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SOUTH COUNTY WATER SYSTEM

STANDARD SPECIFICATIONS

MONROE COUNTY DRAIN COMMISSIONER

MONROE COUNTY, MICHIGAN

South County Water System

Standard Specifications

MCDC

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GENERAL CONDITIONS

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G1) Definition of Term as used in these standard specifications:

a) Owner: Monroe County, South County Water System.

b) Engineer: The Engineer on the staff of the Owner or the engineering firm or individual hired by the Owner to provide on site inspection and / or consultation for the project.

c) Project: The proposed water system improvements which when built and accepted will become part of a public system.

d) Developer: That person, firm or company who has employed the Contractor to build the project. The project is owned by the developer until it is accepted by the Owner.

e) Contractor: The individual, firm or corporation who is awarded the contract to construct the utilities by the developer.

G2) A preconstruction conference shall be set up by the Developer and Contractor with the Owner at least one week prior to commencing construction.

G3) A construction schedule shall be furnished to the Owner at the preconstruction meeting.

G4) All water mains installed as part of the South County Water System shall have the installation and acceptance testing inspected and witnessed by the Engineer and the South County Water System in accordance with these specifications. The Contractor shall provide the Superintendent of the South County Water System and the Owner with 48 hours notice prior to initiating construction or scheduling disinfection or testing procedures.

G5) The Contractor shall receive an approval letter from the Owner, required state permits, agreements, financing and have held a preconstruction meeting before commencing construction.

G6) If any requirements of the following specifications are in conflict with the manufacturer's recommendations, the manufacturer's recommendations shall be utilized.

G7) "American Iron and Steel (AIS)"-All iron and steel used in a project will be and/or have been produced in the United States in a manner that complies with the AIS requirements, unless a waiver of the requirements is approved or the State made the determination in writing that the AIS requirements do not apply to the project, and the Contractor will provide any further verified information, certification, or assurance of requirements, as may be requested by the Purchaser.

G8) To protect underground utilities, the contractor shall contact "Miss Dig" by calling 1-800-482-7171, at least 72 hours before commencing construction. The Owner is not responsible for unmarked or mismarked utilities or associated damage.

G9) AS – BUILT PLANS – Unless approved otherwise by the Owner, the Agency providing the design water main construction plans shall be responsible to provide As-Built Construction plans within 45 days after the completion of the water main construction. To facilitate this process, the contractor in cooperation with the construction inspector shall maintain and furnish to the design agency inspection reports. The Design Agency shall submit to South County Water electronic files of the As-Built construction plans in PDF, My LARS and Auto-CAD format. The As-Built Plans shall be prepared and furnished with appropriate control points included in the plans that are tied into the North American Vertical Datum of 1988 (NAVD 88).

G10) MAINTAINING TRAFFIC-The Contractor shall so conduct his work that inconvenience to residents and the traveling public is minimized. Prior to the start of construction the

Contractor shall meet with and obtain the permission of the Monroe County Road Commission for the closing of any street to traffic or for modifying traffic flow on any street and to establish requirements for signing, flashers, flagmen, etc. Work area protection and work area lighting both within and outside the work limits shall be the responsibility of the Contractor involved.

G11) SOUTH COUNTY WATER SYSTEM RULES AND REGULATIONS – Development Owners and Development Contractors are advised that the South County Water System has specific rules and regulations that apply to water service customers served by the South County Water System. These rules and regulations are herewith included in these specifications. Owners and Contractors shall secure the latest revision of the rules and regulations from the South County Water System Office. Any conflicts between the South County Water System Rules and Regulations and these specifications shall be brought to the attention of the Owner or the Owner's Engineer who shall render a decision to resolve the conflict. The decision of the Owner or the Owner's Engineer shall be final.

SECTION 1

WATER MAINS

1.1 **SCOPE / DESIGN REQUIREMENTS** - This item shall include the furnishing and installation of the Water Mains of the type and sizes as herein specified and as shown on the plans, including all fittings and other appurtenances and the making of all connections.

1.1a All water mains shall be AWWA C900 for 8" and 12" main, and AWWA C905 for diameters 16" and larger, as herein specified and as shown on the drawing. Typically, water mains placed along Monroe County Section roads shall be 12" diameter minimum and mains placed in subdivisions and or site condominiums shall be 8" diameter minimum. Water mains shall be looped with two separate connection points with existing water mains as determined by owner. Pipe fittings shall be ductile iron as herein specified. (See Section 1.4)

1.1b Water mains in public right-of-way are subject to review and approval of the Monroe County Road Commission, and shall meet their master utility layout to the extent possible. Water mains on private property, including private road shall be within a 15' public water main easement centered over the water main.

1.1c The minimum cover over any water main shall be 4 feet from proposed finish grade. Maximum cover shall not exceed 6 feet.

1.2 **PVC PLASTIC PIPE AND FITTINGS** - PVC pressure pipe shall meet the requirements of AWWA C900 for 8" and 12" main and C905 for diameters 16" and larger. The outside diameter (OD) of PVC pressure pipe shall conform with the OD dimensions of ductile iron pipe. PVC pressure pipe shall have a dimension ratio of 18 and a minimum pressure class of 150 PSI.

1.2a Bell and spigot pipe shall have an integral wall-thickened bell end designed for joint assembly using a factory installed elastomeric gasket conforming to ASTM F477 to affect the

pressure seal. All pipe shall be designed for direct connection into ductile iron pipe and fittings. The pipe shall have a nominal laying length of 20 feet. Pipe shall be assembled in accordance with the manufacturer's recommendations, using an approved joint lubricant, and so as to make watertight joints when installed. Fusible joints shall meet the requirements of C900 and C905, respectively.

1.2b All fittings shall meet the requirements of AWWA C153 (ANSI A21.53) Pressure Class 350 or AWWA C110 (ANSI A21.10) Pressure Class 350. All fittings shall be provided with a bolted mechanical or push-on rubber gasketed joint meeting the requirements of AWWA C111 (ANSI A21.11). All fittings shall be constructed of ductile iron. Fittings shall be inside coated with a cement-mortar lining in accordance with AWWA C104 (ANSI A21.4). Also, fittings shall be outside coated with a bituminous coating approximately 1 mil in thickness and wrapped with a polyethylene encasement. The polyethylene film shall be a minimum 8-mil thickness and installed as per AWWA C105 (ANSI 21.5). All mechanical joint fitting bolts, nuts, and washers shall be #304 stainless steel or COR-BLUE, Cor-Ten coated with a ceramic-filled, baked-on fluorocarbon resin.

1.2c Restrained joints shall be provided where shown on the drawings or as called for in these specifications. Restrained joints shall incorporate Series 1300 and Series 1350 Restrainers as manufactured by Uni-Flange Corporation; Meg-A-Lug Series 2500 Restraints for C900 PVC and Meg-A-Lug Series 2800 Restraints for C905 PVC pipe as manufactured by EBAA Iron Inc., or approved equal. Restraining devices and T-bolts shall be of ASTM A535, Grade 65-45-12 ductile iron, and clamping bolts and nuts shall be of Core-Ten steel.

1.2d All ductile iron fittings installed with a granular pipe embedment material as subsequently specified in Paragraph 1.8 shall be field wrapped for distance of 5'-0" each side of the joint with a minimum 8 mil thick polyethylene encasement meeting the requirements of AWWA C105 (ANSI 21.5). All overlaps and seams shall be completely taped. All rips, punctures and other

damage to the polyethylene shall be acceptably repaired. Tape shall be 2-inch wide plastic backed adhesive tape, which will bond securely to both metal surfaces and the polyethylene film.

1.2e The installation of PVC water main shall include the providing of a detectable tracer tape continuously on top of and directly over the centerline of the pipe installed for positive pipe location by pipe/cable locators and a visible warning to excavators. The detection tape shall be not less than 2 inches wide; shall be an inert, bonded layer plastic with a metallized foil core; shall be blue per APWA Uniform Color Code with minimum 1-1/4 inch high lettering warning of buried water line repeated at least every 24 inches; and shall be buried in the trench approximately 1-1/2 feet above the pipe barrel.

1.2f The materials and methods of manufacture shall be subject to inspection at all times and the complete pipes, fittings, etc. shall be subject to inspection and rejection at the factory, trench, or other point of delivery. Further, all said components are subject to rejection until the final completion and adjustment of the Contract.

1.2g The manufacturer shall furnish an affidavit that all tests and requirements of the pipe, fittings and appurtenances have been fully met. A copy of the affidavit, indicating the project on which the material is to be used, shall be forwarded to the Owner and the Engineer prior to construction.

1.3 HDPE PIPE – Directional drilled High Density Polyethylene (HDPE) pipe may be allowed at the discretion of the South County Water System superintendent or designated representative on a case-by-case basis.

1.3a HDPE pipe shall meet the requirements of AWWA C906 and ASTM D3035. Installation shall be in accordance with ASTM D2774.

1.4 DUCTILE IRON PIPE AND FITTINGS – DUCTILE IRON PIPE IS NOT ALLOWED WITHOUT EXPRESS APPROVAL FROM OWNER AND OWNER'S ENGINEER. IN CASES

WHERE IT IS APPROVED FOR USE, IT SHALL MEET THE FOLLOWING STANDARDS. Ductile iron pipe shall meet the requirements of AWWA C151 (ANSI A21.51). The minimum pipe thickness shall be ANSI Thickness Class 53 or Pressure Class 350 per AWWA C150 (ANSI A21.50) for 16" diameter pipe size & smaller. Pipe joints shall be bolted mechanical or push-on rubber gasketed meeting the requirements of AWWA C111 (ANSI A21.11) except where restrained joints are required. Pipe shall be furnished in minimum 18-foot lengths. Ductile iron pipe may be permitted in sizes 3-inch through 16-inch diameters. All pipe shall be inside coated with a cement-mortar lining in accordance with AWWA C104 (ANSI A21.4). Pipe shall be outside coated with a bituminous coating approximately 1 mil in thickness and wrapped with a polyethylene encasement. The polyethylene film shall be a minimum 8-mil thickness and installed as per AWWA C105. All nuts, bolts, and washers used on mechanical joint pipe shall be #304 stainless steel or COR-BLUE, Cor-Ten coated with a ceramic-filled, baked-on fluorocarbon resin as manufactured by NSS Industries or approved equal.

1.4a All fittings shall meet the requirements of AWWA C153 (ANSI A21.53) Pressure Class 350 or AWWA C110 (ANSI A21.10) Pressure Class 350. All fittings shall be provided with a bolted mechanical or push-on rubber gasketed joint meeting the requirements of AWWA C111 (ANSI A21.11) or restrained joint type, as shown on the detail sheet. All fittings shall be constructed of ductile iron. Fittings shall be inside coated with a cement-mortar lining in accordance with AWWA C104 (ANSI A21.4). Also fittings shall be outside coated with a bituminous coating approximately 1 mil in thickness and wrapped with a polyethylene encasement as specified in the preceding for ductile iron pipe. All mechanical joint fitting bolts, nuts, and washers shall be supplied with #304 stainless steel or COR-BLUE, Cor-Ten coated with a ceramic-filled, baked-on fluorocarbon resin as manufactured by NSS Industries or approved equal. The branch on tees for hydrants shall be ductile iron or PVC pipe using joint restraints on all pipe and fitting joints.

1.4b For push-on joints, the surface to be in contact with rubber gasket shall be wiped clean and dry just prior to making the joint and, when making the joint, a lubricant shall be used in accordance with the manufacturer's recommendations. With mechanical joints, the surfaces to be in contact with the rubber gasket shall be brushed with soapy water to remove all sand and grit just prior to making the joint. Restrained joints shall be U. S. Pipe TR Flex; Meg-A-Lug Series 1100 Mechanical Joint Restraint as manufactured by EBAA Iron Works Inc.; or approved equal.

1.4c The manufacturer shall furnish an affidavit indicating that the pipe, fittings and appurtenances have been manufactured and tested in accordance with the requirements of the applicable referenced standards. A copy of the affidavit, indicating the project on which material is to be used, shall be forwarded to the Owner and the Engineer prior to construction.

1.5 PIPE LAYING — Pipe sections shall be strung along the route of the mains so as to interfere least with pedestrian and vehicular traffic and to protect the pipe as fully as possible. Care shall be taken at all times in handling the pipe so as not to damage it in any way and at no time shall other pipes or material be placed in the pipes.

1.5a Rubber tired equipment must be used on all paved surfaces during pipe laying and all related operations. The use of cleated metal treaded equipment shall not be permitted. Heavy equipment shall not be driven over streets, but shall be moved by trailer.

1.5b The mains shall be laid in the locations and at the grades shown on the plans, except as specifically permitted or ordered by the Engineer or Owner in order to avoid existing or proposed utility lines or any other obstructions encountered in the progress of the work; to secure a more readily accessible position for trenching; or to facilitate the location of various appurtenances of the mains.

1.5c Existing utilities and other obstructions along the route of construction shall be uncovered by the Contractor and their elevations determined at least 200 feet in advance of

pipe laying. While the drawings indicate the location of existing utilities in accordance with the best information presently available neither the Owner nor his Engineer assumes any responsibility for the accuracy of the location of all utilities shown.

1.5d All utilities, when encountered, shall be adequately supported, shored up or otherwise protected whenever exposed in the excavation. Where bridging cannot be supported by a firm foundation, the Contractor shall provide vertical support for the bridging, including any lateral bracing necessary to provide a firm and substantial support.

1.5e When abrupt changes in the grade of the main are necessary to avoid existing utilities or other obstructions, suitable fittings, usually 11-1/4° bends, shall be used unless otherwise specified, so as to secure an easy flow of liquid and to provide required pipe cover and separation. Use of 90° bends is prohibited for either vertical or horizontal changes in alignment. Where 90° change in alignment is required, two 45° bends with a minimum of 4' of pipe between the bends shall be used. Restrained pipe joints shall be provided through the section of main being deflected to avoid other utilities. Where possible and when excessive lengths of cover over the main being in excess of 4 feet will not be experienced, pipe joint deflections will be permitted in lieu of using bend fittings. Pipe joint deflections shall not exceed the manufacturers recommendations. Pipe shall be laid at a minimum 10 foot horizontal distance and at a minimum 18 inches vertical distance from any sewer lines at their crossing, both as measured between the outside of the pipe walls. Where these minimum distances cannot be maintained, the Contractor shall at his expense either provide one standard 20 foot length of DI encasement pipe centered on the sewer or install one full length of water main pipe so both joints will be as far from the sewer as possible.

1.5f The Contractor is responsible for disinfection of the water mains in accordance with AWWA C651 latest version, as subsequently specified. The Contractors attention is directed to Section 4.3 – (Preventive and Corrective Measures During Construction, of AWWA C651). All

pipes shall be thoroughly cleaned inside and outside before being lowered into the trench; shall be kept clean during and after laying; and the end of the pipe shall be sealed with a watertight plug when pipe laying is stopped for any reason. If, in the opinion of the SCW Superintendent or Engineer, the pipe contains dirt that will not be removed during subsequent flushing operation, the interior of the pipe shall be cleaned and swabbed, as necessary, with a 1% chlorine solution (10,000 mg/l) prepared by mixing one pound of high-test calcium hypochlorite (65-70% Chlorine) and 7.5 gallons of water.

1.6 **TRENCHES** - Except where otherwise specifically required or permitted by the Engineer, the water mains shall be laid in open trench excavated to a depth sufficient to provide not less than 4 feet of vertical cover from proposed finish grade and not less than 4 inches of clearance between the bottom of pipe barrel and the bottom of the trench. However, pipes shall be installed at a greater depth when shown on the plans; when necessary to pass under other utilities or obstructions; or where necessary to prevent high points in the main. In addition to the minimum vertical cover, where any pipes parallel roadside ditches or streams a lateral cover shall be provided at least equal to the specified vertical cover. Excessively long sections of water main installed deeper than 6' of cover is prohibited.

1.6a The width of the trench shall not be more than 24 inches greater than the outside diameter of the pipe, except at joints, where sufficient space shall be provided for properly making the joints without raising the length of pipe above the solid bottom of the trench. Care shall be taken to detect and remove any large stones or other debris that might be encountered in the bottom of the trench, which would damage the pipe or be detrimental to the proper bedding of the pipe.

1.6b Where the water main enters the paved limits of a street, alley, driveway or parking area, the pavement shall be neatly cut and the main installed in the open trench. Trench excavation shall include the removal of existing pavements.

1.7 **ANCHORS AND SUPPORTS** - Concrete thrust blocks shall be provided as called out in the plans or as directed by the Owner or Engineer at all fittings, valves or changes in direction of the pipe and for all plugs in lieu of or in addition to restrained joint pipe previously specified within Section 1.3. Thrust blocks shall be constructed of Class I concrete and shall be placed against firm undisturbed soil. Class I concrete shall have a 4000 PSI minimum 28 day compressive strength.

1.8 **DEAD ENDS** – Dead ends should be avoided whenever possible. All dead ends require review and approval by the Owner. Generally, the following are maximum dead end lengths:

8" Main: 600 feet

12" Main: 1,000 feet

All dead ends, if approved, are to end with an inline valve of the mainline pipe diameter, 10 feet of mainline pipe beyond the valve, a reducer, hydrant valve and hydrant. South County Water may, at its discretion, require automatic flushers to be installed at dead ends.

1.9 **PIPE EMBEDMENT** - Pipe bedding shall include the material placed beneath the pipe to the depths of excavation previously specified and around and over the pipe for a distance of 12 inches above the top of the pipe barrel. The material shall consist of crushed stone equivalent to Ohio #8 Coarse Aggregate/MDOT 25A(Equivalent 2012 MDOT Specification for Construction) and shall be provided at the expense of the Contractor. The bedding material shall be shaped to conform to the bottom quadrant of the pipe barrel. The Owner reserves the privilege of altering the type of bedding material and regulating the exact grading of the bedding material depending upon the water characteristics of the trench. At least the minimum of bedding shall be provided under pipe bells. After the pipe is laid, the bedding material shall be shovel placed and tamped to fill all voids. All embedment material shall be carefully placed so as not to damage the joints or displace the pipe and no material shall be dropped directly on the pipe.

1.10 BACKFILLING - Backfill shall include the material placed above a plane 12 inches above the top of the pipe barrel.

1.10a Trenches located within the public right of way shall be backfilled in accordance with the requirements of the Monroe County Road Commission and approved by Owner.

1.10b Trenches coming within paved or stoned streets, alleys, driveways and parking areas shall be backfilled for their full depth with MDOT 21AA dense graded aggregate. The material shall have a Standard Proctor density of at least 125 pounds per cubic foot, and shall be placed and compacted to minimum density of 95% of the Standard Proctor density in a manner acceptable to the Engineer.

1.10c Where the mains are installed along and across pavements, the specified compacted backfill material shall also be provided for any portion of the trenches falling within that area below a line drawn at 45 degrees to the horizontal from one foot outside the edge of the pavement and above the horizontal plane of the pipe embedment material.

1.10d The Engineer or Owner may check compaction at any time.

1.10e The Monroe County Road Commission reserves the right to require additional compacted granular backfill and / or to request the use of control density backfill material in lieu of compacted granular backfill as necessary for adequate support of road shoulder and / or pavement. Control density backfill material shall consist of a mix of Portland cement, fly ash, and selected granular materials, with a minimum density of 130 pounds per cubic foot and a maximum compressive strength of 100 psi.

1.10f Where trenches are backfilled with granular material, the excess excavated material must be removed by the Contractor at the expense of the Contractor.

1.10g The cost of all backfill material shall be included in the price bid per lineal foot for the water mains.

1.10h For all pavements removed, a temporary pavement shall be provided in accordance with the requirements of the Monroe County Road Commission as subsequently specified.

1.10i For backfilling the remainder of the trenches, as much of the excavated material as possible shall be used. The material shall be free of excessively large stones, boulders or other harmful debris and may be placed by hand or machine.

1.10j Special care shall be taken in backfilling any trenches under sidewalks to compact the backfill material such that it shall be equal to the degree of compaction of the adjacent undisturbed earth; however, in no case shall the compaction be less than 95% as determined by the Standard Proctor Test.

1.10k The Contractor shall be required to regrade and reshape all road shoulders and all ditches and swales from existing high points to existing drainage structures and pipe outlets, and replace all drive connections which are disturbed during construction at his expense. The Monroe County Road Commission shall establish all ditch grades to be restored prior to construction. Ditches, which are reshaped, shall have reasonable side slopes. Vertical or steep slopes will not be permitted. Side slopes shall not be greater than 2 to 1.

1.11 **BORE AND JACK CASING PIPE** - Where specifically called out on the plans, the contractor shall install the water main by the method of bore and jacking steel casing pipe and inserting the water main within the casing pipe. The carrier pipe inserted into the casing pipe shall be restrained joint PVC or fusible PVC.

1.11a All pipe inserted into casing pipes shall have casing spacers strapped to the pipe in accordance with the manufacturer specifications. Casing spacers shall have a body of either Stainless Steel or Ductile Iron and runners made of Ultra High Molecular Weight Polymer Plastic as manufactured by Advanced Product Systems or Be a Raci - High Density Polyethylene (HDPE) body and runner as manufactured by the Public Works Marketing, Inc. or approved

equal. Treated wood may also be used as shown in the Standard Details for Water Main Construction.

1.11b Steel casing pipe shall be used for construction at railroad, roadway or highway crossings as shown on the plans. Steel casing pipe shall comply with the following minimum requirements or such minimum requirements as established by the authority having jurisdiction. Casing pipes at other locations shall also comply with the following minimum requirements unless otherwise indicated.

Table of Minimum Wall Thickness for Steel Casing Pipe

Nominal Diameter (Inches)	Nominal Thickness (Inches)
Under 14	0.188
14	0.219
16	0.219
18	0.250
20	0.281
22	0.312
24	0.344
26	0.375
28	0.406
30	0.406
32	0.438
34	0.469
36	0.469

1.11c Smooth wall steel pipes with a nominal diameter of over 36 inches require special approval. Steel pipe shall have minimum yield strength of 35,000 PSI. All joints shall be fully welded completely around the circumference of the pipe. Welds shall be ground smooth inside and out to prevent conflict with the soil or pipe placement. If coated pipe is used, the coating shall be repaired following welding. The ends of all casing pipe shall be sealed and plugged in a manner that will allow future access for main replacement if required.

1.12 STREAM CROSSING – At locations where the water main must be installed across creeks, streams and or rivers, the water main shall be installed in a casing pipe meeting the requirements of Section 1.9(referencing 2012 MDOT Specification for Construction). The casing pipe may be installed using open cut excavation or bore and jacking as detailed in the plans. The end of the casing pipe shall be plugged and sealed such that the plug can be removed in the event of inserting new water main in the future. Directional Drilling HDPE water main may be allowed in lieu of a casing pipe at the discretion of the South County Water System superintendent or designated representative.

1.13 CONNECTIONS TO EXISTING MAINS - New mains shall be connected to existing mains, using proper fittings and as detailed in the plans. Connections shall be made in a manner called out in the plans and acceptable to the Owner and Engineer. No cut-ins or connections to existing mains shall be made unless at least 48 hours notice of such cut-ins or connections is given to the Superintendent of the South County Water System and the related portion of the new main has been disinfected and all testing completed, as subsequently specified. Two days prior to shutting valves on existing lines, the Contractor shall notify all affected property owners, the local official in charge of the water works system and the Engineer of such shut off. The shut off time shall be kept to minimum and shall be made at off-peak hours.

1.13a A representative of the South County Water System shall perform the operation of all existing valves. The Contractor shall not operate existing valves.

1.13b The Owner and the South County Water System assume no responsibility for any delay occasioned by special requirements or conditions, which must be met in making connections.

1.13c Extreme care shall be taken in making such connections to prevent contamination of the existing mains. Before making cut-ins or connections to existing mains, all fittings, valves and

pipe shall be washed with clean water and then disinfected by washing with a chlorine solution having residual chlorine strength of not less than 50 ppm.

1.13d All such work shall be planned so as to reduce the number of main shut-offs and to keep the length of main shut-offs to a minimum.

1.13e When called for in the plans, water main tapping sleeves shall be #304 stainless steel, including the flange. The shell, lift bar, and flange shall be stainless steel. The flange gasket shall be factory installed virgin SBR compound or equal for water mains. The tapping sleeve shall be provided with a stainless steel 3/4" NPT test plug for pressure testing the sleeve prior to tapping the main. The tapping sleeve and valve shall be installed and pressure tested at 150 lbs for 20 minutes with no loss to be approved to proceed with tapping the main. South County Water System personnel shall witness the test. The tapping sleeve and valve shall be wrapped with a polyethylene encasement. The polyethylene film shall be a minimum 8 mil thickness and installed as per AWWA C105. Tapping sleeves shall be Romac Industries, Inc., "SST", Power Seal Pipeline Products Corp. Model 3490, or approved equal. Special tapping sleeves for tapping concrete cylinder pipe shall be Romac Industries, Inc., "FTS 435" steel fabricated tapping sleeve or approved equal. Connections to concrete cylinder pipe shall be performed by the pipe manufacturer. All bolts, nuts, and washers shall be #304 stainless steel or COR-BLUE, Cor-Ten coated with a ceramic-filled, baked-on fluorocarbon resin as manufactured by NSS Industries or approved equal. The tapping valves supplied for use with tapping sleeves shall be furnished with valve boxes as specified in Section 2.3 of these specifications. Approved equal tapping sleeves shall be subject to submittal of manufacturer specifications, approval of the Engineer, and issuance of contract addendum prior to the bid due date.

1.13f Plugs removed from the existing mains may be re-used within the project and those remaining after completion of construction shall remain the property of the Owner.

1.14 DISINFECTION - All pipe interiors shall be cleaned before laying and shall be kept clean thereafter. For purposes of testing new water mains and in coordination with the Owner or the Engineer, one physical connection to an existing water main will be permitted. After a main has been completed it shall be disinfected in accordance with AWWA C651 latest version, "Disinfecting Water Mains", using the tablet or continuous feed method.

1.14a For the tablet method, an average chlorine dose of 25 mg/L shall be provided by placing calcium hypochlorite granules and tablets in the main as it is being installed. Granules shall be placed at the upstream end of each branch main, and at 500 foot intervals in the following quantities, based on pipe diameter:

OUNCES OF CALCIUM HYPOCHLORITE GRANULES
PER 500-FT INTERVAL OF WATER MAIN PIPE

(inches)	(ounces)
4	1.7
6	3.8
8	6.7
10	10.5
12	15.1
14 and larger	D^2 x 15.1

D = inside pipe diameter in feet (D= d/12)

d = inside pipe diameter in inches

1.14b Tablets shall be placed in each section of pipe, with the number of tablets determined by the formula **(.0012d^{2}L)** rounded to the next highest integer, where **d** is the inside diameter of the pipe in inches and **L** is the length of the pipe section in feet. Also, one tablet shall be placed in each hydrant, hydrant branch, and other appurtenances. Tablets shall be attached using food-grade adhesive on only the broadside of the tablet attached and so that they are inside the top of the pipe upon installation of pipe, and with approximately equal number of tablets at each end of a given length. When installation of pipe is complete, the main shall be filled with potable water at a rate such that water within the main will flow at a velocity no greater than 1 fps.

Precautions shall be taken to assure that air pockets are eliminated. The water shall remain in the pipe for at least 24 hours, except if the water temperature is less than 41 degrees, the water shall remain in the pipe at least 48 hours.

Number of Calcium Hypochlorite Tablets of 5g Required for Dose of 25 mg/L

Length of Section (ft)	Pipe diameter (inches)				
	4"	6"	8"	l0"	12"
13 or less	1	1	1	2	3
18	1	1	2	3	4
20	1	1	2	3	4
30	1	2	3	4	6
40	1	2	4	5	7

1.14c For continuous feed method, the main shall be flushed as thorough as possible with the water outlets available and all air exhausted. If no hydrant is installed at the end of the main, a tap large enough to develop a velocity in the main of at least 2.5 fps shall be provided by the Contractor. Disinfection can be accomplished by injecting a 1% chlorine solution; (10,000 mg/L), prepared by mixing one pound of calcium hypochlorite (approximately 65% available chlorine by weight) and 8 gallons of water, into the main at a point not more than 10 feet downstream from the beginning of the new main. Potable water for preparing and injecting the 1% chlorine solution shall be pumped from a cleaned and sterilized container. Water from the existing distribution system or other approved potable water source shall be controlled so as to flow slowly into the new main during chlorine application. The rate of chlorine application shall be proportionate to the rate of water entering the main so that the chlorine concentration in the main is maintained at a minimum of 25 mg/L free chlorine. The solution shall remain in the main 24 hours, at which time the treated water in all portions of the main shall have residual of not less than 10 mg/L free chlorine.

1.14d For all methods, after the applicable retention period the main shall be thoroughly flushed out with potable water from the distribution system until the main has approximately the same chlorine content as water in the existing system.

1.14e Air shall be exhausted at fire hydrants, air release valves, and 1-inch corporation stops inserted at the extremities and high points of the main. The Contractor shall provide all corporation stops required for exhausting air, for samples for testing for chlorine residual, and for chlorine solution injection. In all cases, the Owner or the Engineer will perform tests for chlorine residual.

1.14f During all flushing and disinfection operations, existing valves shall be manipulated so that strong chlorine solution in the main being treated will not flow back into the line supplying the water, and new valves and hydrants shall be operated so as to disinfect appurtenances and pipe branches.

1.14g Bacteriological samples shall not be taken for testing until the main has been subjected to a successful pressure and leakage test.

1.14h Disinfection is a responsibility of the Contractor, who shall provide all materials, labor and equipment and, in addition, pay for the total volume of water used and dispose of all heavily chlorinated water.

1.14i After a main has been disinfected and pressure tested, as subsequently specified; samples will be collected from the extremities and mid-point of the main by a representative of Owner and bacteriological tests performed. Samples shall not be taken until the water has stood in the main for at least 16 hours after final flushing has been completed.

1.14j Before a sample is taken, the water shall be allowed to flow from the sampling point for at least one minute. The outlet shall be thoroughly flamed in order to kill all bacteria. Nothing should be allowed to touch the lip or top of the sample bottle while the sample is being taken. Two consecutive tests, taken 24 hours apart, shall be required to show the water to be safe.

1.14k If bacteriological tests show the water to be unsafe, the main shall be completely disinfected again at the expense of the Contractor.

1.15 **PRESSURE AND LEAKAGE TEST** - After a main has been disinfected and flushed out, it shall be subjected to a pressure and leakage test in accordance with AWWA C600/C605 latest version.

1.15a Each valve-to-valve section shall be isolated from adjacent mains and pressure shall be applied by pumping clean water from a sterilized container into the main via 1-inch corporation stops. The Owner or the Engineer may allow more than one valve to valve water main section to be included within a specific leakage and pressure test. In such case the allowable leakage for the shortest valve-to-valve water main section within the test sections will prevail as the allowable leakage for the total length of water main being tested. The test pressure shall be 150 pounds per square inch (PSI) and shall not vary by more than ±5 PSI. At the end of the two-hour pressure test of water main containing multiple valve-to-valve sections, the test pressure shall be bled off by opening hydrants in the furthest upstream main segment until a drop in the pressure gauge reading is detected. At the direction of the Owner or Engineer, hydrants throughout the test sections shall be open and pressure bled off until satisfactory indication is made that all water main sections are confirmed to have been included in the pressure and leakage test. In cases where a leakage and pressure test requires testing against an existing system valve, the test pressure shall be 100 PSI and shall not vary by more than ±5 PSI. When testing is required against an existing valve, the test section shall be limited to testing up to the first new water system valve.

1.15b Before applying the specified test pressure, air shall be expelled completely from the pipe, valves and hydrants. If permanent air vents are not located at all high points the contractor shall install 1-inch corporation cocks at such points so that air can be expelled as the

line is filled with water. At the conclusion of the test the corporation cocks shall be capped and left in place.

1.15c The test pressure shall be maintained for two hours at 150 psi by pumping water from the container. At the end of the two hour period, the water used shall be measured and the loss by leakage shall not exceed that as determined by the following formula **$L = (SD\sqrt{P})/148{,}000$** in which **L** is the allowable leakage in gallons per hour; **S** is the length of pipe tested in feet; **D** is the nominal diameter of the pipe in inches; and **P** is the average test pressure during the leakage test in pounds per square inch gauge.

1.15d When hydrants are in a test section, the test shall be made against the closed hydrant.

1.15e If the main and valves do not pass the leakage test, the leakage test shall be applied to individual valve-to-valve sections to establish the sections containing the excessive leakage. The leak or leaks shall be located and repaired and the testing procedure repeated by and at the expense of the Contractor. All visible leaks shall be repaired regardless of the amount of leakage.

1.15f Pressure and leakage testing is the responsibility of the Contractor, who shall provide all materials, labor and equipment and, in addition, pay for the total volume of water used.

1.16 <u>COMPLETION OF TESTS</u> - When all tests on the water main have been successfully completed, the main will be placed in service by the Owner and no further work on the main or its valves will he permitted without full knowledge of the work by the local official in charge of the water works system and the Owner.

1.17 <u>REMOVAL AND REPAIR OF TREES</u> – Trees and bushes which are in the immediate vicinity of the route of construction and the complete destruction of which cannot be prevented, using open cut type construction, shall be tunneled under. Tunneling shall be required within that area described by drawing a circle centered on the tree having a diameter in feet equal to the tree diameter in inches.

1.17a Other trees, tree limbs and bushes that are so located that equipment of the Contractor will damage same during construction shall be carefully trimmed and shaped by workmen skilled in tree trimming. All limbs and branches shall be flush cut. All exposed surfaces in excess of 1-inch diameter shall be immediately painted with an approved pruning compound. Trees and bushes which are destroyed or damaged to the extent that their continued life is impaired shall be replaced by the Contractor at his expense and to the satisfaction of the Owner.

1.17b Prior to final payment of the work, the Contractor may employ a competent arborist to inspect all trees and shrubs along the line of the work and to properly trim, prune, repair and protect any that have been damaged, and to designate those which have been so damaged as to require replacement at the discretion of the Owner.

1.18 REMOVAL OF EXCAVATED MATERIAL AND STORAGE OF MATERIALS - All excess excavated material, which has been stockpiled at the work site, and which will not be used for backfill or other fill purposes, must be removed from the project area within forty-eight (48) hours. In all cases, stockpiles of all excavated material and all construction materials shall be of limited size and shall be neatly maintained in such a manner that they will not block existing drainage or be hazardous to pedestrian or vehicular traffic in any way. The Owner and the Engineer shall control the limitation relative to the stockpiling of all excavated material and all construction materials.

1.18a The Contractor shall assume all responsibility relating to placing excavated material, excess excavated material and construction materials on private property. Such responsibilities shall include but not necessarily be limited to securing written approval of the property owner, applicable property use permits and or fill permits from units of government of jurisdiction, maintaining property drainage, security, property restoration after construction is completed, leveling any excess excavated material and not adversely affecting adjacent properties.

1.18b The removal and disposal of surplus excavated material shall be the sole responsibility of the Contractor. Surplus material shall not be delivered to private property without prior written approval from the property owners, and acquisition of all required permits, including, but not necessarily limited to Soil Erosion and Sedimentation Control, Fill/Grading permit, etc.

1.18c The Contractor shall be responsible for the condition of all haul routes, including dust prevention. The Contractor shall immediately remove and clean all materials spilled or tracked on the haul routes.

1.19 PREVENTION OF AIR AND WATER POLLUTION THROUGH DUST AND DIRT CONTROL - It shall be the responsibility of the Contractor to prevent air and water pollution through dust and dirt control to the satisfaction of the Owner and the Engineer in the following areas:

1. In the streets, sidewalks and drives within the limits of the Contract.
2. Any haul roads leading to or away from the project that are used by the Contractor, his sub-contractors and his material suppliers.
3. Take all necessary steps to prevent soil from eroding onto all paved areas and into all natural watercourses, ditches and the public sewer system.

1.19a The following methods of control shall be used:

1. The streets and haul roads shall be swept by an automatic self-contained mechanical sweeper.
2. All excessive dirt that gets on the pavement shall be removed by means of hand shoveling or appropriate mechanical equipment and the area swept as in Method a. above.
3. Sidewalks and driveways shall be cleaned by means of shovels and hand brooms or approved mechanical equipment.
4. If authorized or directed by the Owner or the Engineer, any dust remaining shall

be controlled in accordance with the Monroe County Road Commission.

1.19b The Contractor shall comply with the above requirements on a daily basis.

1.20 **PROGRESS** - The Contractor shall be required to complete backfilling operations and general cleanup within a reasonable distance of trenching and pipe laying operations, and other excavations. The specific limitations of this paragraph shall be at the discretion of the Engineer, but the general intent is to require the Contractor to minimize the inconvenience to nearby residents or businesses.

1.21 **MAINTENANCE OF TRENCHES AND EXCAVATIONS** - At all times during the progress of the work and until release of the Contractor from his guarantee by the Owner, the Contractor shall maintain the backfilled trenches and other excavations. In particular, those trenches or excavations which are within 15-feet of the edge of pavements or the edge of traveled roadways shall be kept filled up to the same level as the adjacent undisturbed ground. Any settlement which occurs during this period shall be immediately filled in to prevent the possibility of accidents.

1.22 **SEEDING** - The Contractor shall seed the backfilled trenches, other excavations and any other areas disturbed in the performance of his work in which, as determined by the Engineer, lawns or grass existed prior to construction in accordance with Section 816, 917, Tables 816-1 and 917-1 as specified in the 2012 Michigan Department of Transportation Standard Specifications for Construction. The Contractor shall take special care to ensure backfill over trenches or other excavations is well compacted prior to seeding. If the trenches settle after the seeding is completed and during the duration of the term of the Contract, the Contractor shall fill the settled areas with approved topsoil, re-fertilize and reseed the areas as herein specified.

1.22a In all areas to be seeded, a 3-inch layer of approved topsoil shall be provided. All wheel marks or other evidence of damage shall be similarly carefully prepared for seeding.

1.22b After the topsoil has been applied and leveled as above specified, all areas to be seeded shall be given an application of an approved Class A chemical fertilizer nutrient, applied at the rate of 228 pounds per acre. Immediately prior to seeding, the area shall be raked sufficiently to thoroughly mix the fertilizer with the topsoil.

1.22c Unless called out differently in the plans, grass seed shall be THM mix as stipulated in Table 816-1, contain the seed mixtures proportions noted in Table 917-1(2012 MDOT Specification For Construction) and shall be applied at the rate of 220 pounds per acre.

1.22d If certain disturbed lawns are of better quality than the specified seed will produce, as determined by the Engineer, the Contractor shall furnish seed for these specific lawns that will produce a lawn of equal quality.

1.22e The specified seed shall be uniformly sown at the rate noted above. Seed shall be sown dry or hydraulically. No seeding shall be done during windy weather or when the ground is frozen, muddy or otherwise non-tillable. After seeding, the ground shall be raked so as to cover the seed to a depth of approximately 1/4-inch and the area covered with a non-toxic mulching material. Mulching material meeting the requirements of Section 917.15 of 2012 Michigan Department of Transportation Standard Specifications for Construction shall be placed over all seeded areas at the rate of approximately 2 tons per acre. All mulching material shall be securely anchored in accordance with Section 816(2012 MDOT Specification For Construction) or otherwise kept in place by a method approved by the Engineer. In the event any mulching material is displaced, the disturbed area shall be brought back to acceptable condition by means of fresh seed and fertilizer, if necessary, and the mulching material shall be replaced.

1.22f The Contractor shall properly protect and care for all lawn areas until the grass is a well established dense uniform growth at least 4-inches high. At that time, all excess mulch shall be

removed from seeded areas, and then all grass shall be mowed. The Contractor shall be responsible for the grass for two weeks after this mowing. If the grass shows a good growth and a dense stand at this time, the Contractor's obligations shall have been fulfilled except for the repair of future settlement.

1.22g For all seeded areas, any spots that do not show a prompt "catch" shall be re-seeded at intervals of 21 days, which shall continue until a good growth is established over the entire seeded area. The methods pursued in the renewal or replacement of lawn areas shall be as previously specified. Areas damaged due to acts of neglect by residents or vandalism shall be re-sown at the Contractors expense.

1.22h The cost of seeding operations and the furnishing of all materials shall be included in the price bid per lineal foot for the pipe, sod is permitted with Owner's approval.

SECTION 2

VALVES & APPURTENANCES

2. 1 **SCOPE / DESIGN REQUIREMENTS** - This item shall include the furnishing and installation of Valves and appurtenances, including gate valves and valve boxes, as herein specified and as shown on the drawings. Work shall be in accordance with applicable requirements previously specified in Section 1.

2.1a Valves shall be placed on each water main segment at the junction of tees and crosses. The valves shall be set as close to the tee or cross as possible and in no case will they be permitted on the opposite side of the street from the tee or cross.

2.1b The maximum spacing between valves shall not exceed 700 feet.

2.1c All valves are to be furnished with valve boxes. Valve wells will be considered under special conditions and / or as directed by the Owner or Engineer.

2.1d Valves placed on water mains 16" and larger shall comply with Section 2.3.

2.2 **GATE VALVES** - Gate valves shall be of the bronze mounted, resilient-seated type and shall meet the requirements of AWWA C509 or AWWA C515, latest revision. Valves shall provide bubble tight shut off up to 200 psi pressure, and, when fully opened, provide a clear unobstructed waterway. All valves shall be the non-rising stem type with a standard AWWA nut. Valves shall have ends suitable for laying with the pipe provided for the water mains. Stem seals shall consist of at least two "O" rings. Valves shall open by turning to the left (counter-clockwise). Valves shall be set plumb, with the valve box accurately centered over the valve. Gate valves shall be as manufactured by Clow Corporation, East Jordon Iron Works, Inc., or Kennedy Industries. South County Water may allow alternative valves at their sole discretion. Valves shall be furnished from the manufacturer assembled using 304 stainless steel bolts, nuts and washers. The manufacturer shall furnish an affidavit indicating that all tests and provisions of AWWA C509 or AWWA C515 have been met.

2.2a Extension stems shall be provided when the operating nut is greater than 4 feet below grade and shall be centered in the valve boxes by approved stem guides. No valve operator shall terminate greater than 4 feet below grade.

2.3 **BUTTERFLY VALVES** – Valves 16" diameter and larger shall be Pratt Groundhog Flanged End with MDT Buried Service Actuator. Actuator shall be MDT-3S.

2.4 **VALVE BOXES** - Valve boxes shall be constructed of ASTM A48 Class 35B cast iron; shall be coated; shall be of the three-piece, screw type; shall have a 5 1/4 inch shaft; and shall be provided with a heavy neat fitting cover having the word "WATER" cast on the top. The base of the valve box shall cover the entire bonnet section of the valve.

2.4a Valve boxes shall be correctly set on the valve body and shall extend to the ground elevation with sufficient length for each section to be properly engaged. The top of the cover shall be flush with the surrounding surface.

2.5 **FLUSHERS** – Water main flushers shall come from the manufacturer with capabilities for water dechlorination, below-grade discharge, multi-event programming, integrated metering, and sampling quick connect. The flusher shall include either an air-gap or double check valve to prevent potential backflow. Acceptable models include Hydro-Guard HG-8 by Mueller or equal as approved by the Owner.

2.5a If the water main flusher is a sub-surface model, it shall utilize a cast-iron lid which shall be flush with the surrounding surface.

2.5b Water main flushers shall be connected to the water main with a curb stop of size matching the inlet of the flusher to allow the flusher to be disconnected from the main for maintenance. Backfill flushers with Ohio No. 8/MDOT 25A(Equivalent 2012 MDOT Specification for Construction) or equal as approved by Owner.

SECTION 3

HYDRANT ASSEMBLIES

3.1 **SCOPE / DESIGN REQUIREMENTS** - This section shall include the furnishing and installation of Hydrant Assemblies including fire hydrants, gate valves and valve boxes, ductile iron pipe and fittings, and appurtenances as herein specified and / or as shown on drawings.

3.1a Work shall be in accordance with all applicable requirements previously specified in Section 1.

3.1b Hydrants shall be spaced at 350 feet maximum within residential developments and 600 feet maximum along non-residential section roads or rural road conditions. Hydrant branches shall be ductile iron or PVC pipe as previously specified in Section 1. Hydrants shall be located on the end of all dead end runs of water mains. Dead end hydrants placed in Cul-De-Sacs shall be placed within the Cul-De-Sac Island. Dead end hydrant settings shall consist of an 8”X6” reducer, 6” PVC pipe nipple, 6” watch valve and box, 6” PVC pipe nipple and hydrant.

3.1c Hydrants shall be placed within residential developments at a distance of 22 feet from the centerline of the road which typically will be located between the edge of the sidewalk and the back of curb. Hydrants placed along rural roads typically may be located at 30 feet from the centerline of the road and may require the installation of a hydrant approach consisting of an earth fill drive approach and culvert pipe for fire department access to the hydrant. Under special conditions, hydrants may be located as a close setting hydrant branch within the 5-foot easement adjacent to the road right of way within residential developments as detailed in the drawings.

3.2 **FIRE HYDRANTS** - Fire Hydrants shall be of the compression type, opening against and closing with the water pressure in the main, having a 5 ¼-inch valve opening, two 2-½-

inch hose nozzle and one 4-inch Storz pumper nozzle. Hydrants shall conform to AWWA C502, latest revision. The manufacturer shall furnish an affidavit indicating that all tests and provisions of AWWA C502 have been met. The hydrants shall be East Jordan Iron Works 5BR-250 or Waterous Pacer for projects in the South County Water System.

3.2a The hydrant body shall be in two sections fastened together with breakaway flanges located just above the ground line. The hydrant stem shall be of steel possessing a tensile strength of at least 70,000 PSI. Seals shall be rubber O-rings. Bolts or studs shall be at least 1/2-inch in diameter of suitable non-corrodible metal or cadmium plated. Composition or other non-corrodible metals shall be of the best quality end have a tensile strength of not less than 32,000 psi, with five percent reduction of area at breaking point. Hydrants shall be furnished from the manufacturer assembled using 304 stainless steel nuts, bolts and washers.

3.2b Hydrants shall be suitable for setting in trenches of the depths shown on the plans or as required. The hydrants shall be designed so that when properly operated water hammer will be prevented. Hydrants shall not have drains. Each hydrant shall be furnished with a 6-inch mechanical joint base. Hydrants shall open by turning to the left, (counter-clockwise).

3.2c The Contractor shall verify that the hydrant pumper nozzle, operating nut, outlet nozzle cap nuts and hose threads for the proposed hydrants conform to those on existing hydrants in the South County Water System before new hydrants are shipped. Based on the best information available, existing hydrants have NST.

3.2d Each hydrant shall be given two coats of good weatherproofing paint before leaving the factory and another after erection per Owner's discretion. The portion of the hydrant below ground shall be painted with black paint and the portion above ground shall be painted **YELLOW** to match the existing hydrants within the system.

3.3 **GATE VALVES AND VALVE BOXES** - Watch valves and valve boxes shall be 6-inch gate valves and valve boxes as previously specified, except the valves shall have ends

suitable for the pipe to which it will be connected. All costs for the watch valves and valve boxes shall be included in the price of the hydrant.

3.4 **PIPE AND FITTING RESTRAINED JOINTS** – All pipe and fitting joints provided in the hydrant branch shall be restrained joint as previously specified in Section 1.4 in the Ductile Iron Pipe and Fittings specification.

3.5 **INSTALLATION** - Hydrants shall be set plumb and to the grade of the curb, street, alley, highway or right-of-way as approved by the Engineer. Installations shall be perpendicular to the main as shown. Pumper nozzle shall always be set toward the centerline of the street, highway or right-of-way.

3.5a Excavation for hydrants shall first be embedded and backfilled with Ohio No. 8/MDOT 25A(Equivalent 2012 MDOT Specification for Construction) coarse aggregate to a depth of two feet. Remainder of excavation shall then be backfilled as specified for the trenches.

SECTION 4

WATER SERVICE LINES

4.1 **SCOPE** - This Item shall include the furnishing of all labor, materials, tools, and equipment required to construct water system service lines from the water main to the building.

4.2 **SERVICE CONNECTIONS** to the water main shall be direct tapped to ductile iron water main or by means of a saddle fitting on PVC water mains.

4.3 **SERVICE LINES** shall be pre-tapped and installed from the tap to the curb box using Type K copper pipe. The service line from the tap to the curb box shall be a part of the South County Water System. The service line from the curb box to the building shall be the property owners system and may be installed using Type K copper (CTS 200 psi) or polyethylene(250psi).

4.4 **CURB BOX LOCATION** – Curb boxes shall be placed at the farthest edge of the 10' public utility easement adjacent to the road Right of Way. Curb boxes shall not be placed under driveways or sidewalks or closer than 5' to building foundations.

4.5 **MINIMUM SIZE SERVICE LINE** shall be 1-inch diameter with the minimum size meter of 5/8-inch diameter. All water service material required to install the service including service pipe, saddles, meter setting yoke, meters, and stop box may be purchased from the South County Water System.

4.6 **RESPONSIBILITY OF INSTALLATION** - The project contractor shall install water services required for subdivision and site condominium developments with noted materials being purchased from the South County Water System. For individual site developments, all water services ranging from 1-inch through 2-inch in size shall be installed by the South County Water System from the tap to the curb box. A contractor licensed by Owner,

Contractor shall install the portion of the service installed from the curb stop to the building and the entire service when the size is greater than 2-inches.

4.7 **METER PIT** - The Owner desires to avoid meter pits wherever possible. The necessity, size, details and location of a meter pit will be evaluated on a "Case By Case" basis as a part of the plan approval process.

4.8 **SERVICE LINE SPLICING** - Service lines shall be installed using one continuous section of service piping. Bend fittings will not be permitted in the service line. Only Mueller compression fittings will be permitted under any pavement surface. Splicing of PVC service lines will not be permitted.

4.9 **CURB BOXES:(NO SHOT-OFF RODS)** Extension type with Minneapolis pattern base and 1 ¼ inch upper section, lid to have pentagon plug, 4 -1/2' or 5-1/2' extended length.

4.9a For 1" curb stops; Mueller Co. Minneapolis pattern Model H-10300-99008 (no shut-off rod) in the 54" or 66" size; or equal as approved by the Owner.

4.9b For 1-½" or 2" curb stops; Mueller H-10300-99002 (no shut-off rod) in the 54" or 66" size; or equal, as approved by the Owner.

4.10 **CURB STOPS:** Curb Stops for 1", 1-1/2", or 2"; AWWA C800, Minneapolis pattern, compression connection both ends, complete with required fittings for the type of connection to the service pipe; Mueller Co. 300 Ball Curb Valve B25155. The valve operating nut shall in no cases be greater than 66" below finish grade.

4.11 **BACKFLOW PREVENTERS:** Backflow preventers will be required on any water service 2-1/2" or greater in size. The necessity, type, location and manufacturer of a backflow preventer will be evaluated and established within the plan approval process.

SECTION 5

CULVERTS

5.1 **SCOPE** - This item shall include the furnishing of all labor, materials, tools and equipment required to construct Culverts as herein specified and as shown on the drawings. Culverts shall include those constructed for access to fire hydrants. Existing culverts at driveways (drive culverts), which are disturbed during construction shall be replaced in accordance with applicable requirements of these specifications or as detailed in the plans.

5.2 **CULVERTS** - In the locations shown, the Contractor shall construct culverts with concrete pipe and fill material to provide ready access to fire hydrants installed across ditches from the roadway proper. The concrete pipe shall meet the requirements of ASTM C76, Class IV, and shall be of the diameter shown. Length of the culvert pipe shall be such as to provide a drive approach width of 12'-0" or as otherwise shown and a 3:1 maximum slope at each end of the culvert, or as approved by Monroe County Road Commission.

5.2a The fill material shall be select excess excavated material as determined by the Engineer and shall be tamped in layers as approved by the Engineer to the elevation of the ditch bank nearest the edge of the roadway. All approaches shall then be seeded, fertilized and mulched.

5.3 **MONROE COUNTY ROAD COMMISSION** - Any requirements in this item which may be in conflict with or inconsistent with the requirements of the Monroe County Road Commission, the requirements of Monroe County Road Commission shall govern to the extent of the inconsistency or conflict.

SECTION 6

PAVEMENT REPLACEMENT

6.1 **SCOPE** - This section shall include the providing of permanent pavement replacement, except as noted, of HMA bituminous pavements, which are damaged or removed in connection with trenching or other operations. Gravel or stone roadways, driveways or parking areas are not classified as pavements and shall be replaced to a condition similar to or better than that existing before the start of the project, at the expense of the Contractor, with a minimum of 8 inches of compacted 23 A stone to be provided.

6.1a The latest revision of Michigan Department of Transportation Standard Specifications for Construction shall be followed insofar as applicable. Driveways and parking areas shall be classified as pavements according to the materials of construction.

6.1b All work shall be approved by the Monroe County Road Commission.

6.2 **PAVEMENT REMOVAL** – Pavement shall be removed to limits shown on the plans and the method of removal shall be in accordance MDOT Section 204(2012 MDOT Specification for Construction).

6.3 **TEMPORARY PAVEMENT** - In all paved streets and / or highways, immediately upon completion of backfilling operations, the contractor shall provide permanent pavement replacement as detailed in the plans and approved by the Monroe County Road Commission. In cases where permanent pavement replacement cannot be immediately provided, temporary pavement shall be provided in accordance with the temporary road crossing repair detail on the standard water main details to open the roadway travel lanes to traffic movement. Any temporary measure to be provided to open the roadway to traffic movement shall be approved by the Monroe County Road Commission and be in accordance with their requirements. The contractor shall be responsible to monitor and

provide maintenance to any temporary pavement measures to maintain a safe traffic surface condition.

6.4 **PREPARATION** - Prior to the replacement of the permanent pavement, any temporary pavement provided shall be removed and the existing pavement removed to a neat straight edge 12 inches each side of the trench in accordance with MDOT Section 204(2012 MDOT Specification for Construction).

6.4a If, in the opinion of the Engineer or the Monroe County Road Commission, the aggregate base is not adequately compacted and keyed, the Contractor shall be required to scarify the base to a sufficient depth and work the aggregate in with mechanical tampers or vibratory devices to obtain maximum compaction condition as called out in the plans. The compacted aggregate shall have a firm, even surface ready for the placement of the permanent pavement. All excess material shall be removed.

6.5 **PERMANENT PAVEMENT REPLACEMENT** – Permanent pavement shall be replaced in accordance with the Standard Details for Water Main Construction and MDOT Sections 501 and 502. For existing bituminous concrete driveways and parking areas having a pavement sealer, as determined by the Engineer or Monroe County Road Commission, not less than 60 days after replacement of the permanent pavement a pavement sealer shall be provided on the surface from the property line to the edge of the roadway at the expense of the Contractor. The pavement sealer shall be Jennite J-16, or equal and shall be applied in strict accordance with the manufacturer instructions.

6.6 **MONROE COUNTY ROAD COMMISSION** - Any requirements in this section which may be inconsistent or in conflict with the requirements of the Monroe County Road Commission, the Monroe County Road Commission shall govern, to the extent of the inconsistency or conflict.

SECTION 7

EXISTING SEWER AND DRAIN REPLACEMENT

7.1 **SCOPE** - This item shall include all labor, materials, tools and equipment to complete Existing Sewer and Drain Replacement as herein specified. All existing sewers and drains which must be removed or are damaged during trenching or other operations shall be replaced in a workable condition equal to or better than that found. Existing pipes, tiles, etc. in good condition and not damaged during removal may be re-laid upon the approval of the Engineer.

7.1a The Owner reserves the right to change the location of the proposed improvements in order to avoid existing sewers and drains.

7.2 **REPLACEMENTS** - The Contractor is cautioned to use the greatest care in reporting to the Engineer all existing sewers and drains lines exposed during trenching or other operations. The requirements of Sections 401, 402, 404, & 909 of the 2012 MDOT Standard Specifications for Construction shall be followed insofar as applicable.

7.2a Drains of perforated pipe or open joints shall be replaced with perforated pipe. Joints between existing and replacement pipes, when of differing materials or with otherwise non-compatible joints, shall be made using banded neoprene couplings as manufactured by Fernco, Inc., or equal.

7.2b Existing sewers and drains shall be replaced so as to withstand future settlement by bridging with timber supports a minimum of 6 inches square. Bridging shall extend into undisturbed earth a minimum of 12 inches each side of the trench, and the pipe, tile, etc., banded or tied to the bridging for its full length. Where timber bridging cannot be supported

by a firm foundation, the Contractor shall provide vertical support for the bridging, including lateral bracing necessary to provide a firm and substantial support. Supports, bracing, etc., shall be of native hardwood and shall be provided at the expense of the Contractor.