

# GRAND HAVEN CHARTER TOWNSHIP

## PUBLIC SERVICES DEPARTMENT

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### *WATER MAIN CONSTRUCTION SPECIFICATIONS*

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- ⊕ All work shall be completed in accordance with the plans and specifications and shall meet the approval of the Grand Haven Charter Township Public Services Department.
- ⊕ A street cut permit shall be obtained from the Ottawa County Road Commission before any road crossings begin.
- ⊕ Water main construction and testing shall be in accordance with the "Regulations and Standard Specifications of the Ottawa County Water and Sewer System" with the following exceptions:

#### **Water Main**

Water main material shall be Ductile Iron, Class 52 or better, cement lined with slip or mechanical joints. Pressure Class pipe is not permitted. Pipe shall be manufactured in accordance with the requirements of ANSI/AWWA C151/A21.51 as amended. Push-on joints and mechanical joints for such pipe shall be in accordance with ANSI/AWWA C111/A21.11 as amended. Pipe thickness shall be designed in accordance with ANSI/AWWA C150/A21.50 Class 52 as amended, and shall be based on laying conditions and internal pressure as specified in the project plans. Pipe shall have cement mortar lining and seal coating in accordance with ANSI/AWWA C104/A21.4 as amended. The weight, class or nominal thickness, and casting period shall be shown on each pipe (ANSI/AWWA C151/A21.51-91).

Two (2) bronze wedges shall be installed for 6 inch and 8 inch pipe at each pipe joint. Four (4) bronze wedges shall be installed at each pipe joint for pipe larger than 8 inch. Water main shall be installed to ensure 5½ feet of cover at finish grade. All pipe shall be installed on a bed of virgin ground or bedded on soil that has been compacted to 95% of maximum unit weight.

#### **Valves**

Gate valves shall be double disc gate, domestically manufactured within the State of Michigan when available. Resilient wedge valves are not permitted.

Butterfly valves shall be installed on all mains larger than 12 inch in diameter. Butterfly valves shall be Henry Pratt Company "Ground Hog <sup>TM</sup>".

All valves shall have a clockwise direction (open right) of opening.

Valve boxes shall be three piece sectional, adjustable, screw type with round base and cast iron cover marked with the word "WATER". They shall be domestically manufactured within the State of Michigan when available. The top of the valve box shall be set flush with the established pavement or finished ground surface and shall be designed to withstand heavy traffic loads.

## **Hydrants**

Fire hydrants shall be domestically manufactured within the State of Michigan when available. They shall be equal to East Jordan Iron Works, Model BR-5.

The hydrant shall have a breakable stem and flange and conform to ANSI/AWWA C-502 as amended.

All hydrants shall have counter-clockwise (open left) direction of opening, 1 - ½ inch pentagon operating nuts on stem and caps and be yellow in color. Each hydrant bonnet shall be equipped with 2 - 2 ½ inch male connections and 1 - 4 ½ inch male pumper connection, each with National Hose Threads, caps and chains.

The hydrant's main valve shall have a 5¼ inch opening and a 6 inch mechanical joint inlet, the centerline of which shall be located 5½ feet below finish grade. Hydrants shall have both concrete thrust backing to virgin ground and two (2) - ¾ inch coated steel rods connecting the hydrant to the valve and two (2) - separate ¾ inch coated steel rods from the valve to the tee or the last length of pipe for anchorage. Threaded rods shall be installed using eye-bolts. Meg-a-lugs™ or set screw glands are not permitted on any hydrant installation. Weep holes shall be left open unless otherwise noted, and there shall be coarse gravel or crushed stone placed at the base to a distance of at least 6 inches above the weep hole and a distance of 1' around the shoe.

## **Fittings**

All fittings shall be domestically manufactured within the State of Michigan when available, in accordance with ANSI/AWWA C110/A21.10 as amended. All fittings shall have a minimum pressure rating of 200 psig. They shall be manufactured of ductile iron and be cement lined. Care shall be exercised not to damage the cement lining of any fittings. *Grand Haven Township reserves the right to reject any fitting(s) that appears to be damaged.*

Movement of all plugs, caps, tees and bends shall be prevented by the use of Meg-a-lug™ restraining glands. Set screw glands are not permitted. When joints are to be restrained as noted above, all joints shall be restrained for a minimum distance from the fitting in both directions (where appropriate) as required in the following table:

**PIPE RESTRAINT LENGTH REQUIRED, FEET**

<b>Pipe Diameter</b>	<b>Tees, 90° Bends</b>	<b>45° Bends</b>	<b>22 1/2° Bends</b>	<b>11 1/4° Bends</b>	<b>Dead Ends</b>	<b>Reducers (one size)</b>	<b>*</b>
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	194	82	110
20"	89	37	18	9	233	82	104
24"	104	43	21	10	272	82	99

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

NOTE: The length of restrained joint pipe required as shown in the table above is based on trench backfill being compacted to 95% of maximum unit weight in accordance with MDOT procedures. If the pipe is wrapped in polyethylene, a greater length of restrained pipe will be required. The table above does not consider polyethylene wrapped pipe.

All joints lying within the above minimum distances from the fitting must be restrained as noted herein.

**Tees:** Tees shall be restrained in the branch direction as required in the table above. Also, to augment the above, in the straight through direction, the minimum length of the first pipe on either side of the tee shall be 10 feet.

**Bends:** Bends shall be restrained in both directions as required in the table above.

**Dead Ends:** Installation of dead end pipe or fittings shall require the use of restraining glands as outlined above. Thrust backing is not permitted. Hydrants on dead ends shall be installed as required in the section "Hydrants".

An alternative to restraining as described above shall be the use of reaction backing (thrust blocks). Reaction backing shall be concrete of a mix not leaner than 1 part cement to 2½ parts sand and 5 parts stone, and having a compressive strength of not less than 2,000 psig after 28 days. Backing shall be placed between solid ground (virgin) and the fitting to be anchored. The area of bearing on the pipe and on the ground in each instance shall be that shown in the table below or as directed by the Township. The backing shall, unless otherwise directed by the Township, be placed that the pipe and the fitting joints will be accessible for repair. Each fitting shall be wrapped with a visquene type material to protect any attaching bolts and nuts.

Minimum Bearing Area against undisturbed trench wall, in square feet, for sand is indicated in the table below:

REACTION BACKING			
Pipe Diameter	Tees, Plugs, 45° Bends	90° Bends	22 1/2° Bends or Less
6"	3	3	1
8"	4	6	2
12"	9	11	3
16"	13	20	6
20"	20	28	8
24"	28	40	11

If reaction backing is used, all fitting joints shall have a Meg-a-lug™ restraining gland placed at each joint in addition to the reaction backing.

This method shall be used only in cases of undisturbed or stable soils where virgin soils can be determined. It will not be permitted for wet or for unstable soil conditions. Disturbed and wet soils, including muck, shall be considered unstable soils and shall require the use of restraining glands as outlined above.

Vertical bends shall be restrained at each joint. Additional restraining glands shall be required on each side of the bend as listed in the pipe restraint table. Meg-a-lug™ glands shall be used. Set screw glands are not permitted.

Restraining slip joint gaskets (i.e. FIELD LOC®) are not permitted.

Solid Sleeves shall be long pattern type. Installation shall include a properly fitted "spool piece" to fill the void between the two pieces of pipe. The spool piece shall have a tolerance of no more than 1/8 inch.

## Backfill

Clean sand backfill shall be required for all pipe and fittings. Backfill shall be compacted to 95% of maximum unit weight. Frozen material, large clods, stones, black top, concrete or organic matter shall not be used for backfill.

## Pressure Testing

A minimum of a 120 minute hydrostatic test shall be observed by a Public Services Employee and shall be performed in accordance with ANSI/AWWA C600 as amended. Testing shall be completed to the Township's satisfaction.

The Township Public Services Department shall be notified no less than 24 hours prior to the filling and flushing of any project. A Public Services Employee shall be present for the turning of any valve.

It should be assumed that each valved section shall be tested individually. At the discretion of the Township's representative, a project may be tested in sections larger than valved sections. If a project is tested in larger than valved sections, the maximum allowable leakage permitted on any project shall be no greater than the shortest valved section.

If a project is tested in valved sections, each valved section shall be tested individually. Individually shall mean each valved section shall be treated as a separate project for the purpose of testing. A separate connection point shall be provided within each valve section for testing. "Piggy-backing" of tested and approved valve sections is not permitted.

The main shall be slowly filled with water and flushed at least 24 hours prior to the start of the pressure test. When completely filled, the main shall be flushed at a velocity of not less than 2½ feet/second to ensure removal of any foreign material left in the pipe during installation.

Pipe Diameter in.	Flow Required to Produce 2.5 ft/s (approx.) Velocity in Main g.p.m.	Size of Tap in.			Number of 2½-in. Hydrant Outlets *
		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

\* - With 40-psig in the main and a hydrant flowing to atmosphere, a 2½ inch hydrant outlet will discharge approximately 1000 g.p.m. and a 4½ inch hydrant outlet will discharge approximately 2500 g.p.m.

† - Number of taps on pipe based on discharge through 5 feet of galvanized iron (GI) pipe with one 90° elbow.

Each valved section of pipe shall be brought up to a pressure not less than 160 psig. Leakage shall be defined as the quantity of water, during the 120 minute test, that must be supplied into the newly laid pipe or valved section thereof to maintain pressure within 5 psig of starting pressure after the pipe has been filled with water and the air has been expelled. Leakage shall not be measured by a drop in pressure in a test section over a period of time. No pipe installation will be accepted if the leakage is greater than determined by the following formula:

$$L = \frac{S \times D \times \sqrt{P}}{133200}$$

L	=	allowable leakage, in gallons per hour
S	=	length of pipe test, in feet
D	=	nominal diameter of pipe, in inches
P	=	average test pressure during the leakage test, in pounds per square inch

## Chlorination

Chlorination shall be observed by a Public Services Employee and shall be performed in accordance with ANSI/AWWA C651 as amended. It shall also be completed to the Township's satisfaction. The Township Public Services Department shall be notified prior to the flushing of any project. A Public Services Employee shall be present for the turning of any valve.

Chlorination of the water main shall be performed only by the continuous feed method to a level not less than 100 PPM of chlorine before it will be accepted. The chlorine shall be allowed to disinfect the main a minimum of 24 hours at which time a residual chlorine measurement will be performed by the Public Services Department prior to its removal from the water main. Handling of the discharged chlorine shall be performed in accordance with the Michigan Department of Natural Resources and the Environmental Protection Agency requirements as amended.

## Sampling

A sampling point shall be provided at each point of termination of the water main or as directed by the Township Public Services Department. Each sampling point shall be either a typical water tap including a corporation stop, curb stop and a short piece of smooth pipe installed down stream of the curb stop, or, a short piece of pipe reduced to no larger than 1 inch in diameter from a stand pipe. The latter shall include a valve and have no threads on the sampling end. Typical water tap sampling points shall be removed and a main plug inserted after satisfactory sampling has been completed. Inspection by the Township Public Services Department shall be performed prior to covering any main plug. Sampling from hydrants is not permitted.

Sampling shall be obtained by the Grand Haven Township Public Services Department. After chlorine removal is complete, the first of two samples will be drawn and submitted for testing. Twenty-four hours after drawing of the first sample, a second sample will be drawn and submitted. Twenty-four hours after the last sample has been drawn, the results of the testing will be known, provided the samples have been drawn and submitted prior to 11:00 a.m.

## **Tapping Sleeves**

A stainless steel sleeve shall be used on all live taps. A gate valve with a flange fitting is required on the tapping sleeves. Pressure testing is required on the tapping sleeve and valve prior to the live tap being made. The test shall be performed with either water or air, to a pressure not less than 150 psig for a minimum of 15 minutes, with no drop in pressure.

## **Miscellaneous**

A hydrant is required on all "dead end" installations. Restraint shall follow the requirements set forth in the table listed under the section labeled "Fittings". Meg-a-lug™ glands or rodding with coated steel rods will be permitted. Set screw glands are not permitted. Thrust backing alone is not permitted. Hydrants must be restrained as required in the section labeled "Hydrants".

Installation of water main under pavement in a cul-de-sac will necessitate the installation of water taps to each lot at the end of the cul-de-sac. Materials will be supplied by the Township. Placement and payment for these installations shall be the responsibility of the engineer, architect or the contractor(s) and they shall be coordinated and inspected by the Public Services Department.

It is the responsibility of the engineer, architect or the contractor(s) to contact the Grand Haven Charter Township Public Services Department to obtain, understand and implement these specifications prior to the start of any project. Failure to do so does not nullify the need to follow the requirements herein.

Moreover, it is the responsibility of the engineer, architect or the contractor(s) to contact the Grand Haven Charter Township Public Services Department should an issue or difficulty arise that is not identified within these specifications.

Grand Haven Charter Township reserves the right to reject any project that does not meet these specifications.

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