

*Vm* **VILLAGE OF MATTAWAN**

*Rural living at its best*

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SECTION  
33-11-00

Last Revised

**2008**

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Village of Mattawan's Construction Specifications for  
Water.

Water  
Distribution



**SECTION 33 11 00**

**WATER MAINS  
Village of Mattawan  
(10/9/2008)**

**PART 1 - GENERAL**

**1.01 SUMMARY:**

- A. This Section includes the work required for water mains, structures and appurtenant work.

**1.02 REFERENCES:**

- A. AWWA - American Waterworks Association, latest edition.
- B. ANSI - American National Standards Institute, latest edition.
- C. ASTM - American Society of Testing Materials, latest edition.

**1.03 SUBMITTALS:**

- A. Submit the following for review by ENGINEER:
  - 1. Product Data on Valves, Hydrants and service fittings.
  - 2. Details for each connection to existing water main.
  - 3. Proposed equipment (calibrated) and method for flushing, pressure testing, leakage testing and chlorination.
- B. Report the following "as built" information to ENGINEER:
  - 1. Three (3) witness measurements to buried fittings, valves and curb boxes from permanent fixtures such as building corners, power poles and trees 8 inch diameter and larger.
- C. Manufacturer's certifications on pipe and fittings indicating conformance to specifications prior to installation.

**1.04 JOB CONDITIONS:**

- A. Interrupting Water Service:
  - 1. Scheduling: Obtain OWNER's approval prior to interruption of service.
  - 2. Provide notice of twenty-four (24) hours to affected occupants and twenty-four (24) hours to Fire Department of time and duration.
  - 3. Provide stand-by service as required; outage not to exceed four (4) hours.
  - 4. Existing valve operation shall be by OWNER's employees only.
  - 5. Prevent contamination of existing water mains.
- B. Install service lines after pressure and bacteriological testing is accepted.
- C. Clean up promptly following pipe installation within maximum of 600 feet behind pipe laying operation. Clean up includes backfill and rough grading.

- D. Salvage all existing valve boxes, curb boxes and hydrants removed and deliver to the OWNER's yard. Hydrants shall be removed carefully without causing damage to the hydrant and fittings.

## **PART 2 - PRODUCTS**

### **2.01 GENERAL:**

- A. Cement Lining: AWWA C104 / ANSI A21.4 standard thickness for ductile iron pipe and fittings.
- B. Hydrant Leads: Ductile iron pipe with mechanical joints.

### **2.02 PIPE:**

- A. PVC: AWWA C909, Pressure Class 150.
- B. Ductile Iron: AWWA C151 / ANSI A21.50 and ANSI A21.51; Min. Pressure Class 350 or Class 50.
- C. High density polyethylene (HDPE) pipe: HDPE pipe shall be made from a high density, extra high molecular weight material designated as PE3408 with an SDR of 11 or less with working pressure of at least 160 psi. ASTM D3350-83 cell class 345434C. The pipe shall meet current AWWA C906 (4-63 inches). The pipe shall meet Ductile Iron diameter requirements (PIPS). Materials must be listed and approved for use with potable water under ANSI/NSF Standards.
- D. Service Tubing:
  - 1. Copper: ASTM B88, Type K annealed and soft temper.
  - 2. Plastic: Polybutylene, ASTM D-2581, Type II, Grade 1 and ASTM D-2666, AWWA C-902.
  - 3. Plastic: HDPE – AWWA C901, MIN. 160 PSI – Pressure Rating stamped on pipe.

### **2.03 JOINTS:**

- A. Ductile Iron Pipe and Fittings:
  - 1. Mechanical: AWWA C111 / ANSI A21.11.
  - 2. Push-on: AWWA C111 / ANSI A21.11.
  - 3. Electrical Continuity: Provide conductive gaskets (M.J.), (push-on), or thermite welded sockets and cables (push-on).
  - 4. Bronze wedges shall not be allowed
- B. PVC Plastic Pipe: Bell and spigot with elastomeric rubber ring gaskets ASTM D-1869.
- C. HDPE
  - 1. Sections of polyethylene pipe shall be joined into continuous lengths on the jobsite above ground. The joining method shall be the butt fusion method and shall be performed in strict accordance with the pipe manufacturer's recommendations. The butt fusion equipment used in the joining procedures should be capable of meeting all conditions recommended by the pipe manufacturer, including, but not limited to, temperature requirements of 400 degrees Fahrenheit, alignment and an interfacial

fusion pressure of 75 psi. The butt fusion jointing will produce a joint weld strength equal to or greater than the tensile strength of the pipe itself. All welds will be made using a Data Logger to record temperature, fusion pressure, with graphic representation of the fusion cycle. This log shall be part of the Quality Control records.

2. Sidewall fusions for connections to outlet piping shall be performed in accordance with HDPE pipe and fitting manufacturer's specifications. The heating irons used for sidewall fusion shall have an inside diameter equal to the outside diameter of the HDPE pipe being fused. The size of the heating iron shall be ¼ inch larger than the size of the outlet branch being fused.
3. Mechanical joining will be used where the butt fusion method cannot be used. Mechanical jointing will be accomplished by either using a HDPE flange adapter with Ductile Iron back-up ring or HDPE Mechanical Joint adapter with Ductile Iron back-up ring.
4. Socket fusion, hot gas fusion threading, solvents and epoxies will not be used to join HDPE pipe.

D. Service Tubing and Fittings:

1. Copper: Compression.
2. Plastic: Compression with stainless steel stiffener.

2.04 TRACER WIRE:

- A. If PVC or HDPE pipe is used in this project, the CONTRACTOR shall install a 10 gauge solid copper locator wire with insulation suitable for direct burial with the water main. The locator wire shall be attached to the main at approximately 15 feet intervals with plastic cable ties. Splices shall be soldered copper-to-copper and shrink-wrapped to establish insulation across spliced length. A minimum of 6 feet of wire shall be left accessible inside structures and at fire hydrants. The CONTRACTOR shall be responsible for testing continuity of wire locator.

2.05 FITTINGS:

- A. Ductile Iron: AWWA C110 / ANSI A21.10, or AWWA C153 / ANSI A21.53, Class 54, 250 psi working pressure through 12 inches and 150 psi above. Mechanical joint solid sleeves shall be Clow Corporation #F1012 or equal.

B. HDPE

1. Butt Fusion Fittings – Fittings shall be PE3408 HDPE, Cell Classification of 345464C as determined by ASTM D3350-99 and approved for AWWA use. Butt Fusion Fittings shall have a manufacturing standard of ASTM D3261. Molded and fabricated fittings shall have a pressure rating equal to the pipe unless otherwise specified in the plans. Fabricated fittings are to be manufactured using Data Loggers, Temperature, fusion pressure and a graphic representation of the fusion cycle shall be part of the quality control records. All fittings shall be suitable for use as pressure conduits and per AWWA C906.
2. Electrofusion Fittings – Fittings shall be PE3408 HDPE, Cell Classification of 345464C as determined by ASTM D3350-99. Electrofusion Fittings shall have a manufacturing standard of ASTM F1055. Fittings shall have a pressure rating equal to the pipe unless otherwise specified on the plans. All electrofusion fittings shall be suitable for use as pressure conduits per AWWA C906.
3. Flanged and Mechanical Joint Adapters – Flanged and Mechanical Joint Adapters shall be PE 3408 HDPE, Cell Classification of 345464C as determined by ASTM D3350-99. Flanged and Mechanical Joint Adapters shall have a manufacturing standard of ASTM D3261. Fittings shall have a pressure rating equal to the pipe unless otherwise specified on the plans.

2.06 VALVES (Open Left):

- A. Gate: AWWA C509 Resilient seated, epoxy coated surfaces, rubber encapsulated gate, bronze non-rising stem with double o-ring seal. Provide full diameter unobstructed flow. End connections shall match pipe.
  - 1. Manufacturer(s): **American Flow Control Series 2500, EJIW Flowmaster.**
- B. Butterfly: SHALL NOT BE USED.
- C. Boxes: Three (3) section cast iron with lid marked WATER:
  - 1. Upper section: Screw on adjoining center section and full diameter throughout. Place geotextile fabric around threaded joint of risers, if used.
  - 2. Center section: Minimum 5 inch inside diameter.
  - 3. Base section: Fit over valve bonnet and shaped round for valves through 10 inch and oval for 12 inch and over. Place geotextile fabric around valve bonnet.

2.07 HYDRANTS (Open Left):

- A. AWWA C502, mechanical joint with drain outlet (plugged if below water table).
- B. Residential/Commercial: 5 inch size with 6 inch inlet connection, 2 - 2½ inch hose nozzles and 1 – 4 ½ inch pumper nozzle.
- C. Provide National Standard Fire Hose Thread.
- D. Manufacturer: American Flow Control Waterous 5 ¼" Pacer Model WB-67-250, EJIW water master 5BR..
- E. Color: Red. Painted at factory with primer and two (2) coats.
- F. Barrel length shall be properly sized so the centerline of the pumper nozzle is 21" to 27" above grade at the specified depth of cover over the pipe.
- G. Hydrant Extension: 36-inch maximum, limited to one per hydrant.
  - 1. Install between breakaway flange and top of hydrant lower section.
- H. Provide Hydrant Marker: 3/8-inch Ultimate Hydrant Marker Jr.

2.08 VALVE CHAMBERS:

- A. Precast Units: ASTM C478
  - 1. Joints: Cement mortar, preformed bituminous rope or "O" ring gaskets.
  - 2. Pipe openings: Pipe diameter plus 6 inch maximum.
- B. Concrete: 3500 psi 28 day, 4 inch maximum slump.
- C. Concrete Radial units: ASTM C139.
- D. Grade Rings: ASTM C478.
- E. Mortar: ASTM C270, 1 part Portland cement, 1 part lime and 3 parts sand by volume.
- F. Chamber Steps shall be one of the following:
  - 1. Cast iron: 10 inch deep by 10 inch wide, 5 inch tread depth, 1 inch x 1 inch tread section, with 2 inch rail height.
  - 2. Plastic: Reinforced with  $\frac{3}{8}$  inch steel rod and dimensioned as cast iron.

- G. Chamber Castings: East Jordan 1145Z1 A cover or Neenah R-1916-F two (2) hole cover; with letter W.

2.09 SERVICE FITTINGS:

- A. Corporation Stops:
  - 1. Copper tubing: Ford Mfg. FB600.
  - 2. Plastic tubing: Ford Mfg. F1000.
- B. Curb Stops:
  - 1. Copper: Ford Mfg. B22.
  - 2. Plastic: Ford Mfg. B44.
- C. Curb Boxes: Buffalo style, Ford Mfg. 6500 SCRRJ, 95-E.

2.10 MISCELLANEOUS:

- A. Service Saddles: Cast iron double strap, brass or bronze with stainless steel parts, AWWA C800 threads. Required on all pipe materials.
- B. Tie Rods and Clamps: Clow Corp. or Traverse City Iron Works.
- C. Plastic Seamless Encasement Tubing:
  - 1. Material: ASTM D-1248 Polyethylene, Type I, Class C, 8 mils thick. AWWA C105.
  - 2. Closing Tape: 2 inch wide Poly Ken #900 or Scotchwrap #50.
- D. Mechanical Joint Restraint: Megalug by EBAA Iron Sales, Inc., or approved equal.

**PART 3 - EXECUTION**

3.01 PREPARATION:

- A. Alignment and Grade:
  - 1. Deviations: Notify ENGINEER and obtain instructions to proceed where there is a grade discrepancy or an obstruction not shown on plans.
    - a. Verify location and depth of existing utilities in advance of construction and provide adjustments in alignment and grade of water main at no additional cost to OWNER.
  - 2. Depth of pipe: Minimum cover over pipe below finished grade by zones (unless otherwise indicated on plans):
    - a. Lower part of lower peninsula of Michigan and south (South of the north boundary of tier of townships 20 north which is approximately highway US 10): 5 feet - 0 inches.
    - b. Upper part of lower peninsula: 5 feet - 6 inches.
    - c. Upper Peninsula: 6 feet - 0 inches.
  - 3. High points in pipeline: Locate at services and hydrants.
- B. Bedding:
  - 1. Method: Article 3.05 SCHEDULES.
  - 2. Provide bedding area backfill in accordance with SECTION 02220.
  - 3. Provide continuous bearing supporting entire length of pipe barrel evenly.
- C. Cleaning Pipe and Fittings:
  - 1. General: Provide interior free of foreign material and joint surfaces free of lumps and blisters.

3.02 INSTALLATION:

- A. General: Meet requirements of AWWA C600 for ductile iron pipe, AWWA C605 for PVC pipe and these specifications.
- B. Laying Pipe:
  - 1. Prevent entrance of foreign material and plug watertight when left unattended.
  - 2. Provide pipe length and bedding as a unit in a frost free, dry trench.
  - 3. Special supports and saddles: Article 3.05 SCHEDULES.
  - 4. Provide minimum vertical and horizontal separation between water main and sanitary sewer, storm sewer or forcemain of 18 inches and 10 feet, respectively.
  - 5. ENGINEER's approval required for pipe lengths less than 6 feet.
  - 6. Joint deflection shall not exceed the following values or as recommended by pipe manufacturer.

**Maximum Joint Deflection**

| Nominal Pipe Size (inches) | Push-On Joint              |                          | Mechanical Joint           |                          |
|----------------------------|----------------------------|--------------------------|----------------------------|--------------------------|
|                            | Deflection Angle (Deg-Min) | Maximum Offset (inches)* | Deflection Angle (Deg-Min) | Maximum Offset (inches)* |
| 4                          | 3° - 30'                   | 14                       | 6° - 15'                   | 23                       |
| 6                          | 3° - 30'                   | 14                       | 5° - 20'                   | 20                       |
| 8                          | 3° - 30'                   | 14                       | 4° - 00'                   | 15                       |
| 12                         | 3° - 30'                   | 14                       | 4° - 00'                   | 15                       |
| 16                         | 2° - 15'                   | 8 ¼                      | 2° - 40'                   | 10                       |
| 24                         | 2° - 15'                   | 8 ¼                      | 1° - 45'                   | 7                        |

\*Offsets are based upon 18-foot lengths of pipe

- C. Cutting Pipe:
  - 1. PVC: Power saw or hand saw.
  - 2. Ductile iron: Power saw.
- D. Jointing:
  - 1. Mechanical:
    - a. Lubricate as recommended by manufacturer.
    - b. Tighten bolts evenly to 75 to 90 foot-pounds.
  - 2. Push-on:
    - a. Lubricate as recommended by manufacturer.
    - b. Shape beveling as recommended by manufacturer.
  - 3. Prestressed Concrete Cylinder:
    - a. Lubricate as recommended by manufacturer.
    - b. Grouting: Fill external and internal recesses and trowel inside.
  - 4. Plastic: Manufacturer's standard.
- E. Setting Valves, Fittings and Fire Hydrants:
  - 1. General: Article 3.05 SCHEDULES.
  - 2. Valves: Set plumb.
  - 3. Valve boxes:
    - a. Base section: Center and plumb over operating nut and 2 inches above bonnet joint.
    - b. Upper section: Set cover ¼- inch below finished grade.
    - c. Witnesses: Provide 3 measurements to permanent surface features.

4. Hydrants:
  - a. Connection: With ductile iron pipe and auxiliary valve.
  - b. Positioning: Plumb with pumper nozzle facing curb and nozzle centerline 21-27 inches above finished grade.
  - c. Provide necessary length of 6 inch pipe for hydrant leads.
  - d. Provide access to all hydrants.
  - e. Cover hydrant with a plastic bag during installation and before backfilling to protect hydrant and prevent foreign material from entering the connection threads.
5. Tie valves to tees and crosses and tie hydrants to valves.
6. Provide mechanical joint restraint minimum two joints each way from fittings using megalug retainer glands.

F. Chambers:

1. General: Article 3.05 SCHEDULES.
2. Base Bedding: Provide 4 inch pea stone with full and even bearing in impervious soils or wet conditions. Otherwise provide on undisturbed frost-free dry subgrade.
3. Precast: Fill joint space completely and trowel.
4. Provide casting setting as follows:
  - a. Existing pavement: Flush:
  - b. Gravel grade: 4 inches below.
  - c. Unpaved areas: Finished grade.

G. Connections:

1. Existing water mains:
  - a. Provide temporary support during cut-in.
  - b. Disinfect by swabbing pipe, valves and fittings with four percent (4%) chlorine solution.
  - c. Pressure off: Install mechanical joint solid sleeve.
  - d. Pressure on: Install tapping sleeve, valve and box.
2. Service lines:
  - a. Align at right angles to street or easement line.
  - b. Minimum depth shall be same as pipe.
  - c. Install after acceptable pressure test and chlorination of water main.
  - d. Curb boxes: Set plumb and provide 3 measurements to surface features.
    - (1) Locate at easement line within easement or at right-of-way line within road right-of-way, unless otherwise directed.
    - (2) Cover with 5' long section of 4" PVC pipe buried 2 feet.
    - (3) Set cover ¼-inch below finished grade.
  - e. Tapping shall be at 45° above center and shall provide horizontal loop at corporation stop.
    - (1) Plastic Pipe: Tap pipe using a hole saw cutter (new cutter) and double strap saddle per manufacturer's recommendation. No direct tapping allowed.
  - f. Maximum tap sizes shall be as follows:

| Type of Pipe | Pipe Size |     |    |     |     |     |     |     |     |     |
|--------------|-----------|-----|----|-----|-----|-----|-----|-----|-----|-----|
|              | 4"        | 6"  | 8" | 10" | 12" | 14" | 16" | 18" | 20" | 24" |
| Ductile:     | ½"        | ¾"  | 1" | 1¼" | 1½" | 2"  | 2"  | 2"  | 2"  | 2"  |
| All Pipe:    | 1"        | 1½" | 2" | 2"  | 2"  | 2"  | 2"  | 2"  | 2"  | 2"  |

H. Dead-end water main stubs longer than 20 feet:



1. Fire Hydrants will be installed at the end of the main unless it is a temporary dead end (less than 6 months).
2. Install standpipe with shutoff at temporary dead ends to aid in chlorinating, testing and flushing. Remove standpipe upon approval of water main.

I. Pipe Joint Restraint:

1. Provide "mechanical" joint restraint for the minimum lengths shown in the table below:

| PIPE RESTRAINT LENGTH REQUIRED, FEET* |                 |           |               |               |           |                     |     |
|---------------------------------------|-----------------|-----------|---------------|---------------|-----------|---------------------|-----|
| Pipe Dia.                             | Tees, 90° Bends | 45° Bends | 22-1/2° Bends | 11-1/4° Bends | Dead Ends | Reducers (one size) | **  |
| 4"                                    | 23              | 9         | 5             | 2             | 57        |                     |     |
| 6"                                    | 32              | 13        | 6             | 3             | 82        | 43                  | 63  |
| 8"                                    | 41              | 17        | 8             | 4             | 104       | 43                  | 55  |
| 12"                                   | 58              | 24        | 12            | 6             | 149       | 80                  | 120 |
| 16"                                   | 74              | 31        | 15            | 7             | 192       | 82                  | 110 |
| 20"                                   | 89              | 37        | 18            | 9             | 233       | 82                  | 104 |
| 24"                                   | 104             | 43        | 21            | 10            | 272       | 82                  | 99  |
| 30"                                   | 123             | 51        | 25            | 12            | 328       | 115                 | 148 |
| 36"                                   | 141             | 58        | 28            | 14            | 379       | 115                 | 140 |

\* The lengths of restrained pipe required shown above is based on trench backfill being compacted to 95% of the maximum density according to the Modified Proctor Method. The above lengths do not consider polyethylene wrapped pipe. If the pipe is wrapped with polyethylene, the minimum lengths of restrained pipe shall be shown on the plans and approved by the TOWNSHIP ENGINEER.

\*\* If straight run of pipe on small side of reducer exceeds this value, then no restrained joints are necessary.

- J. Repair sewer laterals disturbed during construction with PVC schedule 40 pipe and FERNCO fittings.

### 3.03 FIELD QUALITY CONTROL:

A. Testing and Inspection:

1. General:

- a. Observation: By ENGINEER.
- b. Completion: Before connecting to existing line.
- c. Notification: Pretest and arrange with ENGINEER for observation of test. Contractor to pay additional cost for ENGINEER to witness retests.
- d. Equipment and assistance: Provide.
- e. Required water: By OWNER where available from municipal system.
- f. Connection to existing water main: After passing pressure and leakage tests.
- g. Meet requirements of AWWA C600 for ductile iron pipe, AWWA C605 for PVC pipe and these specifications.

2. Electrical continuity: Test ductile iron pipe for continuity and repair breaks.

3. Pressure/Leakage Test:
  - a. Conditions: Air or air-water methods of applying pressure prohibited.
  - b. Sequence: Prior to Flushing and Chlorination.
  - c. Procedure: Fill system slowly, expel air through corporation stop at high points and apply pressure.
  - d. Pressure: Maintain 150 psi.
  - e. Duration: Two (2) hours.
  - f. Make-up water: From measurable source.
  - g. Leakage: Quantity of water supplied to maintain test pressure.
  - h. Allowable: Less than:

$$L = \frac{SD \times \text{square root of } P}{148,000}$$

where,

L = leakage (gallons per hour).

S = length of pipe (feet).

D = nominal pipe diameter (inches).

P = average test pressure (pounds per square inch gauge).

- i. Correction: Repair defects and repeat test until acceptable.
  - j. Maximum length of pipe to be tested shall be 2000 feet.
4. Testing valves only: Maintain pressure on main and check all valves as follows:
  - a. Vent extreme ends of main and briefly check each valve progressively back towards test point.
  - b. Allowable pressure drop shall be less than 10 psi in five (5) minutes with test pump off.
  - c. Correction: Repair defects and repeat test until acceptable.

### 3.04 FLUSHING:

- A. Flushing: Shall be performed in accordance with ANSI/AWWA C651
  1. Sequence: Following pressure testing and prior to chlorination.
  2. Maximum intervals: 2,000 feet.
  3. Required water: By OWNER where and when available from municipal system. Maintain 20 psi residual pressure in existing water system.
  4. Minimum velocity: 2½ feet per second at pipe wall. See table below for size and number of Taps required to achieve minimum velocity:

**Required flow and openings to flush pipelines**

| Pipe Diameter<br><i>inches</i> | Flow Required<br>to Produce<br>2.5 ft/s<br>Velocity in Main<br><i>gpm</i> | Size of Tap            |     |    | Number of<br>2 ½-in.<br>Hydrant<br>Outlet |
|--------------------------------|---|------------------------|-----|----|---|
|                                |   | 1"                     | 1½" | 2" |   |
|                                |   | Number of Taps on Pipe |     |    |   |
| 4                              | 100   | 1                      | -   | -  | 1   |
| 6                              | 200   | -                      | 1   | -  | 1   |
| 8                              | 400   | -                      | 2   | 1  | 1   |
| 10                             | 600   | -                      | 3   | 2  | 1   |
| 12                             | 900   | -                      | -   | 2  | 2   |
| 16                             | 1600  | -                      | -   | 4  | 2   |

- B. The water main shall be flushed by providing taps in sufficient size or number to provide a velocity of 2½ feet per second in the line being flushed. Hydrants may be used for flushing providing the requirements listed below are met.

- C. The CONTRACTOR shall submit to the ENGINEER a procedure schedule outlining the method the CONTRACTOR proposes to use for flushing water mains. Mains shall be flushed at a maximum of one quarter mile intervals. Utility owner shall be given notice by CONTRACTOR prior to any flushing.
- D. Flushing may be performed prior to pressure testing or following pressure testing, but in any case, prior to chlorination of the water main.

3.05 DISINFECTION:

- A. Chlorination: Shall be performed in accordance with ANSI/AWWA C651
  - 1. Observation: By ENGINEER.
  - 2. Required water: By OWNER where available from municipal system.
  - 3. Chlorine gas: Not permitted on job-site.
  - 4. High Test Calcium Hypochlorite (HTH, "Perchloren," "Maxochlor," "Pittchlor"): Powder and water shall be mixed to form a 1 percent chlorine solution (10,000 ppm). Pump solution at a constant rate into the water main while bleeding off the water at the extreme end. AWWA B300.
  - 5. Liquid Chlorine: Liquid chlorine may be applied to the water main much the same way as the hypochlorite solution listed above. AWWA B301.
  - 6. Sequence: Following pressure tests and flushing and prior to connection to existing water main.
  - 7. Retention time: Chlorinated water of at least 25 mg/l initial shall remain in the pipe for at least 24 hours. At the end of the 24-hour period the chlorine residual shall be at least 10mg/l or rechlorination must take place.
  - 8. Procedure: Operate all valves during disinfection.
  - 9. Bacteriological Testing:
    - a. Two consecutive safe bacteriological samples shall be taken 24 hours apart before placing the water main into service. Samples shall be collected for every 1,200 feet of new main, plus samples from each branch and the end of the line. If excessive quantities of debris, or trench water, have entered the main, samples shall then be taken at approximately 200-foot intervals.
    - b. Sampling: By OWNER.
  - 10. Correction: Rechlorinate sections not meeting MDEQ bacteriological requirements.
    - a. Retesting shall be paid by CONTRACTOR.
- B. Disinfection report; record:
  - 1. Type and form of disinfectant used.
  - 2. Date and time of disinfectant injection start and time of completion.
  - 3. Test locations.
  - 4. Initial and 24 hour disinfectant residuals (quantity in treated water) in ppm for each outlet tested.
  - 5. Date and time of flushing start and completion.
  - 6. Disinfectant residual after flushing in ppm for each outlet tested.
- C. Bacteriological report record:
  - 1. Date issued, project name, and testing lab name, address, and telephone number.
  - 2. Time and date of water sample collection.
  - 3. Name of person collecting samples.
  - 4. Test locations.
  - 5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
  - 6. Coliform bacteria test results for each outlet tested.
  - 7. Certification that water conforms, or fails to conform, to bacterial standards.
  - 8. Bacteriologist's signature and authority.
- D. The chlorinating agent shall be applied at the beginning of the section adjacent to the feeder main and shall be injected through an acceptable connection. Chlorine pills or powder are not an acceptable method of chlorination when placed in the pipe during construction. During chlorination water from the existing system main shall flow very

slowly into the newly laid pipe while partially opening the end-most hydrant or valve to allow chlorine to flow through the pipe. Chlorine shall be fed into the new main until the water at the far end of the main contains a residual/chlorine dosage of 40 to 60 ppm. This shall be retained for a period of 12 hours or more.

- E. After chlorination, the water shall be flushed from the line at its extremities until all of the heavily chlorinated water has been removed, leaving a residual chlorine content not greater than 1.0 ppm. If discharging directly to open drains, discharge water through dechlorinated tablets in mesh sack.
- F. Collect water samples in sterile bottles containing sodium thiosulfate for bacteriological analysis from the end-most outlet of the pipe line at the end of every branch and every 1200 feet of new main. Two (2) samples must be taken 24 hours apart for each section of the line tested. If both samples show safe results, and meet the Safe Drinking Water Standards, the new pipe line may be placed in service through cooperation of the OWNER and CONTRACTOR. If, however, the results are unsafe, a repetition of the chlorine treatment is necessary. Samples should never be collected from hoses or fire hydrants. A suggested sampling tap is a corporation cock with copper goose neck assembly. The goose neck assembly may be removed after use, at the option of the OWNER, samples shall be taken during chlorination.

### 3.06 SCHEDULES:

- A. Standard Details: (Attached)
  - 1. Methods of bedding pipe – pressure pipe.
  - 2. Hydrant Assembly.
  - 3. Copper service lead connection/sample point.
  - 4. HDPE to DIP connection detail.



**END OF SECTION**