manholes for pipe shall allow for not more than 4 inches or less than 2 inches 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 be carefully mortared together

12. 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 Myrick Park Station supply yard.

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 form "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).

13. LOCATION OF UNDERGROUND OBSTRUCTIONS:

The location of pipes and other underground objects 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.

14. SEWER LATERALS & WATER SERVICES:

Replacement of water services and sewer laterals shall be paid for at the bid price only 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.

15. NOTIFICATION OF UTILITIES:

The Contractor shall notify all utilities, both public and private, including gas, electric, city heat, telephone, telegraph, sewer and water, of his schedule of operations. The notice shall be given at least 48 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 it.

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 Northern States Power Company and their agreement with the Contractor as to payment of costs incurred and specifications for the work. A notarized copy of such agreement signed by the Contractor and the Northern States Power Company shall be filed with the Board of Public Works before work is started.

16. RAILROADS:

Notice shall be given in writing to the proper officials of the railroad company, at least 3 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.

17. PRIVATE LANDS:

The Contractor shall not, unless written authority has been 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.

18. 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 travel and also of such streets that are again open to travel

19. SHUTTING OFF WATER:

Whenever any work is to be done in connection with the present system of mains, the Contractor shall give notice to the Water Utility a day 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 notify all properties affected by the shutoff and the Water Utility 24 hours in advance of shut-off. 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.

20. COVERING:

All pipe twelve inches or under in diameter shall have seven foot covering and pipe over twelve inches in diameter shall be covered six feet 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 done by the City, at the Contractor's expense.

21. EXCAVATION:

The Contractor shall also 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 one 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, Police Department, and the State Division of Highways where State and Federal highways are involved. Marking and signing will be done by the Contractor.

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 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 prices 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 representatives. All lot 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.

22. 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 three feet in depth shall be permitted before sheathing is installed in loose or sandy soils, 4.5 feet in depth in hard or solid soils.

23. 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 of plans, so that in the end it shall form and be a continuous part of the water system of the City of La Crosse.

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 when compacting 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 two 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 n a flood-prone area unless designed and constructed to minimize or eliminate the infiltration of floodwaters into the system.

24. JOINTS:

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 effect the joint seal. The gasket, gasket seat, and the plain end must be wiped clean to effect a good joint. Only rubber gasket lubricant furnished by the manufacturer shall be used.

25. 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 10PPM remains in the pipe at the end of 24 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.

Compound	Amount	Quantity of Water
Calcium Hypochlorite (HTH) (6-70% cl)	1 pound	7.5 gallons
Chlorinated Lime (bleaching powder) (30-35% cl)	2 pounds	7.5 gallons
Sodium Hypochlorite (liquid laundry bleach) (5.25% cl)	1 gallon	4.25 gallons

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

Pipe Diameter	100% Chlorine	1% Chlorine Solution
6	0.06 lbs.	¾ gallon
8	0.10 lbs.	1-1/3 gallons
10	0.17 lbs.	2 gallons
12	0.24 lbs.	3 gallons

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. And before placing in service a sample or samples shall be collected and shall be tested by "Standard Methods" for bacteriological quality and shall show the absence of coliform organisms.

The Contractor shall furnish sterile bottles for collection of samples by the Engineer. This Contractor shall pay all costs for bottles, transportation and testing with costs included in the unit prices bid. An Affidavit of Compliance from a State Certified Laboratory shall be furnished to the Engineer, 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 process shall be repeated at the Contractor's expense. The City will furnish the water for the first flushing, up to eight (8) hours. If additional flushing is required, the Contractor shall pay $35.00 per hour per hydrant used for flushing.

26. CLEANING WATER MAIN:

Pipe will be cleaned immediately before placement in the trench by removing any large particles by hand and swabbing the entire length of ALL pipe and fittings with a 5% hypochlorite solution.

A temporary watertight plug will be placed over the open end of the 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 25 of the Standard Specifications regarding main disinfection is still required in addition to the above.

27. TESTING HYDROSTATIC:

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 damages 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 150psi for two hours, as per Section 5, AWWA C-600, latest designation, specifications. Any leaks or damages that may develop during testing 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 PM 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 are 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. Cost of these air releases is to be included in the bid for pipe installation.

28. ELECTRICAL CONDUCTIVITY:

Cast 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 "Cadweld" by Erico Products Co., Cleveland, Ohio, will be permitted.

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

Copper jumpers shall be a minimum 1/16" x ½" wide flat strip or equal cross section round copper wire in annealed condition conforming to ASTM Specifications. B152-58 Type DHP. All copper jumpers shall be welded to the pipefittings 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.

29. DETERMINATION OF CONDUCTIVITY:

The Contractor shall perform a conductivity test on all iron pipes 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 sizes 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.

30. BACKFILLING TRENCHES AND 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 one foot above the top. This material shall be deposited in uniform layers of six 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 two inches in size. The remainder of the trench shall be backfilled in compacted layers not exceeding 12 inches in depth to a point six inches below finished grade or as directed by the Engineer.

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 one 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 that 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.

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 one 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.

31. 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 him or her with existing conditions and the potential for tree damage. Inspection of the work in progress will be made periodically by the Park 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 or cleanup of the area. Work may be suspended if gross negligence or carelessness in operations is noted.

When damage to trees requires 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 costs of such service paid by the Contractor.

Corrective measures shall meet the 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.

32. MEASUREMENTS AND PAYMENT:

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 of pipe to be paid shall include construction into and through fittings and valve manholes. Measurements, in this case, shall be from centerline to centerline of fittings with deduction for valves. Cost of furnishing and installing fittings shall be included in unit price bid for pipe construction. Hydrant leads are considered as water main.

These standard specifications together with the plans, general and special specifications are acknowledged to be a part of the contract.

33. 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 restraints.

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 250psi with a minimum safety factor of 2:1 and shall be EBAA Iron, Inc., MEGALUG TM or equal.

If the Contractor chooses to use the MEGALUG 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" and smaller pipe and within 18 feet for larger than 12" 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 restraint **must** be installed in lieu of concrete thrust blocks whenever a concrete thrust block can NOT 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.

34. ROCK EXCAVATION:

Rock excavation shall be defined as removal of igneous or sediment deposits laying in solid beds or layers in their original position which cannot be removed with the types of excavating machinery usually employed for trench excavation of the character involved in this contract. Rock excavation shall also include removal of boulders larger than ½ cubic yard in volume and of ledge rock, concrete or masonry structures that require drilling or blasting. Rock excavation shall not include removal of boulders less than ½ cubic yard in volume, loose rock, or soft, friable, decomposed rock able to be removed with normal excavation equipment.

Where rock is encountered, the ditch width shall be narrowed to the minimum width required for laying of the pipe subject to the approval of the engineer. The pay width for rock excavation shall be the average width of the excavated trench but shall not exceed the outside pipe diameter plus 2 feet. The trench shall be excavated to a point 4 inches below the outside of the pipe barrel and the exterior of all joints.

Volumetric measurement of rock in the trench shall be the basis for determining the quantity of rock excavation and shall be computed from average trench width, top of rock profile, and profile 4 inches below exterior of pipe joints. Boulders in excess of ½ cubic yard volume will be based on actual volume removed from the trench. The pay quantity for rock excavation for manholes and structures will be one foot beyond the outside neat lines of the manhole or structure.

If blasting is to be used to remove rock, the Contractor must first obtain a blasting permit from the Mayor as required under City Ordinance #623.

If the bid proposal includes a bid item for rock excavation, the payment for cubic yards of rock excavation as determined above shall be in addition to the unit bid amount per lineal foot of pipe installed.

If the bid proposal does not include a bid item for rock excavation, payment for rock excavation shall be determined as indicated under Section 14. Claims for Extra Cost of the General Conditions.

The Wisconsin Administrative Code on Explosives and all local ordinances regulating blasting shall be adhered to. The Contractor will be held responsible for any damage to work performed by others or to adjacent property due to his blasting operation.

AMENDMENT
TO
STANDARD SPECIFICATONS FOR WATER MAIN CONSTRUCTION

Section 7. VALVES and Section 10. VALVE BOXES shall be deleted and the following inserted in their place:

7. VALVES:

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

ANSI/AWWA C509 Resilient-Seated Gate Valves, 3" through 30" 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" 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.

10. VALVE BOXES:

Type F (7' Bury)

All valve boxes shall be screw type having a 5-1/4" 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" 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 two 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.