

CITY OF MUSKEGON  
ENGINEERING DEPARTMENT

**STANDARD CONSTRUCTION SPECIFICATIONS  
&  
STANDARD PLANS & DETAILS**

Approved by the City Commission of the City of Muskegon,  
At a meeting held 2/9/2010

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CITY OF MUSKEGON  
OFFICE OF THE CITY ENGINEER

STANDARD CONSTRUCTION SPECIFICATIONS

**DIVISION 1**  
**GENERAL DEFINITIONS**

Approved by the City Commission  
February 09, 2010

DIVISION 1  
GENERAL DEFINITIONS

Whenever the words hereinafter defined, or any pronouns used in their stead, occur in Contract or any included documents, they shall have the meanings herein given.

A.S.T.M. - American Society for Testing Materials

A.N.S.I. - National Standards Institute

A.W.W.A. - American Water Works Association

A.A.S.H.O. - The American Association of State Highway Officials

M.D.O.T. - Michigan Department of Transportation

M.M.U.T.C.D. - Michigan Manual of Uniform Traffic Control Devices

CITY - City of Muskegon.

COUNTY - Muskegon County.

D.E.Q. - Department of Environmental Quality.

CITY OF MUSKEGON  
OFFICE OF THE CITY ENGINEER

STANDARD CONSTRUCTION SPECIFICATIONS

**DIVISION 2**  
**MATERIALS**

Approved by the City Commission  
February 09, 2010

DIVISION 2  
MATERIALS

2.01 MATERIALS

All Materials, Unless Specified Otherwise, Shall conform to the most Current Michigan Department of Transportation Standard Specifications for Construction or subsequent revision thereof.

2.02 SEWER PIPE

2.02.01 Vitrified Clay Pipe Extra Strength

Vitrified Clay Pipe Extra Strength shall conform to the requirements of A.S.T.M. designation C-700 E.S. or subsequent revision thereof.

2.02.02 Polyvinyl Chloride (PVC) Pipe

Polyvinyl Chloride (PVC) Pipe shall conform to the requirements of A.S.T.M. designation D-3034 SDR 35, D-3034 SDR 26 or subsequent revision thereof.

2.02.03 Reinforced Concrete Pipe

Reinforced Concrete Pipe shall conform to the requirements of A.S.T.M. designation C-76-88 26 or subsequent revision thereof.

2.03 SEWER PIPE JOINTS

2.03.01 Vitrified Clay Pipe Joint

Vitrified Clay Pipe Joint shall conform to the requirements of A.S.T.M. designation C-425 for flexible compression rubber gasket or subsequent revision thereof.

2.03.02 Polyvinyl Chloride (PVC) Pipe Joint

Polyvinyl Chloride (PVC) Pipe Joint shall conform to the requirements of A.S.T.M. designation D-3212, F-477 for flexible compression rubber gasket or subsequent revision thereof.

2.03.03 Reinforced Concrete Pipe Joint

Reinforced Concrete Pipe Joint shall conform to the requirements of A.S.T.M. designation C-443 for flexible compression rubber gasket or subsequent revision thereof.

DIVISION 2  
MATERIALS

2.04 WATERMAIN

2.04.01 Ductile Cast Iron Pipe

Ductile Cast Iron Pipe shall conform to the requirements of the current A.N.S.I. / A.W.W.A. Specification C-151 / A 21.51. Pipe thickness shall be designed in accordance with A.N.S.I. / A.W.W.A. C-150 / A 21.50. Pipe shall have cement mortar lining and seal coating in accordance with A.N.S.I. / A.W.W.A. C-104 / A 21.4 or subsequent revision thereof.

2.04.02 Fire Hydrants

Fire Hydrants shall conform to the requirements of the current A.N.S.I. / A.W.W.A. Specification C-502 Standard for Dry-Barrel Fire Hydrants, and the National Board of Fire Underwriters Laboratories Standard UL246, and Factory Mutual 1510 or subsequent revision thereof.

2.04.03 Valves

Valves shall conform to the requirements of the current A.N.S.I. / A.W.W.A. Specification C-500 Standard for Iron Body, Bronze Mounted, Double Disk, Parallel Seat, A.N.S.I. / A.W.W.A. Specification C-515 Standard for Resilient Seated Gate Valve and A.N.S.I. / A.W.W.A. Specification C-504 Standard for Butterfly Valves or subsequent revision thereof.

2.04.04 Watermain Fittings

Watermain Fittings shall be Ductile Cast Iron and conform to the requirements of the current A.N.S.I. / A.W.W.A. Specification C-153 / A 21.53. Pipe Fittings shall have cement mortar lining and seal coating in accordance with A.N.S.I. / A.W.W.A. C-104 / A 21.4 or subsequent revision thereof.

2.04.05 Watermain Joints

Watermain Joints shall conform to the requirements of the current A.N.S.I. / A.W.W.A. Specification C-111 / A 21.11. All Mechanical Joints shall be restrained, Glands shall be manufactured of Ductile Iron conforming to the requirements of the current A.S.T.M. A-536-80. Restraining devices shall be Ductile Iron heat treated to a minimum hardness of 370 DHN. Dimensions of the gland shall be such that it can be used with the standardized mechanical joint bell and tee-head bolts conforming to A.N.S.I. / A.W.W.A. A-21.11 and A.N.S.I. / A.W.W.A. C-153 / A-21.53. Twist-Off nuts shall be used to insure proper actuating of the restraining devices. The mechanical

DIVISION 2  
MATERIALS

joint restraint device shall have a working pressure of at least 250 PSI with a minimum safety factor of 2:1 and shall be EBAN Iron, Inc. Megalug or equal or subsequent revision thereof. Fast-Grip Gaskets shall conform to the requirements of the current A.N.S.I. / A.W.W.A. Specification C-111 / A 21.11. The gasket shall have stainless steel wedges molded or inserted into it, the wedges will have sharp teeth on the inner surface for gripping the spigot of the pipe.

2.04.06 Water Service Material

Water Service Material shall conform to the requirements of the current A.N.S.I. / A.W.W.A. Specification for the Material Specified or subsequent revision thereof.

2.05 EROSION CONTROL

2.05.01 Erosion Control, Inlet Protection, Fabric Drop

The work shall consist of furnishing and installing Erosion Control Inlet Protection Fabric Drop and Shall conform to the most Current Michigan Department of Transportation Standard Specifications for Construction or subsequent revision thereof. Payment shall be at the unit price as described in the proposal and shall represent payment in full for the Erosion Control Inlet Protection Fabric Drop installed and maintained. No other payment will be allowed.

2.06 MEMBRANE SEALNT

2.06.01 Materials

The material shall be self adhering membrane sealant similar to PETRO-TAC or approved equal.

CITY OF MUSKEGON  
OFFICE OF THE CITY ENGINEER

STANDARD CONSTRUCTION SPECIFICATIONS

**DIVISION 3**  
**CONCRETE**

Approved by the City Commission  
February 09, 2010

DIVISION 3  
CONCRETE

DESCRIPTION - This work shall consist of furnishing Concrete as shown on the construction plans or in the special specifications and shall be placed at the rate specified. Payment shall be at the unit price described in the proposal and shall represent payment in full for all of the work complete.

MATERIALS - All Material, shown on the construction plans or in the proposal, Unless Specified Otherwise, Shall conform to the most Current Michigan Department of Transportation Standard Specifications for Construction or subsequent revision thereof.

CONSTRUCTION METHODS - Unless Specified Otherwise, All Construction Methods Shall conform to the most Current Michigan Department of Transportation Standard Specifications for Construction or subsequent revision thereof.

CITY OF MUSKEGON  
OFFICE OF THE CITY ENGINEER

STANDARD CONSTRUCTION SPECIFICATIONS

**DIVISION 4**  
**ROADWAY EARTHWORK**

Approved by the City Commission  
February 09, 2010

DIVISION 4  
ROADWAY EARTHWORK

DESCRIPTION - This work shall consist of Roadway Earth Excavation and Embankment CIP shown on the construction plans or in the special specifications and shall be at the rate specified. Payment shall be at the unit price described in the proposal and shall represent payment in full for all of the work complete.

MATERIALS - All Work and Material, shown on the construction plans or in the proposal, Unless Specified Otherwise, Shall conform to the most Current Michigan Department of Transportation Standard Specifications for Construction or subsequent revision thereof.

CONSTRUCTION METHODS - Unless Specified Otherwise, All Construction Methods Shall conform to the most Current Michigan Department of Transportation Standard Specifications for Construction or subsequent revision thereof.

CITY OF MUSKEGON  
OFFICE OF THE CITY ENGINEER

STANDARD CONSTRUCTION SPECIFICATIONS

**DIVISION 5**  
**REMOVING EXISTING STRUCTURES**

Approved by the City Commission  
February 09, 2010

DIVISION 5  
REMOVING EXISTING STRUCTURES

DESCRIPTION - This work shall consist of removing in whole or part, all bridges, retaining walls, culverts, old pavement surface and base course, curb. Curb and gutter sidewalk, drives, masonry, fence, poles, guard rail, manholes, water valve manholes, catch basins, inlets, sewers, water mains and other structures which are not suitable to be left in place or otherwise objectionable to the City; disposing of the resulting materials and backfilling the resulting holes and pits in a manner approved by the engineer. The boundaries of all areas to be removed shall be saw-cut full depth by the use of a power-driven saw unless otherwise specified by the Engineer. The Contractor shall become the owner of all excess removed material, Determination of the disposal site and disposal of the removed material is the responsibility of the Contractor. No payment shall be made for material disposal.

PAYMENT - The contract unit price for the removal item as set forth in the contract will be payment in full for performing the work complete. If there are no such unit prices in the contract, the work will be considered included with the project under construction.

CITY OF MUSKEGON  
OFFICE OF THE CITY ENGINEER

STANDARD CONSTRUCTION SPECIFICATIONS

**DIVISION 6**  
**REMOVING TREES & STUMPS**

Approved by the City Commission  
February 09, 2010

DIVISION 6  
REMOVING TREES & STUMPS

DESCRIPTION - This work shall consist of Removing Trees and Stumps as shown on the construction plans or in the special specifications. Payment shall be at the unit price described in the proposal and shall represent payment in full for all of the work complete.

CONSTRUCTION METHODS - Unless Specified Otherwise, All Construction Methods Shall conform to the most Current Michigan Department of Transportation Standard Specifications for Construction or subsequent revision thereof.

CITY OF MUSKEGON  
OFFICE OF THE CITY ENGINEER

STANDARD CONSTRUCTION SPECIFICATIONS

**DIVISION 7**  
**CONCRETE PAVEMENT**

Approved by the City Commission  
February 09, 2010

DIVISION 7  
CONCRETE PAVEMENT

DESCRIPTION - Concrete Pavement, shall consist of placing a pavement of Portland Concrete on the prepared sub grade, and shall have the shape and dimensions as shown on the plans.

MATERIALS - All Material, shown on the construction plans or in the proposal, Unless Specified Otherwise, Shall conform to the most Current Michigan Department of Transportation Standard Specifications for Construction or subsequent revision thereof.

CONSTRUCTION METHODS - Unless Specified Otherwise, All Construction Methods Shall conform to the most Current Michigan Department of Transportation Standard Specifications for Construction or subsequent revision thereof.

CITY OF MUSKEGON  
OFFICE OF THE CITY ENGINEER

STANDARD CONSTRUCTION SPECIFICATIONS

**DIVISION 8**  
**CONCRETE BASE COURSE**

Approved by the City Commission  
February 09, 2010

DIVISION 8  
CONCRETE BASE COURSE

DESCRIPTION - Concrete Base Course, shall consist of placing a base of Portland Concrete on the prepared sub grade, and shall have the shape and dimensions as shown on the plans.

MATERIALS - All Material, shown on the construction plans or in the proposal, Unless Specified Otherwise, Shall conform to the most Current Michigan Department of Transportation Standard Specifications for Construction or subsequent revision thereof.

CONSTRUCTION METHODS - Unless Specified Otherwise, All Construction Methods Shall conform to the most Current Michigan Department of Transportation Standard Specifications for Construction or subsequent revision thereof.

CITY OF MUSKEGON  
OFFICE OF THE CITY ENGINEER

STANDARD CONSTRUCTION SPECIFICATIONS

**DIVISION 9**  
**CONCRETE CURB**  
**&**  
**CONCRETE CURB & GUTTER**

Approved by the City Commission  
February 09, 2010

DIVISION 9  
CONCRETE CURB AND CONCRETE CURB AND GUTTER

DESCRIPTION - Concrete Curb and Concrete Curb and Gutter, shall consist of placing either a separate curb or combination curb and gutter of Portland Concrete on the prepared sub grade, and shall have the shape and dimensions as shown on the plans.

MATERIALS - All Material, shown on the construction plans or in the proposal, Unless Specified Otherwise, Shall conform to the most Current Michigan Department of Transportation Standard Specifications for Construction or subsequent revision thereof.

CONSTRUCTION METHODS - Unless Specified Otherwise, All Construction Methods Shall conform to the most Current Michigan Department of Transportation Standard Specifications for Construction or subsequent revision thereof.

CITY OF MUSKEGON  
OFFICE OF THE CITY ENGINEER

STANDARD CONSTRUCTION SPECIFICATIONS

**DIVISION 10**  
**CONCRETE DRIVEWAY**

Approved by the City Commission  
February 09, 2010

DIVISION 10  
CONCRETE DRIVEWAY

DESCRIPTION - Concrete Driveway, shall consist of placing Portland Concrete on the prepared sub grade, and shall have the shape and dimensions as shown on the plans.

MATERIALS - All Material, shown on the construction plans or in the proposal, Unless Specified Otherwise, Shall conform to the most Current Michigan Department of Transportation Standard Specifications for Construction or subsequent revision thereof.

CONSTRUCTION METHODS - Unless Specified Otherwise, All Construction Methods Shall conform to the most Current Michigan Department of Transportation Standard Specifications for Construction or subsequent revision thereof.

CITY OF MUSKEGON  
OFFICE OF THE CITY ENGINEER

STANDARD CONSTRUCTION SPECIFICATIONS

**DIVISION 11**  
**CONCRETE SIDEWALK**

Approved by the City Commission  
February 09, 2010

DIVISION 11  
CONCRETE SIDEWALK

DESCRIPTION - Concrete Sidewalk and ADA Ramps, shall consist of placing Portland Concrete on the prepared sub grade, and shall have the shape and dimensions as shown on the plans.

SIDEWALK RAMP ADA - ADA Sidewalk Ramps, Unless Specified Otherwise, Shall conform to the most Current Michigan Department of Transportation Standard Specifications for Construction or subsequent revision thereof.

MATERIALS - All Material, shown on the construction plans or in the proposal, Unless Specified Otherwise, Shall conform to the most Current Michigan Department of Transportation Standard Specifications for Construction or subsequent revision thereof.

CONSTRUCTION METHODS - Unless Specified Otherwise, All Construction Methods Shall conform to the most Current Michigan Department of Transportation Standard Specifications for Construction or subsequent revision thereof.

CITY OF MUSKEGON  
OFFICE OF THE CITY ENGINEER

STANDARD CONSTRUCTION SPECIFICATIONS

**DIVISION 12**  
**SEWERS**

Approved by the City Commission  
February 09, 2010

DIVISION 12

SEWERS

12.01      GENERAL

12.01.01      Definition

As used herein, sewers shall be considered to mean all pipes or conduits intended to transport storm water or waste water and lying within public rights-of-way or easements, including all appurtenances.

12.01.02      Construction Methods

Construction Methods. Unless Specified Otherwise, Shall conform to the most Current Michigan Department of Transportation Standard Specifications for Construction or subsequent revision thereof.

12.02      MATERIALS

12.02.01      General

All materials furnished by the Contractor must conform in all respects to the requirements of Division 2 Materials. Where reference specifications are used, they shall be considered as referring to the latest issue.

12.02.02      Pipe Joints

All Pipe Joints must conform in all respects to the requirements of Division 2 Materials. Where reference specifications are used, they shall be considered as referring to the latest issue. When it is necessary to connect new pipe to existing pipe the connection will be made with the appropriate size Fernco. The Fernco connection unless specified shall be included in the payment for the new sewer pipe. When it is necessary to connect new pipe to existing structures, the connection unless specified shall be included in the payment for the new sewer pipe.

12.02.03      Manhole, Catch Basin and Inlet Materials

- a. Concrete: For manhole bases, catch basin bases and inlets shall develop compressive strength of 3,500psi or better in 28 days.
- b. Brick: ASTM C-139, Lime-cement, laid radially.
- c. Mortar and Plaster: U-1 of ASTM C-55, one part Portland cement, one part Lime and three parts sand, or a prepared mortar mix. (ASTM C-91-Masonry cement).
- d. Manhole Steps: Shall be plastic or cast iron, 10 inch x 10 inch overall, tread depth of 5 inches, tread cross section – 1 inch x 1 inch, with 2 ½-inch average rail height.

## DIVISION 12

### SEWERS

- e. Manhole Castings shall be cast iron and conform to East Jordan no. 1045 or approved equal, The Manhole Cover shall have the City of Muskegon Logo cast into it.
- f. Precast Manhole and Catch Basin Units: ASTM C-478 or ASTM C-76 pipe. Joints for precast sections shall be O-ring rubber gasket joints similar to ASTM C-443. Holes for pipe openings shall not be more than 6 inches larger in diameter than the outside diameter of the pipe and shall be filled with non-shrink mortar. Sanitary sewer manholes shall have a Kor-N-Seal, or approved equal, flexible pipe-to-manhole connection, the connection unless specified shall be included in the payment for the new precast manhole. Precast bases shall be set on a 4" thick pea-gravel base.

#### 12.02.04 Disposition of Defective Materials

Any material found during the progress of the work to have cracks, flaws or other defects, will be rejected by the Engineer. All defective material furnished by the Contractor shall be promptly removed by him from the site. Any material furnished by the Owner and found defective shall be set aside by the Contractor and removed from the site by the Owner.

#### 12.03 LINE AND GRADE

##### 12.03.01 Stakes by Owner

The Owner will furnish all line and grade control. Re Staking required by changes or delay in Contractor's schedule or as a result of the Contractor's negligence shall be paid for by the Contractor.

##### 12.03.02 Line and Grade Control

- a. Laser Beam: Line and grade controls will be established by the Owner at each laser setup point and at 25-foot, 50-foot and 100-foot points, and thereafter at 100-foot intervals to the next manhole. All other lines and grades necessary for the location and construction of the work, shall be established and maintained by competent personnel employed and paid by the Contractor. The laser beam projector is to be rigidly mounted to its support platforms(s). The Contractor is encouraged to control line and grade for the sewer by using the laser beam through the sewer being laid. Equipment must incorporate above-ground control to assure positive alignment. Either a laser beam projector or surveyor's transit will be required for line control. Any other equipment necessary to control atmospheric conditions in the pipe to keep line and grade to acceptable standards of accuracy shall be furnished and operated by the Contractor.

## DIVISION 12

### SEWERS

The laser beam method selected must be approved by the Engineer, and is to be operated by competent personnel employed and paid by the Contractor. Prior to placement of each section of pipe, the laser target shall be repositioned in the pipe previously laid to recheck beam accuracy. If beam projection exceeds 600 feet, line and grade checks will be required at 50-foot intervals.

#### 12.04 CONSTRUCTION METHODS

Construction Methods. Unless Specified Otherwise, Shall conform to the most Current Michigan Department of Transportation Standard Specifications for Construction or subsequent revision thereof.

#### 12.05 CONCRETE CRADLE

Where concrete cradle is required, it shall be constructed as shown on the plans, and the concrete shall conform to the most Current Michigan Department of Transportation Standard Specifications for Construction or subsequent revision thereof.  
And as specified on the plans.

#### 12.06 JOINTS ON ALL PIPE:

Joints on all Pipe shall be painted with Manufacturer's approved lubricant or solvent and the joint fully made. If difficulty is encountered in seating, the joint shall be disassembled and carefully inspected for obstructions and proper dimensions.

#### 12.07 MANHOLES, CATCH BASINS AND INLETS

##### 12.07.01 Manholes, Catch Basins and Inlets

All Manholes, Catch Basins and Inlets shall be precast, unless approved otherwise, the precast units shall be installed on a 4" pea gravel sub base with an even and full bearing, the pea gravel shall be included with the structure for payment.

##### 12.07.02 Manhole Invert

Concrete Flow Channel shall be placed in all Manholes, The flow channel shall be the same diameter as the pipe, the concrete shall be formed to the spring line of the pipe and sloped up the inside manhole circumference. Or the pipe can be laid through the manhole. Then concrete shall be formed to the spring line of the pipe and sloped up the inside manhole circumference. The pipe above the spring line shall then be removed. The concrete shall conform to the most Current Michigan

## DIVISION 12

### SEWERS

Department of Transportation Standard Specifications for Construction or subsequent revision thereof. Or as specified on the plans.

#### 12.07.03 Castings

Castings shall be set accurately to grade. Manhole castings in established pavements shall fit both the grade and crown of such pavements. Catch basin grates in concrete curb and gutters shall be set ½ inch below the gutter grade, and shall be in a plane parallel with the gutter pan.

#### 12.08 CONNECTIONS

##### 12.08.01 Existing Sewers

Where a manhole exists at the point of connection of new and existing sewers, it shall be repointed and any loose bricks and/or blocks in the walls of the existing manhole shall be re-laid. The cost of such work shall be included in the contract price for the new sewer unless payments are specifically provided in the proposal. Connections of new sewers to existing sewers when encountered in construction and not shown on the plans shall be made where ordered by the Engineer. Such connections shall be made within a manhole except for house service and drain connections. When such sewer connections are made within an existing manhole, The cost of such work shall be included in the contract price for the new sewer unless payments are specifically provided in the proposal. When connections are made with sewers carrying sewage or water, a flume or dam must be installed and pumping maintained as necessary to keep the new work dry until the joints and the concrete have had sufficient time to set.

##### 12.08.02 Future Sewers

Connections for future sewers indicated on the plans shall be plugged or bricked off at the ends. The ends of such future connections in sizes 4" through 21" shall be sealed with an appropriate sized disc and with the same type of jointing material used on the new sewers. For sewers 24" and larger, the end of the sewer shall be bricked off and plastered on the outside. The cost of such work shall be included in the contract price for the new sewer unless payments are specifically provided in the proposal.

## DIVISION 12

### SEWERS

#### 12.08.03 Services

Wyes for house service connections shall be placed at locations indicated in the field by the Engineer. All house service connection openings shall be "Y" branches with the spur set on the barrel of the pipe at an angle of 45° for pipe sizes to 24 inch. Tees or wyes may be used for pipe 24 inch and larger. Service connection openings in concrete pipe shall be cast in the upper quarter of the pipe with spur having standard bell dimensions for the service connection. Joint type and material on the services shall be the same as specified for the sewer. The ends of house service shall be closed with standard plugs or caps securely blocked to resist test pressure and sealed with the same jointing material used on the service pipe. House service connections to an existing sewer shall be made with the appropriate size Firinco style connection. The caps and firinco connectors shall be included in the contract price for the new sewer unless payments are specifically provided in the proposal. The location of new house service stubs at the lot line shall be marked by a 2 inch by 2 inch wooden stake which shall extend vertically from the plugged end of the service. The stake shall be cut off 4 inches below grade and a ½" x 2' steel rod placed along side the wood stake. The Contractor shall assist the engineer for service connection measurements, measurements are to be taken to the nearest downstream manhole, and the ends of services by measurements from permanent surface witness points. House services shall be laid at right angles to the street line unless otherwise directed and shall be laid on a uniform line unless otherwise directed and shall be laid on uniform line and grade from the riser to the property line unless otherwise specified. The minimum depth at the property line shall be 8 feet below the approved street grade centerline. Where this depth cannot be obtained, the house connection shall be laid with a minimum rise of 1/8 inch per foot between the sewer and the property line. Depths greater than 8 feet at property line may be required where basement elevations are lower than normal.

#### 12.09 TESTING

##### 12.09.01 Pipe Testing

All tests shall be under the supervision of the Engineer, Prior to connecting any active sewer services or extending services beyond the property line, unless specified otherwise, the new sewers and services shall be tested for alignment and leakage. All plastic pipes shall have mandrel testing performed 30 days after placement; the mandrel size shall be 95% of the manufactures actual inside diameter. The sewer shall be thoroughly cleaned before the Engineer is requested to witness or perform any tests.

DIVISION 12  
SEWERS

12.09.02      Alignment

Sewers must be straight between manholes and will be tested for straightness by video taping from manhole to manhole, the video taping will be done by the City at on cost to the Contractor.

12.09.02      Leakage

Unless otherwise called for in the project specifications, the maximum allowable infiltration/exfiltration shall be 299 gallons per day, per inch of diameter, per mile of pipe for ASTM C-443 and ASTM C-425 joints. The joints shall be tight and any visible leakage in the joints and leakage in excess of that specified shall be repaired.

- a. Water Testing: The Contractor shall furnish, install and maintain a “V” notch weir, tightly secured to the low end of each section of sewer, so that the infiltration may be checked. When the infiltration is demonstrated to be within the allowable limits, the Contractor shall remove the weirs and all framing, leaving the sewers and manholes clean and free of any debris.

Exfiltration tests will be required only when the natural or induced ground water table is less than 2 feet over highest point in pipeline under test, including house services. Exfiltration tests shall be made by filling the line to a minimum depth of 2 feet above the high point of the line under test, with allowance for ground water level, and measuring the water required to maintain this level.

- b. Low Pressure Air Testing: The Contractor shall furnish all equipment and personnel to conduct an acceptance test using low pressure air. Pipe shall be cleaned and all outlets plugged and securely replaced before beginning test.

12.10            METHOD OF MEASUREMENT

The length of sewer will be measured in lineal feet form center to center of manholes. The house connections will be measured in lineal feet horizontally, from the center line of the sewer to the end of the pipe.

12.11            BASIS OF PAYMENT

12.11.01        Sewer Pipe

“Vitrified pipe sewer,” “Reinforced concrete pipe sewer,” and “Plastic pipe sewer” of the specified diameters will be paid for at the contract unit price per lineal foot, which price shall be payment in full for all excavation, backfill, disposal of excess material, furnishing materials,

DIVISION 12  
SEWERS

(except when the City furnishes all or part of the materials) including wyes, tees and other fittings, and installing the pipe complete.

12.11.02 House Connections

House connections will be paid for at the contract unit price per lineal foot for installing pipe complete.

12.11.03 Concrete Cradle

“Concrete Cradle” will be paid for at the contract unit price per lineal foot for the work complete.

LOW PRESSURE AIR TEST

MINIMUM HOLDING TIME IN SECONDS REQUIRED FOR  
PRESSURE TO DROP FROM 3-1/2 TO 2-1/2 PSIG

	PIPE DIAMETER													
	4"	6"	8"	10"	12"	15"	18"	21"	24"	27"	30"	33"	36"	39"
25	4	10	18	28	40	62	89	121	158	200	284	299	356	418
50	9	20	35	55	79	124	178	243	317	401	495	599	713	837
75	13	30	53	83	119	186	267	364	475	601	743	898	1020	1105
100	18	40	70	110	158	248	356	485	634	765	851	935		
125	22	50	88	138	198	309	446	595	680					
150	26	59	106	165	238	371	510							
175	31	69	123	193	277	425								
200	35	79	141	220	317									
225	40	89	158	248	340									
250	44	99	176	275										
275	48	109	194	283										
300	53	119	211											
350	62	139	227											
400	70	158												
450	79	170												
500	88													
550	97													
600	106													
650	113	170	227	283	340	425	510	595	680	765	851	935	1020	1105

CITY OF MUSKEGON  
OFFICE OF THE CITY ENGINEER

STANDARD CONSTRUCTION SPECIFICATIONS

**DIVISION 13**  
**WATERMANS**

Approved by the City Commission  
February 09, 2010

DIVISION 13  
WATERMAIN

13.01.01 General

As used herein, watermains shall be considered to mean all pipes, conduits, and all necessary appurtenances to transport water, lying within public rights-of way or easements. All materials outlined in this Division shall be manufactured in the United States or be otherwise approved by the City Engineer.

13.01.02 Scope

The Contractor shall, unless otherwise noted, furnish all materials, equipment, tools and labor necessary to accomplish the work required under this contract in a safe and reliable manner, and all contract items are to be placed in proper operating conditions in full conformity with the contract and proposal, detail drawings, specifications, engineering data, instructions, and recommendations of the equipment manufacturer and materials as approved by the engineer.

13.01.03 Location

The location, grade and the approximate depth of the proposed watermain is shown on the plans with line and grade to be provided by the City of Muskegon unless otherwise noted. The Engineer reserves the right to make minor changes in alignment, grade and location of appurtenances, when such changes deemed necessary or advantageous. Major changes will be accomplished as described in Part 3, Section 1 Item 39 page 45 of the City of Muskegon Standard Contract.

13.01.04 Clean-Up

Surplus materials and appurtenances furnished by the City shall be delivered by the Contractor to the Public Service Building. Confirmation and/or receipts should be obtained from the Stockroom Manager and reported to the Project Inspector. All other surplus construction material shall be removed from the site by the Contractor. Trench backfill and surface replacement shall follow pipe laying operations so that the extent of open trench shall not exceed 500 feet, unless specific authorization is obtained from the Engineer. The finished site shall be free of debris and neat appearance.

13.01.05 Contractors "Notice to Proceed"

After receiving the "Notice to Proceed" the contractor shall give the City Engineer a minimum of 48 hours notice of start to allow for survey layout and assignment of inspection personnel. Whenever work is to be done by City forces or co-ordination with City forces, the contractor shall provide a minimum of 48 hours advance notice to the department from which the work is requested.

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13.02 MATERIALS

13.02.01 General

All materials furnished by the Contractor must conform in all respects to the following standards. (Where reference specifications are used, they shall be considered as referring to the latest revised issue).

The Contractor shall be responsible for all material furnished and shall replace, at his own expense, all such material found defective during the life of the contract. For material furnished by the City of Muskegon, the Contractor shall become responsible from the time of delivery, and shall reject any defective materials within three calendar days of delivery, and such materials shall be replaced by the City. Any defective material furnished by the City and installed by the Contractor without discovery of such defect will, if found defective prior to final acceptance, be replaced with sound material by the owner. The Contractor, however, shall at his own expense, furnish all labor, equipment and supplies necessary to facilitate the above replacement.

The Contractor shall furnish to the Engineer a manufacturer's certification that all materials meet minimum requirements as detailed in the material specifications references (refer to paragraph 13.02.02). The Contractor's unit prices will be assumed to include an allowance for this responsibility.

All pipe and related items shall be stored as recommended by the manufacturer, on suitable timber skids free from contact with the ground. Gaskets shall be stored in as cool, clean and shaded a place as practicable.

Unloading shall be made so as to avoid damage to the castings or pipe. Under no circumstances shall materials be dropped. All special handling equipment and temporary supports shall be furnished by the Contractor.

No damaged or broken pipe shall be used, no damaged or broken cement lining in pipe or fittings shall be used, In the event coatings are damaged, the damaged area shall be recoated with an approved coating, at the Contractors expense, in a manner approved by the Engineer.

The watermain pipe shall be handled by means of slings. No hooks or loader forks shall be permitted to come in contact with joint rings or be inserted in the ends of the pipe and fittings for any reason.

Any material found defective or flawed during the progress of work will be rejected and removed from the site. No attempt will be made to repair defective materials without written consent of the Engineer.

13.02.02 Watermain Specification Reference

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- (a) Ductile Iron, Push-On Joint Pipe, 3”– 64” ANSI/AWWA C151/A21.51-09
- (b) Push-On Joint Detail, ANSI / AWWA C111 / A21.11-12
- (c) Ductile Iron, Mechanical Joint Pipe, 3”– 24” ANSI/AWWA C151/A21.51-09
- (d) Mechanical Joint Detail, ANSI / AWWA C111 / A21.11-12
- (e) Cement Lining, ANSI / AWWA C104 / A21.4-13 (Standard Thickness)
- (f) Ductile Iron Pipe Wall Thickness Determination, ANSI/AWWA C150/  
A21.50-14
- (g) Ductile Iron, Flanged Joint Pipe, 3”– 64” ANSI/AWWA C111/A21.11-12  
and ANSI/AWWA C151/A21.51-09
- (h) Mechanical Joint Fittings, ANSI / AWWA C153 / A21.53-11 and ANSI/  
AWWA C111/A21.11-12
- (i) Push-On Joint Fittings, ANSI / AWWA C110 / A21.10-12 and ANSI/  
AWWA C111/A21.11-12
- (j) Flanged Fittings, ANSI/AWWA C110/A21.10-12
- (k) Flanges, ASA-B16.1 Standard Class 125
- (l) Copper Pipe, ASTM Spec B88-55 “Type K”
- (m) Retainer Glands EBAA MEGALUG 1100 Series or Equal
- (n) Fire Hydrants, ANSI/AWWA C502-14

13.02.03 Provisions for Electrical Thawing

(a) Serrated Silicon Bronze Wedges

Two per joint for 3” through 12” pipe, four for larger pipe. Each wedge is to be driven into the opening between the plain end and the bell until snug. When four wedges are used, they are inserted side by side, in pairs. Wedges can be used with push-on joints only.

(b) Copper Cable Bond Conductor

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Installation of copper cable bond conductor across the joints of push-on and mechanical joint pipe and fittings. The copper cable shall be a minimum AGW size #4 copper cable, The copper cable shall be welded to the pipe on push-on joints and have cable ends that fit standard watermain bolts for mechanical joints. The copper cable shall be of sufficient flexibility to withstand ground and pipe movement after installation.

(c) Copper Strap Bond Conductor

Installation of copper strap bond conductor across the joints of push-on joint pipe. The copper jumper strips shall be 1/16" x 3.4", 48 ounce soft copper, bolts shall be 5/16" x 3/4" silicon bronze hex head bolt and nut. The copper strap shall be welded to the pipe and be of sufficient flexibility to withstand ground and pipe movement after installation.

(d) Conductive Push-On Gaskets

These gaskets may be used in lieu of wedges, cable or strap bond conductors. Metal contact strips which are molded or inserted into the gasket must insure positive electrical contact between pipes. A thorough cleaning of gasket seating surface should be performed prior to assembly.

(e) Payment

The payment for provisions for electrical thawing shall be included in the cost of the new watermain. No other payment shall be made.

13.02.04 Fire Hydrant

A 5 1/4" M.V.O. East Jordan (5BR 250) hydrant shall be furnished and installed in the locations shown on the drawings and should be placed in a plumbed vertical position. Hydrants shall be of the non-compression type, and shall conform to ANSI / AWWA C502-14 as last adopted, and any Underwriter Laboratories requirements. Hydrants shall have two 2-1/2" hose connections and one 5" "STORZ" fitting; their barrels shall be 8-1/2 inches in diameter (minimum) with 5-14" valve openings and shall open to the left utilizing a 1" nut (measured flat to flat). All hydrants shall be painted red. Threaded connections shall conform to the City of Muskegon Standard Big Six (six threads per inch). Hydrant inlets shall have 6" diameter mechanical joint connections unless otherwise specified on the plans or in the special provisions. The hydrant assembly shall have all mechanical joints restrained with ductile iron MEGALUG glands. The hydrant shall be so designed so that the direction of the nozzles can be reoriented without digging up the assembly, and so that height extensions may be added at a later date. Hydrants shall have bronze interior parts including operating stems. Bronze to bronze

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main valve seats shall be required if seat removal is necessary for removing the valve assembly. All hydrants shall have a minimum bury of 6-1/2 feet. If the operating screw is located on the top it shall be bronze. Hydrants shall come with dual drain outlets conforming to AWWA C502-14, Section 4.8.2. When hydrants are installed below the water table, or in soils that are not permeable, the brass drain hole bushing shall be removed and a threaded brass plug inserted into the drain hole (weep hole) as directed by the engineer.

13.02.05 Gate Valves

All valves shall be iron body, bronze mounted, double disc. Parallel seat or compression resilient seated, with a 2" operating nut open to the right, with the direction indicated by an arrow cast on to the valve or the operating nut. Generally, end connectors shall be mechanical joint for all exterior ground-buried valves, unless otherwise specified. All valves shall have bronze stem, o-ring stem seal, non-rising stem, the stem shall have continuity with the body, and shall have a clean waterway equivalent in area, when open, equal to that of the connecting pipe. All valves shall be of new construction and complete with operating equipment and other appurtenances necessary for operation. All valves shall be designed to maintain a minimum 150 pound working pressure, tested at 300 pounds for sizes 14" through 48" or minimum 200 pound working pressure and tested at 400 pounds for sizes 2" through 12" and manufactured as per ANSI / AWWA C500 and C509. The valves shall be shipped as fully assembled as practicable. The exposed flanges and mounting pads shall be protected by wooden pieces bolted to them. All necessary skids and lifting devices shall be provided. Non-attached items shall be packed in boxes and properly labeled for assembly. The contractor may be required to furnish the services of a competent factory-trained serviceman to check final installation and supervise original start-up and operation of the equipment specified. Such services shall be included in the cost of the valve.

13.02.06 Butterfly Valves

Butterfly valves shall be manufactured to conform in all respects to the latest revisions of ANSI / AWWA, designation C-504, and coated inside and outside with standard bitumastic coating for water mains. The body, disc, shaft, seats, bearings and operators shall be designed based on Class 150B and may be the short or long body type. All butterfly valves shall have a working pressure of 150 psi, hydrostatically tested at 300 psi, and bubble-tight tested at 150 psi. The seat-ring shall be made of rubber body or disc mounted, and shall be adjustable and field replaceable in sizes 16" and larger. The shaft may be of the through type or stub type and shall be marked on the end to indicate the position of the valve disc with respect to the shaft and the shaft shall have continuity with the body. The shaft seals shall be of the "split-V" or "Chevron" type. The valve disc shall be of corrosion-resistant alloy cast iron. The valve disc shall be offset so as to prevent valve flutter in the full open position. The valves shall be equipped with a stainless steel stop in the operator to prevent the disk from rotating through the closed position. The

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valve operator shall be permanently lubricated and sealed for buried service and shall be equipped with a two-inch square operating nut. The operator shall be constructed such that the valve will open when the nut is turned to the right or in a clockwise direction, with the direction indicated by an arrow cast onto the operating nut. Operators for valves 16" and 20" in size may be of the traveling-nut or worn gear type. Operators for 24" and larger shall be of the worn gear type. Generally, end connectors shall be mechanical joint, unless otherwise specified. All valves shall be of new construction and be complete with all operating equipment and other appurtenances necessary for operation. The contractor may be required to furnish the services of a competent factory-trained serviceman to check final installation and supervise original start-up and operation of the equipment specified. Such services shall be included in the cost of the valve.

13.02.07 Tapping Sleeve and Valve

Tapping Sleeves shall be full stainless steel sleeve as manufactured by Romac Style SST or approved equal, meeting the requirements of ANSI B16.1 Class 125 and in accordance with MSS-SP60, the sleeve will be required when tapping into existing watermains. The valve shall conform to City of Muskegon Standard Specifications 13.02.05. The joint between the sleeve and valve will be flanged. The Contractor shall present for approval detailed shop drawings of the assembly. Payment shall be at the unit price as described in the proposal and shall represent payment in full for the sleeve, valve and box completely installed.

13.02.08 Valve Boxes

Valve boxes shall be of ductile cast iron, adjustable, and furnished complete including cover, top section, center section and base. Valve boxes shall be not less than five inches in diameter with a minimum adjustment of 24 inches above and below proposed grade. The covers shall have the appropriate name cast on it ("WATER"). All parts of valve boxes, base and covers shall be coated by dipping in hot bituminous varnish. The valve box shall be placed centered on the valve nut and be placed in a plum vertical position. Payment for the materials and labor to install this item shall be included in the cost of the valve, unless otherwise specified.

13.02.09 Adjusting Water Valve Boxes

The water box materials shall be placed centered on the valve nut and be placed in a plumb vertical position. Pavement placement shall be the same as for adjusting manholes, (Section 14.04) unless otherwise specified. No payment will be allowed for adjusting water valve boxes either existing or new unless stipulated in the proposal.

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13.02.10 Fitting Restraints

All plugs, caps, tees and bends which deflect 11-1/4 degrees or more, shall be provided with suitable restraints to prevent movement, in a manner acceptable to the Engineer. The restraint shall be applied to joints in each direction from the fitting according to the pipe restraint schedule or as shown on the construction plans in order to resist the thrust of the test pressure. Details of all restraints, unless specified, are to be submitted to the Engineer for approval. All joint restraints shall be considered incidental to this section of work, and included in the cost of the fitting. When specified as being necessary MEGALUG retainer glands shall be used for all ductile iron mechanical joint pipe and fittings through 24" and fast-grip gaskets for push-on pipe. For sizes larger than those maximums, self-restraining joints such as Superlock, or Lockfast pipe shall be used, or as specified by the Engineer.

13.02.11 Retainer Glands

Retainer Glands shall conform to 2.04.05 specification for watermain joints. Payment for this item shall be included with the new pipe and fittings. No additional payment will be allowed.

13.02.12 Flanged Joints

Where specified. Flanged joints shall be drilled using the Standard 125 pound Template.

13.02.13 Plugs and Caps

The caps (Tyler 5-155, or approved equal) plugs (Tyler 5-152, or approved equal) shall be ductile cast iron, and be 2" tapered with plug. Payment for caps and plugs in place shall be bid price as found in the proposal, or otherwise specified. No payment will be made for temporary caps and plugs used for testing purposes.

13.03 CONSTRUCTION METHODS

13.03.01 General Excavation

On any contract where the Engineer will supply grades, the Contractor will notify the Engineer at least 48 hours in advance. The trench shall be excavated true to line and grade and shall be of sufficient width to provide adequate working space for making joints, compacting back fill, sheeting, pumping and of sufficient depth so that the top of pipe will have a minimum cover of 5-1/2 feet as measured from the established or proposed gutter grade, or as measured from the proposed or existing ground elevation (six feet from the top of curb).

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The Contractor shall take adequate precautions to protect all grade stakes. The Contractor shall be responsible for the cost of replacement of stakes which are damaged or lost through his negligence.

There shall be a minimum of six inches of clearance on each side of the barrel of the pipe and a maximum width of the trench at the level of the top of the pipe of not more than a distance equal to the O.D. of the pipe plus 24 inches. On paved streets, the pavement shall be cut by means of concrete

saws to a neat and straight line along the top edge of the intended trench opening, and all sawing shall be included in the cost of trench repair.

All material in excess of that needed or which is unusable shall be disposed of at such locations as the Engineer may direct. If the disposal site has been specified in the special provisions, the cost of disposal shall be included in the lineal foot cost of the pipe. If no disposal site has been specified, all excess material becomes the property of the Contractor.

The Contractor shall call Miss Dig 3 working days (Excluding Sat. Sun. and Holidays) before digging (1-800-482-7171) for the location of existing under ground systems. The Contractor is liable for all damages to existing under ground systems.

13.03.02 Sheeting and Bracing

When the depth of the trench or soil conditions require, or to prevent damage to adjacent structures and property, or to protect workmen, the sides of the trench shall be sheeted, shored and braced adequately to prevent sliding or caving. All underground utilities crossing the trench or running parallel to the proposed pipe, shall be supported and braced in an approved manner. All materials and labor for sheeting, shoring and/or bracing shall be furnished by the Contractor and will be considered incidental to the work. The Contractor is fully responsible for the sufficiency of such supports and for the integrity of his work. In the removing of the sheeting or bracing, special care shall be taken to prevent any caving of the sides of the excavation and to prevent damage to the completed work or to adjacent property, and to prevent loss of density in the pipe bedding material.

13.03.03 Obstructions

Wherever obstructions, not shown on the plans, are encountered and interfere to such an extent that an alteration to the plan is required, the Engineer shall be notified at once and shall make such changes in the plans as he deems necessary. If such a change results in a significant increase in the amount of work required of the Contractor, such a change shall be paid by

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change order to the contract, only to the extent that his change in work is not covered by contract unit prices.

13.03.04 Deflections

Deflections for obstructions or other purposes shall be governed by these allowable limits in the table presented below, unless further deflection is allowed by written communication from the Engineer.

DEFLECTION TABLE

Unrestrained Connections only

<u>Pipe Size</u>	<u>Deflection in inches</u> <u>Per 20 foot length</u>
3	27"
4	27"
6	22"
8	17"
10	17"
12	17"
14	11"
16	11"
18	9"
20	9"
24	7"

13.03.05 Laying Condition

Laying Conditions Unless Specified Otherwise, Shall conform to the most Current Michigan Department of Transportation Standard Specifications for Construction, Standard Plan for Utility Trenches, R-83-C, or subsequent revision thereof for the trench detail specified.

13.03.06 Unsuitable Conditions

Where unstable soil is encountered at pipe grade, Trench undercut and backfill will be done and Unless Specified Otherwise, Shall conform to the most Current Michigan Department of Transportation Standard Specifications or subsequent revision thereof.

13.03.07 Pipe Care

Care shall be taken to keep the interior of the pipe clean and free from dirt and other foreign materials. Bulkheads shall be used at open ends of the pipe to insure cleanliness, especially at the end of each day's work. If there is water in the trench, a water-tight plug will be utilized, and the seal must remain in place until the trench is pumped completely dry. The end shall also

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be plugged whenever the pipe is left unattended. The pipe shall be laid with the bell ends facing in the direction of laying, unless otherwise directed by the Engineer.

13.03.08 Dewatering

When dewatering is encountered, Unless Specified Otherwise, Shall conform to the most Current Michigan Department of Transportation Standard Specifications or subsequent revision thereof.

13.03.09 Push-On Joint Assembly

It is essential that the gasket groove be clean and free of foreign matter prior to lubrication and gasket installation. Wire brushing, wiping or flushing may be required. The cleaned gasket groove shall be lubricated to make gasket installation easier and to assist in proper positioning of the gasket. The gasket must be correctly positioned within the groove. Check with fingers to be sure of correct placement. Lubricate the gasket over its entire inner surface; as well as to the bevel of the plain end. The joint should be assembled with both pipes reasonably straight alignment. Any deflection should be made after the joint is assembled. On any field cut pipe, the outside edge must be beveled and smoothed as any sharp corner may cause gasket damage. Straight alignment is especially important when assembling field cut pipe. Field inspection by the Engineer must be accomplished before a field cut pipe may be joined. During cold weather installations, keep gaskets warm prior to placement within the bell, to reduce their stiffness.

13.03.10 Mechanical Joint Assembly

The inside of the bell and the plain end of the pipe must be thoroughly cleaned of foreign matter and wire brushed if necessary. All surfaces and gaskets should be brushed over with soapy water. A rubbed gasket and follower gland should be placed on the plain end “seated” in the mechanical flanged bell; and then the gasket firmly and evenly pressed into the bell. After the gland is in position for bolting, insert all bolts and make all nuts finger-tight. Keeping the plain end centrally located within the bell, begin tightening bolts, bringing all bolts up evenly at all points around the bell flange. Alternate bolts from side to side until all bolts are uniformly tight within the correct range of torque of 75 to 90 foot pounds (4” thru 24” sizes). If effective sealing is not attained at the maximum torque level, the joint should be disassembled and reassembled after thorough cleaning. Megalug style retainer glands shall be used on all mechanical joints, after all gland bolts are tight, bring all retainer bolts hp evenly around the pipe, tighten all retainer bolts by alternating tightening on opposite sides of the pipe until the twist-off nuts snap off.

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13.03.11 Existing Water Main Connections

Existing water main connections may be oversized. The Contractor shall confirm the size of the existing water main prior to the connections. No additional payment shall be made if over sized fittings are required.

13.03.12 Cut and Cap \_\_ Inch Watermain

The existing \_\_ inch watermain as shown on the construction plans, shall be cut and capped with a ductile iron, mechanical joint cap and restrained with retaining glands. The existing watermain will be thrust blocked in a manner to prevent movement of the existing watermain. Engineer will determine if the contractor's method of thrust blocking is acceptable

The completed work, Cut and Cap, \_\_ inch Watermain as shown on the construction plans and in the proposal, shall including all materials, labor and equipment, as measured and will be paid for at the contract unit price for Cut and Cap, \_\_ inch Watermain. No other payment will be allowed.

13.03.13 Compaction Tests

All soil compaction tests shall be preformed by the City with full cooperation and labor and equipment assistance from the contractor. The Contractor shall be allowed one re-test. All costs for any additional testing due to failure of the Contractor to meet density requirements shall be borne by the Contractor. These costs shall include all labor and equipment and supervision needed to re-test failed areas.

13.03.14 Field Cutting Pipe

The spigot ends of pipe which have been field cut, shall be ground to a smooth surface and painted with two coats of asphaltum metal protective paint.

13.04 WATER SERVICES

13.04.01 Definition

As used herein, water services shall be considered to include all pipe, corporation cocks, curb stops, curb boxes and all necessary appurtenances to transport water from the watermain to private property. For larger services requiring valves instead of corporation cocks, specifications will be covered in the Special Provisions.

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13.04.02 Scope

The Contractor shall, unless otherwise noted, furnish all materials, equipment, tools and labor necessary to accomplish the installation of all water services at the locations shown on the plans or as located by the Engineer. The Contractor shall conduct his work as to minimize traffic interruptions.

13.04.03 Corporation Cocks

The unit price of this item shall include all labor and materials for tapping the existing watermain and installing the corporation cocks, utilizing a Mueller # P25008, Ford # FB1000-X pack joint or approved equal. On services 1 ¼" to 2" a ductile cast iron saddle Ford # FS101 or approved equal shall be used and will be included with the corporation cock payment. Payment will be for installation complete.

13.04.04 Water Service Line

The unit price of this item shall include all labor and materials for laying copper service pipe, type K, at the location specified and of the size indicated on the plans; in the proposal, or as specified by the Engineer. The service shall be connected to the corporation cock and "goose-necked" for expansion purposes, with a minimum of 5 ½ feet of bury below the proposed grade. Payment for water service shall be by the lineal foot as measured horizontally from the centerline of the main to the centerline of the curb stop or meter pit and from the centerline of the curb stop to the connection point of the existing water service, from the connection point of the meter pit to the connection point of the existing water service shall be lineal foot of pipe used, the connection fitting shall be included in the new water service line and shall have continuity between the old and new service.

13.04.05 Curb Stop and Box

The unit price of this item shall include all labor and materials to install a working and useable curb stop and box., utilizing a Mueller # P25155, Ford # B44-444M pack joint or approved equal with 2 inch Minneapolis thread, bushed for 1 ½ inches. Connections shall be copper pipe to copper pipe. Payment will be for installation complete.

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13.04.06 Meter Pit

The unit price of this item shall include all labor and materials to install a working and useable meter pit, utilizing a Ford # W3-T Cover with Locking lid, Ford # AV94-324W pack joint Angle Yoke Key Valve, Ford # L94-24D pack joint Yoke Ell, Ford # EC-23 Expansion Connection, Ford # Y503 Series Yoke Bar, Sono-Loc 20 inch diameter 36 inch high Meter Box, or approved equal on all items, the City of Muskegon will provide the meter. The Contractor will install to finish grade at locations specified on the plans; in the proposal, or as specified by the Engineer. Payment will be for installation complete.

13.05 HYDROSTATIC TESTS

**Connecting to Existing Water Mains Prior to Pressure Testing Will Not Be Allowed.** Preliminary testing of mains shall be done by the Contractor to ascertain if there are any major leaks. Final pressure tests shall be made in presence of the Engineer, who shall receive 24 hours notice prior to testing. The Contractor shall pressure test each 5000 foot section of water main as it is constructed or as directed by the Engineer. Pressure testing of each 5000 foot section shall be made in increments of 1500 feet or less.

Before applying the specified test pressure, all air shall be expelled from the pipe. If hydrants for blow off are not available at high points, the Contractor shall make the necessary taps to release the air and insert plugs after the test has been completed, or install corporation cocks and leave them in place after testing. The Engineer shall notify the Municipal Water Department prior to making connections to any existing watermains, filling of mains with water and flushing of any watermains. Reasonable use of water from City mains for purposes of testing will be available at no cost to the Contractor.

The Contractor shall furnish proper appliances and facilities for testing and draining the main without injury to the work and surrounding territory. The Contractor shall test by filling the main with clean water under minimum hydrostatic pressure of 150 lbs per square inch. In no case shall the leakage in any stretch of pipe being tested exceed the following amounts in a 2-hour period: All pipe installed on the project shall be tested in accordance with the requirements of ANSI / AWWA C600-10.

$$L = \frac{SD \sqrt{P}}{148,000}$$

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Where;

L = testing allowance (makeup water), in gallons per hour

S = Length of Pipe tested, in feet

D = Nominal Diameter of Pipe Tested, in Inches

P = Average Test Pressure during the hydrostatic test, in pounds per square inch (gauge)

For 6" pipe – 1.00 gallons per 1000 lineal feet per two hour period

For 8" pipe – 1.32 gallons per 1000 lineal feet per two hour period

For 10" pipe – 1.66 gallons per 1000 lineal feet per two hour period

For 12" pipe – 1.98 gallons per 1000 lineal feet per two hour period

For 14" pipe – 2.32 gallons per 1000 lineal feet per two hour period

For 16" pipe – 2.64 gallons per 1000 lineal feet per two hour period

For 18" pipe – 2.98 gallons per 1000 lineal feet per two hour period

For 20" pipe – 3.32 gallons per 1000 lineal feet per two hour period

For 24" pipe – 3.98 gallons per 1000 lineal feet per two hour period

For 30" pipe – 4.96 gallons per 1000 lineal feet per two hour period

For 36" pipe – 5.96 gallons per 1000 lineal feet per two hour period

In the event that a leak is detected and located, the Contractor shall review the method of repair with the engineer for concurrence before proceeding with the repair. After repairs are made the main will be retested. The Contractor shall notify the Engineer of his intent to retest at least 24 hours in advance. However, the Contractor shall not begin the retest until all attempts have been made to correct all defects, and approval for retesting has been given by the Engineer.

The City shall be responsible for all inspection costs for the first two hydrostatic tests of any section. If a section requires a third hydrostatic retest, the Contractor may be held liable for such inspection costs incurred by the City of Muskegon personnel.

13.06 ELECTRICAL CONDUCTIVITY

All ductile iron pipe and fittings furnished and installed under this contract shall be provided with electrical conductivity connections. Electrical conductivity connections shall be brass wedges, copper cable bond, copper strap bond, conductive push-on gaskets and megalug retainer glands as specified. After installation of the mains, backfilling and the hydrostatic pressure tests are completed, the system (pipe line and hydrants) shall be tested for electrical continuity and current capacity. It is imperative that all lines and appurtenances be filled with water prior to conductivity testing. The line will be tested in sections between hydrants and or stand pipes. The hydrants and hydrant valves will be opened to bleed off any air in the lead. The hydrant will then be closed and the hydrant valve left open. Adjacent hydrants or stand pipes will serve as test section termini. The Contractor will provide electric current of 100 to 150 amperes for the test. Direct current of 150 amperes, shall be passed through the pipe line for a period of five

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minutes. Current flow through the pipe shall be measured continuously on a suitable ammeter and shall remain steady without interruption or excessive fluctuation throughout the five minute test. Insufficient current or intermittent current or arcing, indicated by large fluctuations of the ammeter needle, shall be evidence of defective electrical contact in the pipe line. The cause shall be isolated and corrected. Thereafter, the section in which the defective test occurred shall be retested as a unit and shall meet the test requirements to the satisfaction of the Engineer. All electrical connections shall be capable of carrying 60 amps. Any pipe cut and repaired with couplings shall have electrical connections. In addition to the above work the Contractor at the time the joint is made shall test each joint for contact effectiveness. The payment for electrical conductivity shall be included in the cost of the new watermain. No other payment shall be made.

13.07 Tapping Existing Water Mains 4 Inch and Larger

All work relative to tapping existing watermains shall be under the supervision of the Water Department Superintendent. The Contractor, after proper notice and coordination, shall have at the site adequate personnel, equipment and materials to properly install the tapping sleeve and valve. The existing watermain shall be exposed and the pipe cleaned to accept the tapping sleeve. The sleeve shall then be installed and valve attached. The Contractor shall then perform the pressure test at (150#) for five (5) minutes in the presence of the project Inspector. After testing, personnel from the Water Department will make the tap using City equipment. The Contractor will assist as necessary. No charges shall be made to the Contractor by the City for such described work.

13.08 Permeation

Every effort will be made to identify any contaminated areas before any work proceeds, but should the contractor encounter any contaminated area, work shall cease and the specialized gaskets for use in contaminated areas will be used. Refer to AWWA C600 section 4.1 (**Permeation**), for instructions about how to proceed in contaminated work areas.

13.09 CLEANING AND DISINFECTING

13.09.01 Flushing

After the hydrostatic tests have been satisfactorily completed, the pipe lines shall be cleaned and flushed by introducing water from the city watermains into the completed line and the water allowed to flow from the far end of the section and flushed until it runs clear. Before the main is chlorinated, it shall be flushed with potable water to remove air pockets and particulates.

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The flushing velocity in the main shall not be less than 3.0 ft/sec in accordance with AWWA C651-14, Section 4.4.2. Each section tested shall be flushed separately. All disinfecting shall be done in accordance with AWWA Standard C651-14.

13.09.02 Disinfecting

Disinfect the pipe lines with chlorine. The preferable point of application of the chlorinating agent is at the beginning of the new pipe line, or any valve section of it, and through the stand pipe or a corporation cock inserted in the horizontal axis of the newly laid pipe. Water from existing watermains should be controlled to flow very slowly into the newly laid pipe during application of chlorine. Partially open the end-most hydrant or valve on the section of pipe line under treatment to permit the flow of water through the pipe line. Continue treatment until the water flowing from the far end of the main contains a chlorine residual of at least 25 parts per million. Stop the flow of water and chlorine by closing appropriate openings. (See Sections 13.09.05 and 13.09.06 for information on chlorine products and methods of application) A field test shall be done for determining that the proper amount of chlorine residual is in the new pipe line, the test shall be done by the Contractor with testing equipment approved by the Engineer.

13.09.03 Disinfecting Duration

Permit the treated water to remain in the pipe line for at least 24 hours, after which, there should be a free chlorine residual of not less than 10 ppm. A field test shall be done for determining that the proper amount of chlorine residual is in the new pipe line, the test shall be done by the contractor with testing equipment approved by the Engineer. The main shall then be thoroughly flushed until all of the heavily chlorinated water is removed to the point of a residual chlorine content not to exceed 2 ppm, or a residual acceptable to the City of Muskegon Department of Public Works. The Contractor will test the water to see that this has been accomplished. (See AWWA C651-14, Section 4.9)

13.09.04 Sampling

The Engineer will schedule with the water filtration plant for sample pick-ups. (First sample pick-ups shall be done Monday through Thursday, no first sampling will be done Friday through Sunday) An initial set of samples will be taken after 16 hours without any water use. Then collect, using the sampling site procedures outlined and without flushing the main, two sets of samples a minimum of 15 min apart while the sampling taps are left running. Both sets of samples must pass for the main to be approved for release. A 48 hour test is required for each sample. If the results of the samples are unsafe, a repeat of the chlorine treatment and sampling is necessary. A set of samples includes all samples collected along the length of the pipeline. For new mains, sets of samples shall be collected every 1200 feet of the new

DIVISION 13  
WATERMAIN

watermain, plus one set from the end of the line, and at least one from each branch greater than one pipe length. Sampling should never be collected from hoses or fire hydrants. Sampling shall be from stand pipes or a corporation tap with a copper pipe extension. Sampling points shall have a valve and a copper gooseneck assembly. Cost of collecting samples and laboratory analysis shall be paid for by the City of Muskegon, up to a maximum of two tests per section. Any additional testing will be at the Contractors expense. All materials, labor, equipment and tools for conducting the cleaning and disinfecting treatment shall be furnished by the Contractor without cost to the City. All sampling shall be done in accordance with AWWA C651-14, section 5.1, Bacteriological Tests.

13.09.05 Chlorine Products

Chlorine products for disinfecting watermains are available in several forms. Refer to AWWA C651-14, Sec. 4.1 for the forms of chlorine which may be used in the watermain disinfection operation, and the proper methods of handling and feeding different types of chlorine into the watermain. The most convenient forms are as follows:

A. Liquid Chlorine (gas) conforming to ANSI/AWWA B301 contains 100 percent available chlorine and is packaged in steel containers usually of 100-lb, 150-lb, or 1-ton net chlorine weight. The pressure of the chlorine in the cylinder varies with the outside temperature and will usually be found to vary between 40 and 140 lbs. per square inch.

B. Calcium hypochlorite conforming to ANSI/AWWA B300 is available in granular form or in 5-g tablets and must contain approximately 65 percent chlorine by weight. The material should be stored in a cool, dry, and dark place to minimize its deterioration.

CAUTION: Tablets dissolve in approximately 7 hr and must be given adequate contact time. Do not use calcium hypochlorite intended for swimming pool disinfection, as this material has been sequestered and is extremely difficult to eliminate from the pipe after the desired contact time has been achieved.

13.09.06 Calcium hypochlorite Application

A solution of water and approved chlorine should be applied to watermains by means of solution feed chlorinating device with a power operated booster pump. High test calcium hypochlorite must be prepared as a water mixture for introduction into the watermains. The powder should be made into a paste and then thinned to about a 1% chlorine solution (10,000 parts per million). The preparation of a 1% chlorine solution requires the following proportions of powder to water.

DIVISION 13  
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<u>Product</u>	<u>Amount of Compound</u>	<u>Gals. Of Water</u>
High test calcium Hypochlorite 65% to 70%	1 lb	8.0

Prepare the 1% chlorine solution in a container and permit solids to settle. Apply the clear supernatant solution to the main by pumping through a power operated chemical feeder. The following table indicates the amount of chlorine required for each one hundred feet of various pipes.

<u>Size of Pipe</u>	<u>Vol. gals. In 100 ft. pipe</u>	<u>Amounts of chlorine or chlorine solution per 100 ft of main for 25 p.p.m.</u>	
		<b>Chlorine 100%</b>	<b>1% Chlorine Water Solution</b>
4"	65.3	.013 lbs.	.16 gal.
6"	146.9	.030 lbs.	.36 gal.
8"	261.1	.054 lbs.	.65 gal.
10"	408.0	.085 lbs.	1.02gal.
12"	587.5	.120 lbs.	1.44 gal.
16"	1044.5	.217 lbs.	2.60 gal.

13.10 METHOD OF MEASUREMENT AND PAYMENT

13.10.01 Watermain Pipe

Watermain Pipe shall be measured by lineal feet of pipe in place, including the lengths of fittings and valves, as measured along the center line of the pipe. At hydrant leads, watermain pipe shall be measured by lineal foot from the centerline of the main to the centerline of the hydrant including fittings and valves.

DIVISION 13  
WATERMAIN

13.10.02 Valves and Fittings

Valves and Fittings shall be paid for as “each”, and the unit price shall include the cost of all materials and accessories, testing installation, restraining devices and labor necessary for proper operation.

13.10.03 Restraining Devices

Restraining devices, thrust blocks, retainer glands, tie rods, etc., shall be incidental to the piping costs and the cost of which shall be included in the unit price for watermains and / or valves, fittings, etc.

13.10.04 Hydrants

Hydrants shall be paid for as “each”, and shall include all materials, accessories and labor to install this item in the proper manner. Hydrant valves shall be paid for separately as an “each” item but the cost of all the restraining devices is incidental and should be included in the cost of the pipe in place.

CITY OF MUSKEGON  
OFFICE OF THE CITY ENGINEER

STANDARD CONSTRUCTION SPECIFICATIONS

**DIVISION 14**  
**MANHOLES & CATCH BASINS**

Approved by the City Commission  
February 09, 2010

DIVISION 14  
MANHOLES & CATCH BASINS

DESCRIPTION - This work shall consist of placing pre-cast concrete structures at locations shown on the construction plans, and shall include excavation and backfilling.

MATERIALS - All Structures shall meet the requirements of Division 12, And Unless Specified Otherwise, Shall conform to the most Current Michigan Department of Transportation Standard Specifications for Construction or subsequent revision thereof.

CONSTRUCTION METHODS - Unless Specified Otherwise, All Construction Methods Shall conform to the most Current Michigan Department of Transportation Standard Specifications for Construction or subsequent revision thereof.

ADJUSTING & RECONSTRUCTING MANHOLES & CATCH BASINS - When called for on the plans, or so ordered, the Contractor shall remove as incidental the existing structure to what ever depth necessary to support the new work. The Authorized Representative or his Agent shall determine the depth of removal and type of materials required for the work. The existing brickwork shall then be washed thoroughly. The casting shall then be adjusted to grade with all masonry work and casting resting on a full 1/2 inch thick bed of regular cement mortar (3:1 mix). A mortar plaster coat 1/2 inch thick shall then be placed on the outside of the masonry work. The inside masonry work shall be smoothed and dressed to present a finished product. Wooden wedges or other organic material used for support are not acceptable. Payment for rebuilds shall be by the Vertical foot and shall be measured from the lowest elevation of the new work to the top 12 inches of masonry work. Payment for the top 12 inches of masonry work shall be paid as adjusting casting. All the above work shall be payment in full for removal and disposal of old material. In paved areas, where the casting has to be loosened, the Contractor shall remove the pavement around the casting. The opening shall be cut square, have vertical walls, be free of loose material and be graded to the proper depth (a minimum depth of 6" on Residential and 8" on Major Streets). After the casting is adjusted, the opening shall be filled with 9 sack concrete. After the concrete has set and prior to the top course, the contractor shall place Membrane Sealant material to span the joint where concrete abuts bituminous material. The Membrane Sealant material shall be placed in accordance with the manufactures application specifications. The concrete shall be left two (2) inches low at the casting, and shall meet the edge of the existing pavement leveling course. Payment for adjusting and reconstructing Manholes and Catch Basins shall be at the unit price described in the proposal and shall represent payment in full for all of the above work. Application of Membrane Sealant shall be included with the Adjusting Manhole and Catch Basin Castings. No payment shall be allowed for adjusting new structures.

MEMBRANE SEALANT

Description - The work shall consist of applying a self adhering membrane sealant around manhole castings and water valve boxes that have been adjusted with concrete.

Materials - The material shall conform to Division 2 Section 2.06.01 of the Standard Specifications.

Construction Methods - Application of the material shall be after the adjustment of the casting and immediately prior to placing HMA top course. Application of the material shall be placed at a time when contact from vehicular traffic will be minimized. The membrane shall be applied per manufacturer's specifications and shall be free of wrinkles

and folds. The material shall overlap the joint between the concrete used for adjustment and HMA leveling course a minimum of 6 inches.

Measurement and Payment - The completed work, Membrane Sealant, including all materials, labor and equipment will be included with the adjusting of manholes and water valves, no other payment will be made.

CLEANOUT - All Structures shall be kept thoroughly cleaned of all silt, debris and foreign matter and shall be free from such accumulations at the time of final acceptance.

BASIS OF PAYMENT - Payment shall be at the unit price described in the proposal and shall represent payment in full for all of the work for each unit complete.

CITY OF MUSKEGON  
OFFICE OF THE CITY ENGINEER

STANDARD CONSTRUCTION SPECIFICATIONS

**DIVISION 15**  
**HOT MIX ASPHALT PAVEMENT**

Approved by the City Commission  
February 09, 2010

DIVISION 15  
HOT MIX ASPHALT PAVEMENT

DESCRIPTION - This work shall consist of placing Hot Mix Asphalt consisting of two or more separate courses on a prepared surface at a rate shown on the plans or specified by the Engineer.

MATERIALS - All Material Unless Specified Otherwise, Shall conform to the most Current Michigan Department of Transportation Standard Specifications for Construction or subsequent revision thereof.

CONSTRUCTION METHODS - Unless Specified Otherwise, All Construction Methods Shall conform to the most Current Michigan Department of Transportation Standard Specifications for Construction or subsequent revision thereof.

ASPHALT PAVING - A self-propelled mechanical paver shall be used to place all leveling and top courses to such a depth that when compacted, it will have the thickness specified on the plans. Spreader boxes will not be allowed for these applications.

The Contractor is required to complete the top course application in one day unless given prior approval by the Engineer. If the Engineer grants permission for partial paving of the top course, the Contractor is required to traverse the same distance across all lanes to avoid a cold longitudinal joint.

ASPHALT QUANTITIES - In the event of poor grade control on any course of asphalt paving which results in a significant variance from planned quantity, and which is corrected by means of adjusting the thickness of a subsequent course, the material in excess of the verified planned quantity will be paid for as the material with the lowest bid price of those showing the discrepancy.

RANDOM WEIGHT CHECKS - On any material being paid for on the basis of weight the Engineer shall be allowed to randomly check trucks to verify the net weight of the material. The truck will be directed to a certified scale within the City of Muskegon for weighing before and after unloading. The random weight check will be considered incidental to the contract with no additional compensation allowed.

JOINTS IN ASPHALT PAVEMENTS - Without exception, and prior to the placement of adjacent asphalt mats, the vertical edges of the initial mat shall be coated with a asphalt bond coat.

SAND SEAL FOR ASPHALT JOINTS - The Contractor shall sand seal all feathered, sawed or butt joints that are produced during the top course placement. The joint shall be sealed with asphalt cement, Grade 85 - 100 penetration and broomed as necessary to entirely cover the joint. Clean 2NS Sand shall then be placed and spread upon the asphalt cement surface to prevent tracking. No payment will be allowed for Sand Seal placement.

NOTICE OF PAVING - The Contractor shall give the Engineer a minimum of 24 hours notice prior to paving so that an inspector can be assigned and no parking signs posted. If less than 24 hours notice is given and an inspector is not available the Contractor will not be authorized to proceed. In the event an inspector is available on less than 24 hour notice, the removal of any vehicles parked on the street shall be the responsibility of the Contractor.

It shall be the responsibility of the Contractor to notify the Police Department, Fire Department, and the Department of Public Works and Utilities before closing any street to traffic for construction.

BASIS OF PAYMENT - Hot Mix Asphalt will be paid for at the contract unit price per ton which price shall be payment in full for all preparation of foundation, furnishing the materials and constructing the work complete.

MEMBRANE REINFORCEMENT - Membrane Reinforcement shall be non-woven polypropylene fabric "Petromat" as manufactured by the Phillips Petroleum Company, or an approved equal. This material shall generally be installed in accordance with the manufacturer's recommendations. Membrane Reinforcement shall be placed after the bituminous leveling course is complete.

The asphaltic binder used for this project shall be Asphalt Cement, penetration grade 85-100. The asphaltic binder shall be applied at the rate of 0.25 gallons per square yard at 320 degrees Fahrenheit. Care shall be exercised so as to prevent the placement of excessive amounts of asphaltic binder. After the asphaltic binder has cured, the fabric shall be placed in the areas designated on the plans. The fabric shall be broomed to remove air bubbles and wrinkles and to insure complete contact with the road surface. Overlaps shall be four to six inches. Additional asphaltic binder shall be placed as directed by the Engineer.

Turning of machinery on the membrane shall be kept to a minimum in order to avoid damage to the fabric. A small quantity of sand or hot mix may be broadcast ahead of vehicles to prevent equipment tires from adhering to the membrane. Membrane Reinforcement shall be measured and paid for at the contract unit price per square yard. The unit price shall be payment in full for all labor, equipment and materials necessary to satisfy these specifications.

CITY OF MUSKEGON  
OFFICE OF THE CITY ENGINEER

STANDARD CONSTRUCTION SPECIFICATIONS

**DIVISION 16**  
**MISCELLANEOUS**

Approved by the City Commission  
February 09, 2010

DIVISION 16  
MISCELLANEOUS

CONTRACT COORDINATION - The Contractor may be required to coordinate this contract work with other projects which may be in progress at the same time.

No additional payment shall be allowed the Contractor because of any delay, inconvenience, or extra work caused by other contracts in the area.

GOVERNING ORDER - The Technical Specifications, which include the City of Muskegon Standard Specifications for construction and materials shall govern the construction of this project except as modified by these Special Specifications. Special attention is called to Page 40, Paragraph 34b, "Discrepancy", which defines the governing order of Specifications.

CITY'S RIGHT TO REDUCE OR INCREASE QUANTITIES - Reference is made to Part 3, Section I, Number 38 on Page 44 of the General Specifications which gives the City the right to increase or decrease the total contract price 25% without penalty.

CONSENT TO PROCEED - The Contractor shall obtain Consent to Proceed from the Engineer or Project Inspector before proceeding with construction of any of the following items:

1. Concrete Curb and Gutter
2. Trench Repair
3. Base Course
4. Leveling Course
5. Wearing Course
6. Concrete Pavement
7. Concrete Walk
8. Drive Approach

Consent to Proceed shall be issued upon confirmation that all necessary labor, equipment and material are on the site, and the area is properly prepared.

LETTERS OF RECOMMENDATION IN LIEU OF PERFORMANCE BOND - Four letters of sincere recommendation may be presented to the City Manager in lieu of a performance bond when this Contract is under the amount of \$50,000 and the successful Bidder cannot produce the appropriate performance bond. To use letters of recommendation for this purpose, your intention to do so must be disclosed as part of your bid, so that a decision on acceptability can be made prior to the contract award.

SALVAGE MATERIALS - The Contractor shall become the owner of all salvaged cast iron, brass and lead products, including manhole and catch basin castings, goosenecks, stops, corporations, valve boxes, valves, and hydrants. Determination of the disposal site and disposal of the salvaged material is the responsibility of the Contractor. No payment shall be made for salvage disposal.

LIQUIDATED DAMAGES; TIME OF THE ESSENCE - The work is to be completed on the specified completion date, and completed, ready for final payment within 30 days after receiving the "Punch List".

Liquidated Damages. The parties recognize that time is of the essence of this agreement, and that the City will suffer financial loss and be entitled to damages in the event it is not completed within the time stated above, and further if partial performance is not completed within the times provided for partial performance, if a schedule is attached to this agreement or included herein. The parties also recognize the delays, expense, and difficulties involved in proving actual losses suffered by the CITY if the work is not completed on time. Accordingly, instead of requiring any such proof the CITY and the CONTRACTOR agree that as liquidated damages for delay, (but not as a penalty) the CONTRACTOR shall pay the CITY Three Hundred Dollars (\$ 300 ) for each day that expires after the time specified for substantial completion set forth above, and the same amount for each day that expires after failure to complete partial performance if set forth in a schedule adopted in this contract. After substantial completion if the CONTRACTOR shall neglect, refuse, or fail to complete the remaining work within the time specified above for completion and readiness for final payment or any proper extension thereof granted by the CITY, the CONTRACTOR shall pay the CITY Three Hundred Dollars (\$ 300 ) for each day that expires after the time above specified for completion and readiness for final payment.

Only delays caused by labor disputes, fire, natural catastrophe or acts of God shall excuse the CONTRACTOR from the above payments. When the effects of such interruptions have ceased, in the reasonable opinion of the CITY, the said time limits shall be adjusted only for the period of delay caused thereby, and shall remain in effect as adjusted.

The foregoing provisions for liquidated damages shall, however, be in addition to and not in substitution for any other rights or remedies which the CITY may have under this agreement or otherwise against the CONTRACTOR by reason of its failure to complete construction within the time and in the manner required by this agreement.

DEFECTIVE MATERIALS AND WORK -All materials which do not meet the requirements of the specifications at the times they are to be used shall be rejected, unless otherwise authorized as acceptable by the Engineer. Any completed work that may be found to be defective before the final acceptance of the completed work shall be corrected and replaced immediately in conformance with the Specifications. The Contractor shall be responsible for any and all damages that the work may sustain prior to its acceptance, and shall rebuild, repair, restore and make good at his own expense, all injuries and damages to any portion of the work by the action of the elements or from any cause whatsoever prior to its acceptance.

CORRECTING WORK - Any unfaithful work or imperfect work or material that may be discovered before the final acceptance of the work shall be corrected and replaced immediately on the order of the Engineer. In case any material is rejected, it shall be immediately removed from the line of work and not again brought thereon. In case the order for removal and replacing as specified above is not promptly complied with after written notice, the Engineer shall be at liberty to remove and replace the same with proper materials, at the expense of the Contractor, and the cost thereof shall be deducted from the amount due him. Any omission to disapprove the work or material at the time of inspection or at the time of any estimate, shall not relieve the Contractor of any of his obligations. All work or material of whatever kind which, during the progress of construction and before its final acceptance, may become damaged, shall be removed and replaced by the Contractor with good and satisfactory work and material.

RETENTION OF IMPERFECT WORK - If any portion of the work done or material furnished under this Contract shall prove defective and not in accordance with the Contract Documents, and if the imperfection in the same shall not be of sufficient magnitude or importance to make the work unacceptable or impracticable, or will not create conditions which are dangerous or undesirable, the Engineer shall have the right and authority to retain such work instead of requiring the imperfect work to be removed and reconstructed but he shall make deductions there for in the payments due the Contractor as may be just and reasonable.

ACCIDENT PREVENTION AND SAFETY - The Contractor shall comply with all Federal, State, and local laws and regulations governing the furnishing and use of all safeguards, safety devices, and protective equipment. He shall also take any other needed actions on his own responsibility or as directed by the Engineer as are reasonably necessary to protect the life and health of employees on the job, the safety of the public, and to protect property during the construction of the project. Recommendation of the current Manual of Accident Prevention in Construction, issued by the Associated General Contractors of America, Inc., shall be used for guidance in specific situations which are not covered by Federal, State, or local laws or regulations. Special provisions in polluted areas. The Contractor shall be responsible for determining whether work in all locations involved in this contract is subject to a governmentally required health and safety plan to protect workers and others from the effects of hazardous materials in proximity of the work, in the ground or water resources involved. In the event such a health and safety plan is required, the Contractor shall familiarize itself completely with the plan and comply with all its requirements. In the event there is no health and safety plan for hazardous materials, but the Contractor reasonably should recognize that a health and safety plan is warranted, it shall be the Contractor's responsibility to notify the city before commencing work to obtain or produce, as city may require, a health and safety plan and implement it.

CONFINED SPACES - The Contractor shall have a Confined Space Policy and shall use all safeguards, safety devices and protective equipment necessary to comply with the current Federal, State and Local laws and requirements for practices and procedures for protection from the hazards of entry into confined spaces. Also, the Contractor shall make available all necessary tools, equipment and/or man power for city personnel entering confined spaces to inspect the work performed or being performed by the Contractor. In the event Contractor determines that confined spaces exist in the project, it shall notify in writing, before commencing work, the location and existence of all confined places, providing sufficient documentation for city emergency personnel to respond to any and all situations requiring entry into or dealing with confined spaces.

SUNDAY & NIGHT WORK - Ordinarily, no Sunday or night work shall be carried on which will require the presence of the Engineer or an inspector, except with the written permission of the Engineer. Sunday and night work is permissible in an emergency to the extent required to meet the emergency, but the Contractor shall notify the Engineer, as far in advance as possible, of his intention to carry on such emergency work and of the time and place of doing it.

PUBLIC ACT NO. 57 OF 1998, SECTION 2:

A contract between a contractor and a governmental entity for an improvement that exceeds \$75,000.00 shall contain all of the following provisions:

- (a) That if a contractor discovers 1 or both of the following physical conditions of the surface or subsurface at the improvement site, before disturbing the physical condition, the contractor shall promptly notify the governmental entity of the physical condition in writing:

- (i) A subsurface or a latent physical condition at the site if differing materially from those indicated in the improvement contract.
- (ii) An unknown physical condition at the site is of an unusual nature differing materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in the improvement contract.
- (b) That if the governmental entity receives a notice under subdivision (a), the governmental entity shall promptly investigate the physical condition.
- (c) That if the governmental entity determines that the physical conditions do materially differ and will cause an increase or decrease in costs or additional time needed to perform the contract, the governmental entity's determination shall be made in writing and an equitable adjustment shall be made and the contract modified in writing accordingly.
- (d) That the contractor cannot make a claim for additional costs or time because of a physical condition unless the contractor has complied with the notice requirements of subdivision (a). The governmental entity may extend the time required for notice under subdivision (a).
- (e) That the contractor cannot make a claim for an adjustment under the contract after the contractor has received the final payment under the contract.

LOCAL PREFERENCE POLICY - To establish parameters in order for the City Commission to give local preference consideration for city contracts and purchase

The City Commission may give local preference on purchases and contracts to local businesses when the lowest local business bid/price is within 1% or less of the lowest non-local bid. In cases where the total cost is expected to exceed \$1 million, the City Commission will be consulted on whether local preference may apply, prior to soliciting bids. Additionally, for the purposes of this policy, "local" shall mean a business location in the City of Muskegon.

TERRACE GRADING - This work shall consist of removing all delirious material, excavating 3 inches below finish grade and disposal of this material, and furnishing and placing of approved top soil. The top soil shall be struck off on a line between the top of curb and the outside edge of sidewalk, if no sidewalk exists, the grade line shall be as directed by the Engineer. Class A Seed, Fertilizer and Mulch as shown on the construction plans or in the special specifications shall be placed at the rate specified. Terrace grading will be paid for per lineal foot, measured along the center of the street and shall include all of the above work.

SODDING, SEEDING, TOP SOIL, FERTILIZER & MULCH

Description - This work shall consist of furnishing and placing Sod, Seed, Top Soil, Fertilizer and Mulch as shown on the construction plans or in the special specifications and shall be placed at the rate specified. Payment shall be at the unit price described in the proposal and shall represent payment in full for all of the work complete.

Materials - All Material, shown on the construction plans or in the proposal, Unless Specified Otherwise, Shall conform to the most Current Michigan Department of Transportation Standard Specifications for Construction or subsequent revision thereof.

Construction Methods - Unless Specified Otherwise, All Construction Methods Shall conform to the most Current Michigan Department of Transportation Standard Specifications for Construction or subsequent revision thereof.

Basis of Payment - Payment shall be at the unit price described in the proposal and shall represent payment in full for all of the work for each unit complete.

HYDROSEEDING - This work may be done in place of seeding and in accordance with the most Current Michigan Department of Transportation Standard Specifications for Construction or subsequent revision thereof.

The Contractor shall use care spraying around signs, drives, sidewalk, and personal property. Excess material shall be rinsed promptly from these areas with clear water. Application rates shall be the same as conventional methods: Class A seeding - 220# per acre, Hydromulch - per manufacturer, Adhesive - per manufacturer, Fertilizer - 228# per acre, and water as necessary.

Payment shall be at the unit price bid per square yard and shall include all of the above and other work needed to place the hydroseeding. No other payment will be allowed.

TRAFFIC CONTROL - Traffic Control shall be in accordance with the "Michigan Manual on Uniform Traffic Control Devices" and shall be the responsibility of the Contractor to provide, place and maintain signs, barricades and lights for the closing of the street as directed by the Engineer for the entire period of construction.

Type III barricades and signs shall be placed at all intersections leading to the construction site, as well as the site itself, in accordance with the plans for Traffic Control . The Contractor shall review barricade and sign placement with the Engineer for conformance approval.

As part of the Traffic Control Item, It shall be the responsibility of the contractor to make every reasonable attempt possible to maintain traffic during the construction period. While it may be impossible at times to permit traffic around the work zone it will be the responsibility of the contractor to keep the actual work zone to a minimum. Should it be necessary to close a portion of the street the contractor must maintain a level of coordination with the residence so that they do not unknowingly become stranded, The contractor shall devise a plan to meet the ingress / egress needs of the residence. In no instance shall the roadway be inaccessible while no work is being performed.

All costs incurred in maintaining traffic are to be considered part of the Traffic Control pay item. No additional payments will be made for the maintenance of traffic. Payment for Traffic Control shall be by the unit and rate as described in the proposal. No other payments shall be made.

SAW CUTS - The Contractor shall saw cut all meets relative to sidewalk, driveway, or pavement construction unless waived by the Engineer. No payment shall be allowed for Saw Cutting unless specified in the proposal.

SOIL DENSITY - When soil density is specified, the Contractor shall deposit the backfill or fill in layers not to exceed 12" in depth, loose measure, parallel to the finished grade for the full width of area to be filled. Each layer shall be compacted by the use of suitable equipment to a minimum of 95% of the maximum unit weight unless otherwise specified. The maximum unit weight will be determined by the current method of testing for the compaction and density of soil, A.A.S.H.T.O. designation T-99 as revised. The Contractor shall provide all labor and equipment necessary to prepare the site or location for density testing. The City of Muskegon will provide

personnel and testing equipment and will conduct the density testing at specified locations, and will conduct one retest on failed sections at no cost to the Contractor. When additional testing is required, due to inadequate compaction, the Contractor will be charged for time, materials, equipment and all incidental costs involved. No payment shall be allowed for trench or sub grade density.

ADJUSTING SMALL CASTINGS - Whenever small castings are encountered outside the paved area they shall be adjusted at no cost to the City unless stipulated within the proposal. Castings for stop boxes, meter pits, and water valves are included in the scope of this item. If the existing materials are deficient they shall be replaced by the City at no cost to the Contractor under the same provisions as defined in Stock Room Materials.

### TRENCH REPAIR - VARIOUS TYPES

#### General Information - for all types.

*Removing Existing Pavement:* The Contractor shall remove the existing pavement to a sufficient width to eliminate undermining of adjacent paved areas and to provide safe, adequate working conditions.

*Saw Cutting Trench Perimeters:* The Contractor shall saw cut, using straight lines, parallel with the trench center line or as directed by the Engineer.

Secondary Trench Rehabilitation: - Trenches that extend beyond the principal trench saw cut edge, and are caused by the installation of lateral mains, connections or hydrant installations shall be paid by the lineal foot method, measured on the trench center line, beginning at the edge of the principal trench, in accordance with the pavement type defined in the proposal.

#### Local Street - Type I to include:

1. Remove existing pavement including curbs and gutters.
2. Saw cut trench perimeters.
3. Place Concrete Pavement, 6" thick with curbs and gutters as existing. Extra strength concrete as proposal designated.

#### Local Street - Type II to include:

1. Remove existing pavement including curbs.
2. Saw cut trench perimeters.
3. Place Concrete Base Course, 6" thick, with curbs. Extra strength concrete as proposal designated.
4. Place Bituminous Surface Mixture, @ 165# per square yard.

#### Local Street - Type III to include:

1. Remove existing pavement, including curbs and gutters.
2. Saw cut trench perimeters.
3. Place 22A Aggregate Base Course, 6" thick.
4. Place Curb and Gutter per existing.
5. Place Bituminous Leveling Mixture @ 165# per square yard.
6. Place Bituminous Bond Coat @ 0.05 Gal. per square yard.

7. Place Bituminous Top Mixture @ 165# per square yard.

Local Street - Type IV to include:

1. Remove existing pavement, including curbs and gutters.
2. Saw cut trench perimeters.
3. Place Curb and Gutter per existing.
4. Place Bituminous Base Mixture @ 440# per square yard in two lifts.
5. Place Bituminous Bond Coat @ 0.05 Gal. per square yard.
6. Place Bituminous Top Mixture @ 165# per square yard.

Local Street - Type V to include:

1. Place 22A Aggregate Base Course, 6" thick.

Major Street - Type I to include:

1. Remove existing pavement, including curbs and gutters.
2. Saw cut trench perimeters.
3. Place Concrete Pavement, 8" thick, including curb and gutter. Extra strength concrete as proposal designated.

Major Street - Type II to include:

1. Remove existing pavement, including curbs and gutters.
2. Saw cut trench perimeters.
3. Place Concrete Base Course, 8" thick, including curb and gutter. Extra strength concrete as proposal designated.
4. Place Bituminous Bond Coat @ 0.05 Gal. per square yard.
5. Place Bituminous Top Mixture @ 220# per square yard.

Major Street - Type III to include:

1. Remove existing pavement, including curbs and gutters.
2. Saw cut trench perimeters.
3. Place Curb and Gutter per existing.
4. Place Aggregate Base Course (22A), 8" thick.
5. Place Bituminous Leveling Mixture @ 165# per square yard.
6. Place Bituminous Bond Coat @ 0.05 Gal. per square yard.
7. Place Bituminous Top Mixture @ 220# per square yard.

Major Street - Type IV to include:

1. Remove existing pavement, including curbs and gutters.
2. Saw cut trench perimeters.
3. Place Curb and Gutter per existing.
4. Place Bituminous Base Mixture @ 660# per square yard in two lifts.
5. Place Bituminous Bond Coat @ 0.05 Gal. per square yard.
6. Place Bituminous Top Mixture @ 220# per square yard.

State Trunk Lines - Contractor Note: No cost differentials shall be in effect for the various types of materials used on State Trunk Lines. The Contractor shall replace

pavement to the same section as found and shall conduct his work to conform to the Michigan Department of Transportation permit authorizing work in State right of ways. Concrete materials shall be 9 sack minimum.

Lawn Rehabilitation, Sod to include:

1. Place Prepared Soil, 3" thick.
2. Place Seed or Sod, Class "A" or "B", as proposal designated.

Lawn Rehabilitation, Seed to include:

1. Prepared Top Soil, 3" thick
2. Class "A" Seeding - 100# per acre.
3. Mulch - 2 Ton per acre
4. Fertilizer - 240# per acre.
5. Water as necessary.

The Contractor may hydroseed (using the same application rates as above), with the approval of the Engineer. Payment shall be by the lineal foot as measured along the centerline of the trench.

Concrete Sidewalk to include:

1. Remove existing sidewalk.
2. Saw cut trench perimeters.
3. Place Concrete Sidewalk per existing.

Trench Repair - Special to include:

1. Prepared Soil, 3" thick.
2. Sod, Class "A".
3. Concrete Curb as required.
4. Concrete Drive Approach.
5. Concrete Sidewalk.
6. Gravel Shoulder, 6" thick.
7. All other disturbed structures or areas shall be rehabilitated to the original condition.

Payment for Trench Repair - Special shall be by the lineal foot, measured on the pipeline centerline, as described in the proposal. Payment shall be in full for all of the above items.

Trench Repair - Payment - Payment for Trench Repair, as described in the proposal, shall be payment in full for all work described under the above various types. Lineal Foot measurements shall be measured on the center line of pipe installation. No other payment shall be made.

## SOIL EROSION CONTROL

Description - The contractor shall install and maintain all soil erosion and sedimentation (SESC) controls, as indicated on the plans or as directed by the Engineer, to prevent soil from entering storm drains, surface waters and areas beyond project limits.

Catch Basin Protection - Catch basin inlet protection drops (Silt Sacks with Overflow Capability) shall be installed in all new and existing basins. Geotextile fabric covers or wraps are not allowed.

Silt Fence - Silt fence shall be trenched in as required. Clean fence when soil reaches 50% of fence height.

Soil Removal - Remove soil tracked onto paved public roads on a daily basis. Vacuum methods are preferred, but sweeping is acceptable if material is returned to a suitable location.

Inspection - Inspect all controls measures on a weekly basis or after each rainfall event. Clean, replace or repair as necessary, to ensure proper function.

Temporary Soil Control Duration - All temporary control measures shall remain in place until all disturbed areas are adequately stabilized.

Payment - All costs for SESC controls, except for the catch basin inlet protection drops, shall be included in the excavation pay item, unless noted otherwise. No other payment shall be made unless authorized by the Engineer.

CITY OF MUSKEGON  
OFFICE OF THE CITY ENGINEER

STANDARD CONSTRUCTION SPECIFICATIONS

**DIVISION 17**  
**PUBLIC UTILITIES**

Approved by the City Commission  
February 09, 2010

DIVISION 17  
PUBLIC UTILITIES

GAS - The DTE Energy (Michigan Consolidated Gas Company) requests that the Contractor refrain from cutting any gas lines. The Contractor will work around the live gas mains, if the Contractor requests the removal of a live gas line to make construction easier, the Gas Company will do this cutting with their own crew and bill the Contractor for this work. If an abandon gas main is in the way of construction the Gas Company will make the first cut to confirm that it is abandoned, at no cost to the Contractor, after this the Contractor can remove the abandon gas main as needed. This work shall be included item of work being performed and no payment shall be made by the City or the Gas Company.

Where the Contractor encounters any gas line that is parallel or transversally to the trench that he is excavating, he is to support the gas line until the back filling is in place. Where conditions are such that this would be impossible, he is to sheet the trench or brace the pipe so that it meets with the satisfaction of the Engineer and the Gas Company. This work shall be included item of work being performed and no payment shall be made by the City or the Gas Company.

The Contractor shall call MISS DIG three (3) Working Days Excluding Saturday, Sunday and Holidays before digging 1-800-482-7171, for staking the location of the existing gas mains. The Contractor will be responsible for any damages that occur during the course of his excavation to any of the Gas Company utilities.

POWER - The Consumers Energy Company will not brace or support any power poles, if any power poles need to be braced or supported during the construction the Contractor will be responsible for this work, there may be instances where sheeting by each pole would more desirable than bracing, all of the above work shall be included item of work being performed and no payment shall be made by the City or the Power Company for bracing or supporting power poles.

No poles may be moved or climbed by anyone except employees of the Consumers Energy Company. Power poles in conflict with construction will be moved by Consumers Energy Company at no cost to the contractor, if the Contractor requests the relocating of a power pole to make construction easier, the Power Company will do this relocating with their own crew and bill the Contractor for this work. No payment shall be made by the City or the Power Company for the above work.

The Contractor shall call MISS DIG three (3) Working Days Excluding Saturday, Sunday and Holidays before digging 1-800-482-7171, for staking the location of the existing electric lines. The Contractor will be responsible for any damages that occur during the course of his excavation to any of the Power Company utilities.

TELEPHONE - The Verizon Telephone Company will not brace or support any phone poles, if any phone poles need to be braced or supported during the construction the Contractor will be responsible for this work, there may be instances where sheeting by each pole would more desirable than bracing, all of the above work shall be included item of work being performed and no payment shall be made by the City or the Phone Company for bracing or supporting phone poles.

No poles may be moved or climbed by anyone except employees of the Phone Company. Phone poles in conflict with construction will be moved by the Phone Company at no cost to the contractor, if the Contractor requests the relocating of a phone pole to make construction easier,

the Phone Company will do this relocating with their own crew and bill the Contractor for this work. No payment shall be made by the City or the Phone Company for the above work.

Where the Contractor encounters any underground conduits that are parallel or transversally to the trench that he is excavating, he is to support the conduits until the back filling is in place. Where conditions are such that this would be impossible, he is to sheet the trench or brace the conduit so that it meets with the satisfaction of the Engineer and the Phone Company. No payment shall be made by the City or the Phone Company for the above work.

The Contractor shall call MISS DIG three (3) Working Days Excluding Saturday, Sunday and Holidays before digging 1-800-482-7171, for staking the location of the existing phone lines. The Contractor will be responsible for any damages that occur during the course of his excavation to any of the Phone Company utilities.

CABLE T.V. - The Comcast Cable T.V. Company uses the phone and power poles, and if any phone or power poles are relocated the Cable Company will relocate with them at no cost to the Contractor, if the Contractor request the relocating of a cable lines to make construction easier, the Cable Company will do this relocating with their own crew and bill the Contractor for this work. . No payment shall be made by the City or the Cable Company for the above work.

The Contractor shall call MISS DIG three (3) Working Days Excluding Saturday, Sunday and Holidays before digging 1-800-482-7171, for staking the location of the existing cable lines. The Contractor will be responsible for any damages that occur during the course of his excavation to any of the Cable Company utilities.