ADDENDUM No. 5

ITB No. 4424: W.R. Wheeler (Swift Run) Service Center PUD Non-motorized Improvements – Phase 1

Due: June 9, 2016 at 2:00 p.m. (local time)

The following changes, additions, and/or deletions shall be made to the Invitation to Bid for W.R. Wheeler (Swift Run) Service Center PUD Non-motorized Improvements – Phase 1, ITB No. 4424, on which proposals will be received on/or before June 9, 2016 at 2:00 p.m. (local time).

The information contained herein shall take precedence over the original documents and all previous addenda (if any), and is appended thereto. **This Addendum includes 22 page(s).**

Bidder is to acknowledge receipt of this Addendum No. 5, including all attachments (if any) in its Bid by so indicating on Page ITB-1 of the ITB document. Bids submitted without acknowledgement of receipt of this addendum will be considered nonconforming.

The following forms provided within the ITB document must be included in submitted bids:

- **City of Ann Arbor Prevailing Wage Declaration of Compliance**
- **City of Ann Arbor Living Wage Ordinance Declaration of Compliance**
- **Vendor Conflict of Interest Disclosure Form**
- **City of Ann Arbor Non-Discrimination Ordinance Declaration of Compliance**

Bids that fail to provide these completed forms listed above upon bid opening will be rejected as non-responsive and will not be considered for award.

I. CORRECTIONS/ADDITIONS/DELETIONS

Changes to the Bid document which are outlined below are referenced to a page or Section in which they appear conspicuously. The Bidder is to take note in its review of the documents and include these changes as they may affect work or details in other areas not specifically referenced here.

Section/Page(s)	Change
All mentions	As provided in Addendum 4: Bid Due Date: June 3, 2016 at 10:00 a.m. As updated herein: Bid Due Date: June 9, 2016 at 2:00 p.m.

Comment: The Due Date and Time for responses to this ITB has been extended to June 9, 2016 at 2:00 p.m. (local time). Note that all other dates are unchanged.

Bid Forms/ADD 4-7 thru 12	Base Bid Forms; replace with pages ADD 5-3 thru 8

Bid Forms/ADD 4-13 thru 18	Time Alternate Bid Forms; replace with pages ADD 5-9 thru 14
Detailed Specifications/ADD 4-54 thru 58	Detailed Specification for Timber Boardwalk and Foundation System; replace with pages ADD 5-15 thru 19
APPENDIX/ADD 4-59	Appendix title page; replace with page ADD 5-20
APPENDIX	Pittsfield Charter Twp Water Main Specifications and Details; insert pages ADD 5-21 thru 22

Respondents are responsible for any conclusions that they may draw from the information contained in the Addendum.

BID FORM

Section 1 - Schedule of Prices

W.R. Wheeler (Swift Run) Service Center PUD Non-motorized Improvements – Phase 1
File No. 2014-031
Bid No. 4424

BASE BID (Sidewalk and Sidewalk Ramps Complete and Open for Use by August 31, 2016; Slope Restoration and Landscape Plantings Complete by October 10, 2016; Entire Project Complete by November 10, 2016)

Line No.	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Total Price
10	1047051	_General Conditions, Max $75,000.00	LSUM	1.000	$	$
20	1047051	_Project Supervision, Max $10,000.00	LSUM	1.000	$	$
30	1047051	_Audiovisual Tape Coverage	LSUM	1.000	$	$
40	2020002	Tree, Rem, 19 inch to 36 inch	Ea	2.000	$	$
50	2020004	Tree, Rem, 6 inch to 18 inch	Ea	19.000	$	$
60	2030001	Culv, Rem, Less than 24 inch	Ea	3.000	$	$
70	2030011	Dr Structure, Rem	Ea	2.000	$	$
80	2030015	Sewer, Rem, Less than 24 inch	Ft	30.000	$	$
90	2047001	_Curb, Gutter, and Curb and Gutter, Any Type, Rem	Ft	137.000	$	$
100	2047011	_Sidewalk, Sidewalk Ramp, and Driveway Approach, Any Thickness, Rem	Syd	109.000	$	$
110	2047050	_Exploratory Excavation (0-10' Deep) Tr Det I	Ea	5.000	$	$
120	2050023	Granular Material, Cl II	Cyd	705.000	$	$
130	2057011	_Grading, Driveway Approach	Syd	360.000	$	$
140	2057011	_Grading, Sidewalk	Syd	6,070.000	$	$
150	2057011	_Grading, Sidewalk Ramp	Syd	30.000	$	$
160	2057011	_Machine Grading, Special	Syd	115.000	$	$
170	2057021	_Subgrade Undercutting, Type IIA	Cyd	50.000	$	$
180	2057021	_Subgrade Undercutting, Type IIB	Cyd	50.000	$	$

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Line No.	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Total Price
190	2080012	Erosion Control, Check Dam, Stone	Ft	330.000	$	$
200	2080036	Erosion Control, Silt Fence	Ft	2,153.000	$	$
210	2087050	_Erosion Control, Inlet Filter	Ea	21.000	$	$
220	2090001	Project Cleanup	LSUM	1.000	$	$
230	3020001	Aggregate Base	Ton	35.000	$	$
240	3060020	Maintenance Gravel	Ton	50.000	$	$
250	4020987	Sewer, Cl IV, 12 inch, Tr Det B	Ft	229.000	$	$
260	4021260	Trench Undercut and Backfill	Cyd	10.000	$	$
270	4030200	Dr Structure, 24 inch dia	Ea	2.000	$	$
280	4021204	Sewer Tap, 12 inch	Ea	4.000	$	$
290	4030035	_Dr Structure Cover, Type E	Ea	3.000	$	$
300	4030040	_Dr Structure Cover, Type G	Ea	2.000	$	$
310	4037001	_Dr Structure, Adj, Add Depth, Modified	Ft	5.000	$	$
320	4037050	_Dr Structure Cover, Type B, Modified	Ea	2.000	$	$
330	4037050	_Dr Structure Cover, Type D, Modified	Ea	1.000	$	$
340	4037050	_Dr Structure Cover, Type K, Modified	Ea	2.000	$	$
350	4037050	_Dr Structure, Adj, Case 1, Modified	Ea	1.000	$	$
360	4037050	_Dr Structure, Adj, Case 2, Modified	Ea	17.000	$	$

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Line No.	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Total Price
370	4037050	_Dr Structure, Cleaning, Modified	Ea	10.000	$ _____	$ _____
380	4047001	_Underdrain, Subgrade, 6 inch, Special	Ft	200.000	$ _____	$ _____
390	5010005	HMA Surface, Rem	Syd	7.500	$ _____	$ _____
400	5010025	Hand Patching	Ton	85.000	$ _____	$ _____
410	6030005	Cement	Ton	0.500	$ _____	$ _____
420	7057001	Helical Pier	Foot	5,400.000	$ _____	$ _____
430	7097001	Timber Boardwalk	Foot	360.000	$ _____	$ _____
440	7097001	Safety Railing	Foot	720.000	$ _____	$ _____
450	8017011	_Driveway, Nonreinf Conc, 6 inch, Modified	Syd	130.000	$ _____	$ _____
460	8017011	_Driveway, Nonreinf Conc, 8 inch, Modified	Syd	230.000	$ _____	$ _____
470	8027001	_Curb and Gutter, Conc	Ft	1,095.000	$ _____	$ _____
480	8037001	_Detectable Warning Surface, Modified	Ft	93.000	$ _____	$ _____
490	8037001	_Fence, Protective, Modified	Ft	5,153.000	$ _____	$ _____
500	8037010	_Sidewalk Ramp, Conc, 6 inch, Modified	Sft	260.000	$ _____	$ _____
510	8037010	_Sidewalk Retaining Wall, Integral, 6 inch to 18 inch Height	Sft	375.000	$ _____	$ _____
520	8037010	_Sidewalk Retaining Wall, Integral, Greater than 18 inch Height	Sft	1,550.000	$ _____	$ _____
530	8037010	_Sidewalk, Conc, 4 inch, Modified	Sft	53,660.000	$ _____	$ _____
540	8037010	_Sidewalk, Conc, 6 inch, Modified	Sft	595.000	$ _____	$ _____

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Line No.	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Total Price
550	8037010	_Sidewalk, Conc, 8 inch, Modified	Sft	365.000	$ _____	$ _____
560	8067050	_HMA Path Terminus	Each	2.000	$ _____	$ _____
570	8070095	Post, Mailbox	Ea	4.000	$ _____	$ _____
580	8077050	Post, Anchor, Mailbox	Ea	2.000	$ _____	$ _____
590	8110049	Pavt Mrkg, Ovly Cold Plastic, Direction Arrow Sym, Bike	Ea	2.000	$ _____	$ _____
600	8110058	Pavt Mrkg, Ovly Cold Plastic, Bike, Small Sym	Ea	2.000	$ _____	$ _____
610	8110197	Pavt Mrkg, Thermopl, 6 inch, Crosswalk	Ft	12.000	$ _____	$ _____
620	8110198	Pavt Mrkg, Thermopl, 6 inch, White	Ft	1,080.000	$ _____	$ _____
630	8110218	Pavt Mrkg, Thermopl, 24 inch, Stop Bar	Ft	6.000	$ _____	$ _____
640	8117001	_Pavt Mrkg, Thermopl, 24 inch, Crosswalk	Ft	36.000	$ _____	$ _____
650	8120012	Barricade, Type III, High Intensity, Double Sided, Lighted, Furn	Ea	10.000	$ _____	$ _____
660	8120013	Barricade, Type III, High Intensity, Double Sided, Lighted, Oper	Ea	10.000	$ _____	$ _____
670	8120030	Channelizing Device, 42 inch, Furn	Ea	75.000	$ _____	$ _____
680	8120031	Channelizing Device, 42 inch, Oper	Ea	75.000	$ _____	$ _____
690	8120140	Lighted Arrow, Type C, Furn	Ea	2.000	$ _____	$ _____
700	8120141	Lighted Arrow, Type C, Oper	Ea	2.000	$ _____	$ _____
710	8120260	Plastic Drum, High Intensity, Furn	Ea	75.000	$ _____	$ _____
720	8120261	Plastic Drum, High Intensity, Oper	Ea	75.000	$ _____	$ _____

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730	8120330	Sign, Portable, Changeable Message, Furn	Ea	2.000	$	$
740	8120331	Sign, Portable, Changeable Message, Oper	Ea	2.000	$	$
750	8120350	Sign, Type B, Temp, Prismatic, Furn	Sft	200.000	$	$
760	8120351	Sign, Type B, Temp, Prismatic, Oper	Sft	200.000	$	$
770	8120370	Traf Regulator Control	LSUM	1.000	$	$
780	8127051	_Minor Traffic Control, Max $7,500.00	LSUM	1.000	$	$
790	8150002	Watering and Culitvating, First Season, Min. $1,500.00	LSUM	1.000	$	$
800	8150003	Watering and Culitvating, Second Season, Min. $1,500.00	LSUM	1.000	$	$
810	8152541	Pachysandra terminalis, 3 inch pot	Ea	1,600.000	$	$
820	8150780	Celtis occidentalis, 2 inch	Ea	2.000	$	$
830	8151409	Fagus grandifolia, 2 inch	Ea	2.000	$	$
840	8151409	Gymnocladus dioicus, 2 inch	Ea	1.000	$	$
850	8152742	Picea abies, 6 foot	Ea	5.000	$	$
860	8153044	Quercus bicolor, 2 inch	Ea	2.000	$	$
870	8167011	_Slope Restoration	Syd	8,915.000	$	$
880	8190132	Conduit, DB, 2, 3 inch	Ft	4,933.000	$	$
890	8197050	_Handhole Assembly, 12 Inch X 18 Inch	Ea	20.000	$	$
900	8197050	_Handhole Assembly, 17 Inch X 30 Inch	Ea	2.000	$	$

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940	8507050	_Monitoring Well, Adj	Ea	11.000	$ _____	$ _____

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530	8037010	_Sidewalk, Conc, 4 inch, Modified	Sft	53,660.000	$	$
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590	8110049	Pavt Mrkg, Ovly Cold Plastic, Direction Arrow Sym, Bike	Ea	2.000	$ _____	$ _____
600	8110058	Pavt Mrkg, Ovly Cold Plastic, Bike, Small Sym	Ea	2.000	$ _____	$ _____
610	8110197	Pavt Mrkg, Thermopl, 6 inch, Crosswalk	Ft	12.000	$ _____	$ _____
620	8110198	Pavt Mrkg, Thermopl, 6 inch, White	Ft	1,080.000	$ _____	$ _____
630	8110218	Pavt Mrkg, Thermopl, 24 inch, Stop Bar	Ft	6.000	$ _____	$ _____
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660	8120013	Barricade, Type III, High Intensity, Double Sided, Lighted, Oper	Ea	10.000	$ _____	$ _____
670	8120030	Channelizing Device, 42 inch, Furn	Ea	75.000	$ _____	$ _____
680	8120031	Channelizing Device, 42 inch, Oper	Ea	75.000	$ _____	$ _____
690	8120140	Lighted Arrow, Type C, Furn	Ea	2.000	$ _____	$ _____
700	8120141	Lighted Arrow, Type C, Oper	Ea	2.000	$ _____	$ _____
710	8120260	Plastic Drum, High Intensity, Furn	Ea	75.000	$ _____	$ _____
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740	8120331	Sign, Portable, Changeable Message, Oper	Ea	2.000	$	$
750	8120350	Sign, Type B, Temp, Prismatic, Furn	Sft	200.000	$	$
760	8120351	Sign, Type B, Temp, Prismatic, Oper	Sft	200.000	$	$
770	8120370	Traf Regulator Control	LSUM	1.000	$	$
780	8127051	_Minor Traffic Control, Max $7,500.00	LSUM	1.000	$	$
790	8150002	Watering and Culitvating, First Season, Min. $1,500.00	LSUM	1.000	$	$
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810	8152541	Pachysandra terminalis, 3 inch pot	Ea	1,600.000	$	$
820	8150780	Celtis occidentalis, 2 inch	Ea	2.000	$	$
830	8151409	Fagus grandifolia, 2 inch	Ea	2.000	$	$
840	8151409	Gymnocladus dioicus, 2 inch	Ea	1.000	$	$
850	8152742	Picea abies, 6 foot	Ea	5.000	$	$
860	8153044	Quercus bicolor, 2 inch	Ea	2.000	$	$
870	8167011	_Slope Restoration	Syd	8,915.000	$	$
880	8190132	Conduit, DB, 2, 3 inch	Ft	4,933.000	$	$
890	8197050	_Handhole Assembly, 12 Inch X 18 Inch	Ea	20.000	$	$
900	8197050	_Handhole Assembly, 17 Inch X 30 Inch	Ea	2.000	$	$

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TOTAL FROM PAGE ADD 5-10 $ _____

TOTAL FROM PAGE ADD 5-11 $ _____

TOTAL FROM PAGE ADD 5-12 $ _____

TOTAL FROM PAGE ADD 5-13 $ _____

TOTAL BASE BID $ _____

CITY OF ANN ARBOR

DETAILED SPECIFICATION
FOR
TIMBER BOARDWALK AND FOUNDATION SYSTEM

a. Description. This work consists of furnishing all labor, equipment, and materials necessary to construct a timber boardwalk over the wetland area as shown on the plans, including timber framing, decking and structural components, a foundation system using helical piers, railings with treated timber and composite wood, and concrete massive wall unit blocks as the HMA terminus.

All structural members of the boardwalk shall be designed for a uniform pedestrian live load of 90 psf. The pedestrian live load shall be applied to those areas of the walkway so as to produce maximum stress in the member being designed. The boardwalk shall be designed for a maintenance vehicle satisfying the AASHTO H-10 Design Truck configuration. A single truck shall be placed to produce the maximum load effects and shall not be placed in combinations with the pedestrian load.

b. Materials. Wood framing, decking, structural components, footings, and hardware must be in accordance with sections 709 and 912 of the Michigan Department of Transportation (MDOT) 2012 Standard Specifications for Construction except as modified herein.

Submit the following to the Engineer for approval at least 14 calendar days prior to the start of construction. Work must not begin until all submittals have been received and approved by the Engineer.

1. Working drawings and design calculations for the Helical Piles intended for use. The calculations should include the minimum torque required to install the vertical and battered helical piles based on the specified allowable capacities, the estimated pier installation depth of the helical piles, and a critical buckling load analysis due to the low strength soil conditions on site.

2. A detailed description of the construction procedures proposed for review, including a list of major equipment to be used.

3. Shop drawings for all Helical Pile components that include, but are not limited to:

    a. Helical Pile design load,
    b. Type and size of central steel shaft,
    c. Helix configuration (number and diameter of helix plates),
    d. Minimum effective installation torque,
    e. Minimum overall length,
    f. Inclination of Helical Pile,
    g. Helical Pile attachment to structure relative to grade beam, column pad, pile cap, etc.,
    h. Indication of corrosion protection.

4. Soil Analysis Report for detailed bearing capacity.

5. Copies of calibration reports for each torque indicator or torque motor, and all load test equipment to be used on the project. The calibration tests must have been performed within 45 working days of the date submitted. Helical Pile installation and testing must not proceed until the Engineer has received the calibration reports.

Helical piers as specified must conform to the applicable building code.

The helical lead sections and extension sections must be solid steel, round cornered square shaft, or round steel pipe shaft, or composite steel and grout shaft configured with one or more helical bearing plates welded to the shaft. Bolts and couplings shall be per manufacturer's recommendations for each helical pier type.

All helical pile material must be corrosion protected by hot dip galvanization after fabrication in accordance with ASTM A 123 and/or ASTM A 153.

Installation units consist of a rotary type torque motor with forward and reverse capabilities.

Appropriate helical pier selection will consider design load plus safety factor, soil parameters and the installation torque vs. capacity equation as per the manufacturer's recommendations.

Design of helical screw piers and anchors must be performed by an entity as required in accordance with existing local code requirements or established local practices. This design work shall be performed by a licensed professional engineer licensed in the state of Michigan.

Piers must have U-shape bracket sleeves to mount lateral support beams for joist and deck structure. All component materials must be protected by hot dip galvanization in accordance with ASTM A 153.

The minimum block dimensions for the concrete massive wall units shall be 12 inches high x 72 inches wide x 14 inches deep and have a minimum block weight of 850 pounds.

The concrete massive wall units shall meet the aesthetic requirements for the site.

The concrete massive wall units shall have a minimum 28-day compressive strength of 5000 psi as tested in accordance with ASTM C 140. The concrete shall have a maximum moisture absorption rate of 5 percent to ensure adequate freeze-thaw.

The drainage pipe used in the HMA path terminus section shall be perforated corrugated HDPE or PVC pipe, with a minimum diameter of 4 inches, protected by a geotextile filter to prevent the migration of soil particles into the pipe.

All timber and lumber shall be treated and in accordance with section 912 of the MDOT 2012 Standard Specifications for Construction. Lumber shall be S4S (surfaced four sides) according to ASTM D245. All lumber sizes are nominal. All lumber shall be stamped by the rating agency and certifications shall be provided to verify the preservative treatment including net retention, pressure process used, and compliance to current standards.

Fasteners, unless specifically noted, may be screws or nails in accordance with MDOT 2012 Standard Specifications for Construction.

c. Construction. Construction must be in accordance with section 709 and 912 of the MDOT 2012 Standard Specifications for Construction except as modified herein.

Protection in Transit. A coat of end sealer must be applied to ends of all wood members as soon as practicable after end trimming. Wood members must be protected until installed.

Field Storage and Handling. If products are stored temporarily at the job site after arrival, wood members must be placed on blocking, well off the ground and be separated by wood blocking so air can circulate around each member. Place water resistance paper over the top but do not use opaque polyethylene.

Butt Joints, if used, must be placed over supports and must be staggered a minimum of 3 feet apart for adjacent planks.

Centerline of Helical Piles must not be more than 3 inches from indicated plan location. Helical Pile plumbness must be within 2 degrees of design alignment. Top elevation of Helical Pile must be within +1 inch to -2 inches of the design vertical elevation.

Helical Piles must be installed by an authorized installer who has satisfied the certification requirements of the manufacturer. Provide the Engineer proof of current manufacturer's certification.

Adequate soil boring information for estimated bearing capacity and pier depths are available from the geotechnical report within the proposal. Installation of Helical Pile locations on the project site will be necessary to generate a presumptive soil profile using the well-known installed torque vs. capacity attribute of helical piles to determine an appropriate helical pier to meet the required capacity.

A torque indicator must be used during Helical Pile installation. The torque indicator can be an integral part of the installation equipment or externally mounted in-line with the installation tooling and must be properly calibrated. The torque indicator shall be capable of providing continuous measurement of applied torque throughout the installation. Installation units must be capable of developing a torque capacity 15% greater than the torsional strength rating of the central steel shaft to be installed.

Installation units must be capable of positioning the helical pier at the proper installation angle and location as indicated on the plans. The Helical Pile sections shall be engaged and advanced into the soil in a smooth, continuous manner at a rate of rotation of 5 to 20 RPM's. Extension sections shall be provided to obtain the required minimum overall length and installation torque as shown on the shop drawings and calculations. Connect sections together using coupling bolt(s) and nut torqued to 40 ft-lb. Sufficient down pressure shall be applied to uniformly advance the Helical Pile sections approximately 3 inches per revolution. The rate of rotation and magnitude of down pressure shall be adjusted for different soil conditions and depths.

Helical Piles must be installed so that the top helical plate is at minimum 42" below ground level.

Battered Helical Piles must be installed to the minimum torque value required to provide 6 kip allowable load capacities. Vertical Helical Piers must be installed to the minimum torque

value required to provide 15 kip allowable load capacities. The average torque for the last three feet of penetration shall be used as the basis of comparison with the minimum installation torque. The average torque shall be defined as the average of the last three readings recorded at on-foot intervals.

Installation torque must be monitored throughout the installation process. Measured torque shall never exceed the torsional strength rating of the central steel shaft.

If reasonable doubt exists as to the accuracy of the torque measurements, the torque indicator shall be re-calibrated on-site.

Install the piers within the construction area with the least amount of disturbance to the wetlands as possible.

Accurately record location, type, torque and depth of piers and provide the Engineer with a copy of this data.

Helical Pile capacity in soil shall not be relied upon from the soil layers indicating peat, marl, or loose sands as shown in the geotechnical report. End-bearing on the helix plates must be in appropriate soil strata.

The bottom row of wall modules for the HMA path terminus section shall be placed on the prepared leveling base as shown on the plans. Care shall be taken to ensure that the wall modules are aligned properly, leveled from side to side and front to back and in complete contact with the base material.

The wall modules above the bottom course shall be placed such that the tongue and grove arrangement provides the design batter as indicated on the plans.

The wall modules shall be swept clean before placing additional levels to ensure no dirt, concrete, or other foreign materials become lodged between successive lifts of the wall modules.

The contractor shall check the level of wall modules with each lift to ensure that no gaps are formed between successive lifts.

Care shall be taken to ensure that the wall modules are not broken or damaged during handling and placement.

Install timber decking planks with a maximum 1/8 inch gap between planks.

Use 4 inch self tapping screws to attach timber decking planks to joists and/or beams. Attach planks with at least two fasteners at each end and at every joist and/or beam. Drill planks prior to installation of screws to prevent splitting.

Fasten joists to header beams using tie down clips/brackets.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit prices using the following pay items:

Pay Item	Pay Unit
Timber Boardwalk	Foot
Helical Pier	Foot
HMA Path Terminus	Each
Safety Railing	Foot

Timber Boardwalk as measured shall be paid for based on the length in feet of boardwalk installed, and includes all labor, equipment, and materials for furnishing and installing the boardwalk over the wetland including all wood members, hardware and fasteners, and appurtenances for a complete installation and as shown on the plans.

Helical Pier as measured shall be paid for based on the length in feet below grade of helical pier installed to the minimum depth specified, and includes all labor, equipment, and materials for furnishing and installing the boardwalk foundation piers in the wetland including drilling equipment, hardware and fasteners, and appurtenances for a complete installation and as shown on the plans. Any helical pier length installed below the minimum depth or minimum torque requirement, whichever is deeper will not be paid.

HMA Path Terminus as measured shall be paid for based on the number each of units installed, and includes all labor, equipment, and materials for furnishing and installing the HMA terminus at the ends of the boardwalk including all concrete massive wall unit blocks, required backfill, limestone base, geotextile fabric, and perforated drain as shown on the plans.

Safety Railing as measured shall be paid for based on the length in feet of safety railing installed, and includes all labor, equipment, and materials necessary for furnishing and installing the safety railings on the boardwalk including all wood members, hardware and fasteners, and appurtenances for a complete installation and as shown on the plans.

APPENDIX

MDOT Special Provisions

MDOT Supplemental Specifications

MDOT, City of Ann Arbor, and Pittsfield Charter Twp Standard Plans and Special Details

MDEQ, WCWRC, and Pittsfield Charter Twp Permits

Geotechnical Report

Pittsfield Charter Twp Water Main Specifications and Details

1.00 GENERAL

1.01 DESCRIPTION

A. The CONTRACTOR shall furnish all labor, materials, and equipment required to construct a water main and necessary appurtenant work as herein specified. The water main shall be installed in the locations as shown on the Plans and shall meet all acceptance tests.

1.02 NOTIFICATION

A. CONTRACTOR shall notify the ENGINEER and the Pittsfield Township Utilities Department at (734) 882-2110, 24 hours prior to flushing or chlorination of the water main.

B. CONTRACTOR shall schedule bacteriological testing with the ENGINEER 48 hours prior.

C. CONTRACTOR shall notify the ENGINEER and the Pittsfield Township Utilities Department 48 hours prior to connecting to an existing water main.

1.03 SUBMITTALS

A. The CONTRACTOR shall submit shop drawings or data sheets for all pipe, manholes, manhole castings, pipe to manhole connections, valves, hydrants and the B-1 Poly Pig. The Contractor shall submit a certification letter for all pipe proposed on the project. The letters shall contain the following: Contractor name, project name, Township name, current date, certification of pipe provided and letterhead of the certifying company.

1.04 TESTING

A. General

1. CONTRACTOR shall furnish all equipment and personnel to conduct system acceptance tests as specified herein. All tests shall be conducted under the supervision of the ENGINEER. All water mains, branches and valves shall be subject to cleaning with a poly-pig, hydrostatic pressure testing, disinfection and bacteriological testing. No acceptance tests shall be conducted until the water main has been installed and backfilled for not less than 30 days. A copy of all test results shall be furnished to the ENGINEER.

2. Hydrostatic pressure testing must be performed in accordance with ANSI/AWWA C600, Disinfection and bacteriological testing must be performed in accordance with ANSI/AWWA C651.

3. CONTRACTOR shall furnish all material and labor to provide for an acceptable full size blow-off to flush the poly-pigs out of the main at the far end of the project not connected to the existing system.

4. Should the results of any test fail to meet the criteria established in this Specification, the CONTRACTOR shall, at his own expense, locate and repair the rejected section and retest until it is within the specified allowance.

5. Only Pittsfield Township personnel or the CONTRACTOR under direct supervision of Pittsfield Township personnel may fill or flush lines.

B. Preparation

1. After the pipe has been laid and backfilled as specified, the CONTRACTOR shall fill the line, or a valve section thereof, to be tested with water in such a manner as to expel all air from the pipe. This may be done through fire hydrants at the high points; or, if no hydrant is available at such point, the CONTRACTOR shall make the taps necessary to accomplish the expulsion of all air. At the close of the test, all taps shall be satisfactorily plugged with brass plugs.

C. Sequence

1. All water mains connected to an existing water system shall be flushed, swabbed, chlorinated and bacteriological tested prior to pressure testing. The sequence for acceptance testing shall be:

   a. Flushing with approved B-1 Poly-Pig
   b. Chlorination
   c. Flushing
   d. Bacteriological Testing
   e. Pressure Testing

2. Where mains can be totally isolated from the existing water system with airgaps, pressure testing shall precede chlorination and bacteriological testing. The sequence for acceptance testing shall be:

   a. Pressure Testing
   b. Connect to System
   c. Flushing with approved B-1 Poly Pig
   d. Chlorination
   e. Flushing
   f. Bacteriological Testing

3. If a hydrostatic pressure test fails, the chlorination and flushing process must be repeated after repairs to the system are completed.

D. Flushing

1. All flushing will be conducted by the TOWNSHIP with clean potable water until the water runs clear.

E. Chlorination

1. All new mains and pipe or any existing mains contaminated by the CONTRACTOR shall be chlorinated to a minimum residual chlorine concentration of fifty (50) parts per million with commercial liquid chlorine solution or approved equal. The chlorinated water shall be allowed to stand in the mains for 24 hours. The end of the 24-hour period the chlorinated water at all parts of the mains shall show a free available chlorine residual of not less than twenty-five (25) parts per million. If less than twenty-five (25) parts per million residual is shown at the end of the first 24 hours period, additional chlorine shall be added until a residual of not less than twenty-five (25) parts per million at all parts of the system is shown after a subsequent 24 hour period. The chlorinated water shall then be removed from the mains and the mains flushed with potable water for bacteriological testing. No flushing shall take place between the two required bacteriological testing.

F. Bacteriological Testing

1. The Pittsfield Township Utilities Department will take bacteriological samples of the water in the mains for analysis at two different times. The first samples will be taken 24 hours after the mains have been satisfactorily chlorinated, flushed and filled with potable water. The second sample will be taken 24 hours later. Each sample will be incubated for 48 hours. No flushing shall be done during or between tests, unless supervised and approved by ENGINEER. Two sets of safe consecutive bacteriological samples, collected at least 24 hours apart, must be obtained before placing the water main in service.

2. The CONTRACTOR shall provide a sufficient number of corporation cocks and copper tubing for taking samples. Samples shall not be collected from hoses or fire hydrants.

3. Bacteriological testing must begin on Mondays to allow Pittsfield Township personnel and the testing laboratory a full work week to conduct the testing.

G. Hydrostatic Pressure Testing

1. The CONTRACTOR shall pressure test sections of water main as sections of 2,000 feet or less unless otherwise authorized by the ENGINEER. When permitted to test lengths in excess of 2,000 feet, only the allowable leakage for 2,000 feet will be permitted.

2. All water mains shall be subjected to a hydrostatic pressure of 150 psi based on the elevation of the lowest point in the system. The main shall be maintained under the test pressure for a minimum continuous period of two (2) hours by pumping potable water into the line at frequent intervals. The volume of water so added shall be measured and considered to represent the leakage from the main. No pipeline installed will be accepted until the leakage measured is less than 0.092 gallons per inch diameter of the pipe per 1 hour per 1,000 feet.

3. In the event that the leakage exceeds the specified amount, the main shall be carefully inspected for leaks and repaired as necessary. Any cracked or defective pipe, fittings, valves or hydrants discovered shall be removed and replaced with sound material and the test repeated to the satisfaction of the ENGINEER.

4. If the CONTRACTOR chooses to pressure test against an existing valve he assumes the responsibility of meeting the leakage requirements. The CONTRACTOR may at his discretion provide a physical break and cutting in sleeve for pressure testing.

5. Temporary connections (jumpers) between existing water mains and the newly constructed system for testing purposes, shall include a reduced zone backflow preventer to prevent backflow and possible contamination of the public water.

H. Material Tests

1. The CONTRACTOR shall have test of pipe and strength made by an independent testing laboratory. Tests of up to 4 lengths of water main per hundred lengths may be required to show compliance with the Specifications. All pipe delivered to the job site shall be accompanied with a manufacturers certificate of compliance to the specifications.

2.00 PRODUCTS

A. All products shall be consistent with the current component part submittal sheet posted on the Township website.

2.01 PIPE AND FITTINGS

A. Ductile-iron pipe water main shall meet all the requirements of the latest revision of ANSI/AWWA C151/A21.51. Pipe shall be furnished in eighteen-foot or twenty-foot lengths, unless otherwise required. All joints, to include joints for fittings, valves and hydrants, must be of the push on joint type and compatible tyton joint gaskets. Ductile iron pipe must be designed in accordance with the latest revision of ANSI/AWWA C150/A21.50 to meet requirements for Pressure Class 350.

B. Ductile iron pipe and fittings shall be double-cement lined with an approved bituminous seal coat in accordance with ANSI/AWWA C104/A21.4.

C. Ductile iron fittings shall meet all the requirements of the latest revision of ANSI/AWWA C110/A21.10 for full body fittings and ANSI/AWWA C153/A21.53 for compact fittings for a minimum working pressure of 250 psi and be of the push-on joint type. Plugs, where shown on the plans, shall be solid mechanical joint plug type.

D. Restrained mechanical joints of the wedge action type shall use a follower gland and shall include a restraining mechanism which, when activated, impart multiple wedging action against the pipe, increasing its resistance as the pressure increases. Twist off nuts shall be used to insure proper actuating of the restraining device. Restrained mechanical joints for ductile iron pipe shall be Megalug, Series 1100, or approved equal. Mechanical joints shall be in conformity with the requirements of the latest revision of the ANSI AWWA C111/A21.11. Bolts and nuts must be type 304 stainless steel.

E. Push-on joints shall meet all requirements of ANSI/AWWA C111/A21.11. Push-on joints shall consist of a ductile-iron bell provided with a recess to receive a circular molder rubber gasket to effect the joint seal. A rubber gasket and sufficient lubricant to assemble the joint shall be furnished with each joint. The lubricant shall have no deleterious effect upon the color, taste or odor of potable water and shall not be corrosive to either the pipe or gasket. Pipe furnished with push-on type joints shall be equal in strength and leak tightness to pipe furnished with mechanical joints as specified when installed under identical conditions, and shall meet all other requirements of these specifications. In addition to the above requirements, the gasket and lubricant shall conform to the latest revision of ANSI/AWWA C111/A21.11. When it is necessary to utilize a locking mechanism for a push-on joint upstream or downstream of a restrained mechanical joint, field-lok gaskets or equal shall be utilized and shall be used in conformance with DIPRA Standards for restraint distance from a restrained mechanical joint fitting.

F. All pipe and fittings shall be manufactured in the United States of America.

G. The ENGINEER shall witness the delivery and unloading of all pipe and collect the appropriate manufacturer's certificate of compliance per Section 1.04 of this Specification.

2.02 VALVES

A. All valves installed under this Specification shall conform to the applicable requirements of ANSI/AWWA C500, C504 and C509 standards governing construction materials and workmanship. Each valve shall carry the name or trademark of the manufacturer. All valves shall have operating nuts that turn to the right (clockwise) to open.

B. Resilient-Seated Gate Valves

1. Resilient seated gate valves shall conform to the applicable requirements of ANSI/AWWA C515. Valves shall have a minimum working pressure of 250 psi. The gate shall be ductile iron encased in a bonded synthetic rubber to form resilient seating surfaces. Stem shall be bronze with a non-rising design and double o-ring packing. Joints shall be push-on type.

2. Resilient Seated Gate Valves shall be manufactured by American Flow Control or Clow.

C. Tapping Sleeves and Valves

1. Tapping sleeves shall be full length of heavy-duty stainless steel construction designed for use with the type of pipe to be tapped. Tapping sleeve flange and body shall be type 304 stainless steel. Bolts and nuts shall be 304 stainless steel. Gasket shall be full circumferential SBR compounded for water service, Tapping sleeve shall contain a test plug to assure seal prior to tapping. Tapping sleeve shall be JCM Industries 432; Romac Industries SST, Ford FAST, Powerseal 3490AS; Dresser 630 or equal.

2. Tapping valves shall meet the specifications for gate valves except that the valve shall have a flange compatible with the tapping sleeve.

3. The tapping sleeves and valves shall be subjected to a hydrostatic pressure of 200 psi. The sleeves and valves shall be maintained under pressure for a minimum continuous period of 5 minutes by pumping potable water into the sleeve. Upon any visual leakage observed by the ENGINEER, the tapping sleeve and valve shall be removed and replaced, and the test repeated at the CONTRACTOR'S expense to the satisfaction of the ENGINEER.

D. Corporation Stops

1. Corporation stops used for insertion into mains shall be ball valve type. All stops shall have no lead brass bodies, keys, stem washers and nuts. Inlet threads shall conform to the latest revision of AWWA C800. The outlet connection shall be of the compression type to receive copper service pipe.

E. Valve Boxes

1. Valves boxes shall be 5-1/4-inch and be of cast-iron construction. They shall be of three-piece, screw-type adjustment design. All valve boxes shall be installed flush with the top of the proposed site grade. Cover shall be designed to be removed easily to provide access to the valve. The base shall not rest upon the valve assembly. Valve boxes shall be Tyler 6860 Item DD with number 6 base, or equal.

F. Valve Extensions

1. All gate valves with operating nuts at a distance greater than 6.5 feet below ground surface shall be provided with an extension stem. The length of the extension stem shall reach within 6.5 feet of the ground surface. Details of the extension system and method of installation shall be approved by the ENGINEER prior to installation.

G. Post Indicators and Valves

1. Post indicators, when specified, shall be American Flow Control series A240 or Clow series 2945A with aluminum plates indicating OPEN and SHUT. Post indicators shall open left.

2. Post indicator valves shall be American Flow Control Model 2500 or Clow model F-6120. All valves shall open left.

3. Post indicators and their corresponding valves must be made by the same manufacturer.

4. Bollards must be placed to protect post indicators, except as specified by the ENGINEER.

5. Bollards shall be 4-inch diameter galvanized schedule 40 steel posts 36 to 48 inches high with minimum depth of 24 inches. The posts shall be set in and filled with 3000 psi concrete. Bollards protecting hydrants and PIVs shall be painted red.

2.03 GATEWELLS

A. Gatewells shall conform to the latest revision of ASTM C478 for Precast Reinforced Concrete Manhole Sections. Section joints shall be rubber gasketed and shall conform to ASTM C990. Cone sections shall be eccentric, with an offset step configuration.

B. All gatewell components shall have the name of the manufacturer stenciled on the inside. The lettering shall be a minimum of 4-inches high.

C. Gatewells constructed over an existing water main shall have a doghouse mudded to an 8-inch thick cookie. All other gatewells shall have precast integral base sections.

D. Mortar for masonry or plastering outside of gatewells shall be made of one part of Portland Cement to two parts fine aggregate. Mortar materials and mixing shall correspond, in general, to those for concrete. All openings in gate wells shall be closed with brick and mortar in a manner that will make them watertight.

E. Gatewell steps shall be reinforced polypropylene coated steel. They shall be M.A. Industries models PS1-PF or PS1-B, or approved equal.

2.04 GATEWELL FRAMES AND COVERS

A. Gatewell frames and covers shall weigh not less than 350 lbs. Each frame and cover shall have machined bearing surfaces and shall be suitable notched for convenient removal of the cover.

B. Frames and covers shall be East Jordan Iron Works Model 1040Z frame with 1040 A cover. Each cover shall have the Pittsfield Township logo and the letters "PITTSFIELD TWP WATER" cast integrally into the cover.

C. All frames and covers shall be coated at the place of manufacturer with coal tar pitch varnish or other asphaltum coating approved by the ENGINEER.

2.05 GATEWELL CONNECTIONS

A. Water pipe to gate well connections shall be through a watertight flexible pipe-to-manhole connector, which shall be securely clamped into a core-drilled port. Pipe ports shall be core-drilled at the point of manufacturer and shall be accurately located within 1/2-inch of the proposed water main centerline. Flexible pipe-to-manhole connectors shall meet the requirements of ASTM C923 and shall be NPC, Kor-N-Seal, or equal.

B. All non-rubber components including wedges, bands and pipe clamps shall be stainless steel.

2.06 GATEWELL ADJUSTMENTS

A. All final grade adjustment of gatewell cover and frame assemblies shall be completed utilizing injection molded High Density Polyethylene (HDPE) adjustment rings as manufactured by Ladtech, Inc., or approved equal. The adjustment rings shall be manufactured from polyethylene plastic meeting the requirements of ASTM D4976. Brick adjustments are not acceptable.

B. All adjustment for matching road grade shall be made utilizing a molded indexed slope ring.

C. Each adjustment ring shall be sealed with a 3/16 to 1/4-inch bead of butyl rubber sealant per the manufacturer's instructions. Sealant shall meet the requirements of ASTM C990.

D. All castings and adjustment rings shall be securely fastened to the cone of the structure with four 3/8-inch threaded rods. The rods shall be galvanized or stainless steel anchored to the structure with Redhead Trubolt concrete anchors, or equal. Stainless steel or galvanized nuts and washers shall be used to attach the casting.

E. When the depth of the gate well requires an adjustment greater than the maximum allowed, the CONTRACTOR shall provide additional pre-cast gate well barrel sections required to maintain acceptable chimney heights.

2.07 HYDRANTS

A. Fire hydrants shall comply with the latest revision of ANSI/AWWA C502. Hydrants shall be compression type to open with the pressure. They shall have a 5-1/4" valve opening and 6" mechanical joint inlet. Hydrants shall have two 3-1/2" (4.05" O.D.) pumper connections with National Standard 7-1/2 threads per inch. All hydrants shall have City of Ann Arbor standard thread pattern.

B. Fire hydrants shall have an inside barrel dimension of not less than 7.375" I.D. from top to bottom. The 1-1/8" pentagon operating nut shall open left (counter clockwise).

C. All nozzles shall be on a removable head with a flange so that they may be rotated by changing the position of the flange.

D. Hydrant shall be fully bronze mounted, including top of the operating stem where it passes through the double o-ring seal in the bronze packing gland. The forged operating stem in the base and the valve seat shall also be of bronze. The molded valve shall be of composition rubber and the cast iron valve clamps shall be packed with o-ring seals and held tight to the stem by a threaded bronze hex retainer ring and threaded bronze locknut, anchored with set screws.

E. Hydrant shall be designed for 150 psi working pressure and tested to 300 psi. Those portions of the hydrant above grade shall have two coats of red enamel. All unpainted surfaces shall have two coats of coal tar pitch varnish.

F. The hydrants shall be EJIW WaterMaster 5BR-250 with mechanical joint connections and break flange barrel with standard head.

G. Hydrant bolts located below grade shall be type 304 stainless steel

H. All hydrants shall have a 4" Harrington Integral Hydra-Storz (HIHS) adaptor. The HIHS shall meet the requirements of AWWA C502 regarding material and pressure testing. Stortz nozzle shall have a brass metal face and hard anodized ramps and lugs. The aluminum finish shall be hardcoat anodized to MIL-A-8625f, type 3 dark gray. The adapter shall be made from forged or extruded 6061-T6 aluminum.

I. The blind cap shall have hard anodized aluminum Storz ramps and lugs, made of forged or extruded 6061-T6 aluminum, the cap shall be equipped with suction seal. The cap shall be connected to the adapter or the hydrant with 0.125 vinyl coated aircraft cable.

J. Fire hydrant extensions shall be manufactured by the hydrant manufacturer for use with the model hydrant being installed.

K. Hydrants adjacent to truck routes on commercial developments shall be protected by bollards.

2.08 SERVICE LEADS

A. Pipe for service leads 1-inch to 2-inch shall be soft annealed Type K copper. Service leads 4-inch to 8-inch shall be Pressure Class 350 Ductile Iron, Double cement lined.

B. Curb Stops

1. Curb stops used for service connections shall be ball valve type. All parts shall be no lead brass. Both the inlet and outlet connections shall be of the compression type to receive copper service pipe. Curb stops shall be consistent with the most current shop drawing checklist posted on the Township website.

C. Curb Boxes

1. Curb boxes shall be the Bibby Screw Style V010 with S169 top, V201 bottom, V223 extention, and V240 water cover . All curb boxes shall be coated inside and out with a tar base enamel. The minimum bury shall be 5'-0" (60") and the maximum 6' (72"). Curb boxes shall be consistent with the most current shop drawing checklist posted on the Township website.

D. Couplings

1. Couplings used for service connections shall be located outside the pavement and more than 10 feet from any building wherever possible. They shall have a three part union, and both connections shall be of the compression type to receive copper service pipe. All parts shall be no lead brass..

2. All service connections between two copper service pipes (two-inch or less in diameter) located under the pavement or within 10 feet of a building shall be connected using wrought copper, solder-sweat type couplings conforming to ASME B16.18 or ASME B16.22. Fittings shall bear made in USA labels. Joining of copper piping shall be a solder-sweat connection using lead free Silfos. The use of 95-5, Tin-Antimony or equivalent solders will not be allowed.

2.09 TRACER WIRE

A. Tracer wire to be used on open cut pipe shall be AWG #12 single strand copper with blue 30 mil HDPE insulation. Connections shall be made using 3M DBR-6 wire connectors, or equal.

2.10 POLYETHYLENE ENCASEMENT

A. All ductile iron pipe and fittings must be polyethylene encased. In addition, the initial 24-inches of copper service lead must be encased from the corporation stop. Polyethylene encasement must be manufactured in accordance with the requirements of the latest revision of ANSI/AWWA C105/A21.5.

B. Polyethylene Encasement shall be black linear low-density polyethylene with a minimum thickness of 8 mils.

C. The wrap shall overlap the joint by 12 inches to either side and be secured to the pipe with polyethylene adhesive tape.

3.00 EXECUTION

3.01 EXCAVATION AND BACKFILL

A. All excavation and backfill shall conform to the Earthwork specification.

3.02 PIPE INSTALLATION

A. The installation of ductile iron water main must conform to the requirements of ANSI/AWWA C600.

B. Any pipe damaged in transport or handling shall be rejected and removed from the site of the work.

C. Before lowering in the trench, and while suspended, each pipe and fitting shall be inspected for defects. Defective, damaged or unsound pipe shall immediately be removed from the construction site. The interior of each pipe shall be inspected for cleanness and cleared of all dirt and foreign matter before being lowered into the trench.

D. In handling and placing ductile iron pipe and fittings, no metal shall be used in contact with the inside of the pipe to fit or support the pipe. The pipe shall be moved only through the use of belt slings or automatic release type pipe tongs. Care shall be taken not to injure the pipe or pipe coating, and no damaged or imperfect pipe shall be used in the work except that minor damage to pipe coating may be repaired subject to the review of the ENGINEER.

E. Unless otherwise directed, pipe shall be laid with bell ends facing in the direction of laying. After a length of pipe is placed in the trench, the spigot shall be centered in the bell of the adjacent pipe; the pipe shoved into position and brought to a true alignment. It will then be secured with sand backfill tamped under and on each side of the pipe, except at bell holes. No earth or other foreign matter shall be allowed to enter the joint space.

F. All excavation and backfill above the pipe shall conform to specifications under Earthwork and as shown on the Drawings.

G. A minimum of 18-inches vertical clearance shall be provided between the water main and any existing underground facility, unless otherwise approved by the ENGINEER. Whenever a main is installed under any existing utility line such as gas, buried electric power, telephone line, sewer or water, provisions shall be made to properly support or distribute any concentrated load to avoid settlement and possible failure of either main. Such provisions shall consist of concrete bedding of the main, complete concrete encasement, or some other method as shown on the plans. Water mains passing under sewers, in addition, shall be protected by providing:

1. A vertical separation of at least 18-inches between the bottom of the sewer and the top of the water main.

2. Adequate structural support for the sewer to prevent excessive deflection of joints and settlement of the sewer about the water main; i.e., a concrete saddle under the pipe with a span length extending to undistributed earth bearing.

H. Water mains shall be installed at least 10 feet horizontally from any existing or proposed gravity sanitary or storm sewer, septic tank, or subsoil treatment system. The distance shall be measured edge to edge.

I. In assembly of push-on or shove type joints, the bell socket recess and the gasket shall be wiped clean and the gasket placed properly in position. A thin film of lubricant shall then be applied to the surface of the gasket to come into contact with the entering pipe. The plain end of the entering pipe shall be cleaned and then entered and forced home to the base of the socket.

J. Where necessary to cut pipe, cutting shall be done with approved tools and cut ends of pipe shall be square and regular. Cutting shall be done in a manner to avoid damage to lining and coating. Minor damage may be repaired subject to review of the ENGINEER.

K. To prevent trench water from entering the pipe, joints, which for any reason may not be completed as the pipe is laid, shall be thoroughly packed with approved material, in a manner to make them watertight. Open ends of fittings shall be tightly closed with approved plugs and well packed, as shall the end of the last pipe laid whenever work is not in progress.

L. Each pipe shall be laid accurately to the line and grade shown on the Plans. Wherever deflections at joints are required by changes in grade or alignment or to plumb valve stems, the deflection at any bell and spigot joint shall not exceed that which will cause the spigot end of pipe to be away from home in the bell of the adjacent pipe a distance of 1/4 inch at the point of greatest opening.

M. The deflection at any mechanical joint shall not exceed three-quarters of the maximum deflection recommended by the manufacturer or 3 degrees, whichever is more conservative of the joint used.

N. The CONTRACTOR shall not be entitled to any additional compensation because depth is more than specified at certain locations or due to clearances at manholes, or due to unforeseen obstacles, or occasioned in order to avoid undue changes in grade.

O. Pipe shall be laid at depths to provide minimum cover of 5' - 6" over the top of the pipe unless otherwise noted on the Drawings or elsewhere in these specifications.

3.03 GATE VALVES AND WELLS

A. All pre-cast section joints and lift holes shall be pointed and plugged, inside and outside, with mortar.

B. Gate valves shall be of the size and installed at the location as shown on the plans. They shall be set square with the line of the main, and unless otherwise directed by the Township ENGINEER, all gate valves shall be set with stems plumb. At each side of gate valve, the CONTRACTOR shall furnish and install a 1-inch corporation stop on the main as shown on the Standard Details.

C. All gate valves with operating nuts at a distance greater than 6.5 feet below ground surface shall be provided with an extension stem.

3.04 HYDRANTS

A. Fire hydrants shall be constructed in accordance with the details shown on the plans. Finish grade level to center of nozzle caps shall measure between 24 and 30 inches. A maximum of one hydrant barrel extension and one operating stem extension may be used to accommodate changes in grade. Under no conditions shall extended hydrant have more than one coupling in the operating stem. Pumper connections shall point toward the street.

B. Fire hydrants shall be installed with barrel vertical and properly based. Concrete thrust blocks shall be placed behind the hydrant, tee, and every bend. Care should be taken to insure the drain holes on the hydrant are not plugged by the thrust blocks. Hydrant shall be set in 1 yard of coarse gravel for drainage purposes. If ground water is encountered, the drain hole shall be plugged as directed by the manufacturer. The backfill shall be sand thoroughly tamped around the hydrant and valve box in 1 ft layers.

C. Fire hydrant and gate valve shall be set apart 24 inches. Gate valves and valve box shall be as specified under the valve paragraphs of this section.

D. Hydrant leads shall have a minimum of 5.5 feet of cover in all areas, including crossings through ditch sections.

E. Hydrants shall be carefully plumbed, braced and backfilled so they remain plumb.

F. All grade, facing, and vertical alignment adjustment of hydrants shall be completed prior to pressure testing and charging of the hydrants.

G. All hydrants shall be cleaned and painted with a rust inhibitive, oil base paint such as "rustoleum" or approved equal to the Township's color code prior to acceptance.

H. The lubricant reservoirs in all hydrants having such construction shall be filled with a lubricant acceptable to the Michigan Department of Environmental Quality and recommended by the hydrant manufacturer.

I. Backfilling around fire hydrants shall be carefully tamped sand in 12-inch layers from the centerline of the lead main to a height of 1-foot below finished grade.

J. CONTRACTOR shall place burlap sack or equivalent material over the hydrant nozzles after installation.

K. Fire hydrant nozzles shall be aligned as required by the Township Fire Marshal.

L. Fire hydrant extensions shall be provided as necessary so that the safety flange is located at or above surface grade.

3.05 TRACER WIRE

A. Tracer wire shall be installed along the top of all water mains. For directional drilling, the tracer wire shall be installed at the same time as the pipe. For open cut construction, the tracer wire shall be installed at a height of not more than 6 inches above the main line pipe or service leads. Wire shall be extended to all hydrants, blow-offs, dead ends, service leads and post indicator valves. Tracer wire shall be brought to grade, leaving enough excess material to avoid loss or damage to the wire during construction and subsequent activities. Wire shall be trimmed to finish grade following completion of the landscaping.

B. When tracer wire is to be run along short offsets (less than 20 feet), a loop of wire shall be utilized to loop to the end of the offset, bring the loop to grade and terminate it in an approved manner. For service leads and offsets of more than 20 feet in length, or installed by directional drilling method, a splice may be utilized to make the connection at the main. The tracer wire shall then be installed and terminated in an approved manner.

C. Tracer wire terminations shall be made by one of the following methods:

1. Tracer wire shall be terminated at hydrants by tying off the wire at the head flange, leaving excess material for future trimming following landscape activities.

2. Terminations at valve/curb boxes, post indicators, valves and blow-offs shall be made with 2 wraps of wire at grade around the box or pipe, leaving excess material for future trimming following landscaping.

3. Gatewell terminations shall be made by running the tracer wire through the pipe opening in the wall, down to and across the floor to the steps, up the wall and secure to the top step leaving the stub accessible at the casting. Wire shall be run through the gatewell such that it does not create a hazard.

4. Terminations at existing water mains without tracer wire shall be made at the nearest hydrant or gate well as outlined above. If no hydrant or gatewell is available, an upper section of valve box shall be installed with the tracer wire stubbed up inside

D. When connections are made to existing water mains which do not have tracer wire, the following method most applicable to field conditions shall be used.

1. When connection is made at/near a valve or hydrant, the connection shall be made in the same manner as the termination at said structures in Item C(2) above.

2. When connection takes place in a gatewell, the same procedure shall be used as in termination at a gatewell (see Item C(3) above).

3. If no valve or hydrant is available, the upper section only of a valve box shall be set with the tracer wire stubbed up inside.

3.06 POLYETHYLENE ENCASEMENT

A. The polyethylene encasement must be installed in accordance with the specifications and requirements of ANSI/AWWA C105/A21.5. For open cut applications a single wrap is required, and for directional drill applications a double wrap is required.

B. The polyethylene encasement must be taped and overlapped at pipe joints and must be taped in a spiral configuration along the length of the pipe.

3.07 CONNECTION TO EXISTING MAINS

A. All connections to existing water mains shall be made at the locations as shown on the plans.

B. All valves shall be operated by the Pittsfield Township Utilities Department.

C. Prior to beginning construction of the final connections, the CONTRACTOR shall provide sequence of all final connections to the existing system and coordinate a meeting between the ENGINEER, OWNER and CONTRACTOR in the field to review the procedure.

D. When making a dry connection to an existing main, the existing main to which a connection is to be made shall be isolated by the closing of the necessary existing valves, and the water from the existing main shall then be pumped out or removed by other means so the connection may be made in the dry. After the connection has been acceptably made, the portion of the new line to the nearest valve shall be satisfactorily tested and disinfected, along with the drained portion of the existing water main, before the isolated existing main is placed back in service, except as the ENGINEER may otherwise direct. In as much as residents served by this isolated main will be temporarily out of water during this period, the work shall be executed as rapidly as possible, and the time of, and the procedure in, making such connections shall be subject to the review of the ENGINEER. Such work may be required to be done at night in order to minimize inconvenience of water users. The CONTRACTOR shall not be entitled to any additional compensation because of night work or other special requirements in work under this section.

E. The CONTRACTOR shall make particular effort, prior to bidding, to ascertain whether or not valves in the existing mains to be connected to the new mains are so located as to provide isolation. If valves are not found to be adequate, then the CONTRACTOR shall utilize other means to make the connections with a minimum of interruption to service.

F. When making a wet tap connection to an existing main, a tapping sleeve designed for the type of pipe being tapped shall be utilized and the tap shall be made in accordance with the manufacturer of the tapping equipment.

G. Wherever adapters are required to properly connect the pipe with existing pipe or other material or manufacturer, the nominal I.D. of adapters shall be the same size as the nominal diameter of pipe connected thereto. Adapters shall also be furnished and used as required by the manufacturer for connection to fittings.

3.08 BEDDING

A. Ductile iron pipes shall be fully enclosed in polywrap and laid on a compacted sand cushion, 4 inches thick. Sand shall conform to fine aggregate 2NS as defined in 2003 MDOT, Section 902.

B. 2NS sand bedding material shall be placed around and above the main to a height of 12 inches above the main.

C. Sand shall be compacted on top of the 12-inches of sand above the pipe to not less than 95 percent of the maximum unit density as determined at optimum moisture content.

Pittsfield Charter Township
6201 W. Michigan Ave.
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SPEC. UPDATES	MRH	DRW	14.01.24
TWP REV	BWA	DRW	11.04.27
SPEC. UPDATES	BWA	DRW	10.10.25
SPEC. UPDATES	TTN	DRW	10.01.19
Revision	By	Appd.	YY.MM.DD
Issued	By	Appd.	YY.MM.DD
File Name: W-02	BWA	DRW	DRW 07.10.01
	Dwn.	Chkd.	Dsgn. YY.MM.DD

Permit-Seal

Client/Project
PITTSFIELD TOWNSHIP

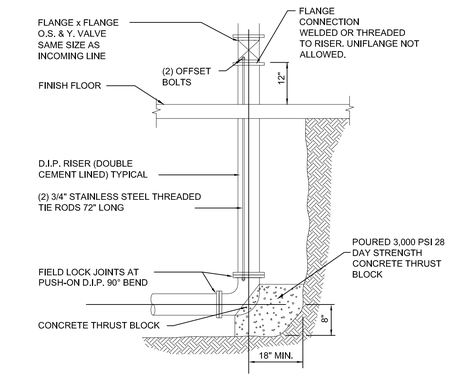
Pittsfield Township, Michigan

Title
WATER MAIN SPECIFICATIONS

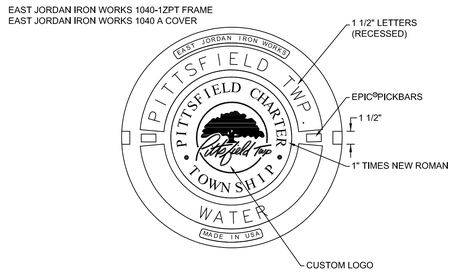
Project No.
2075001300

Scale

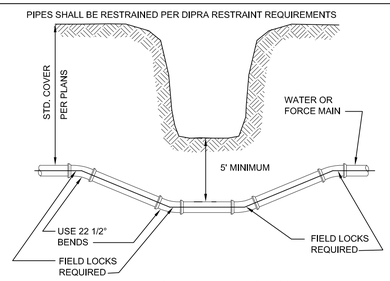
Revision



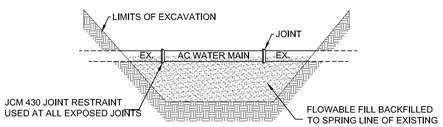
FIRE PROTECTION RISER DETAIL



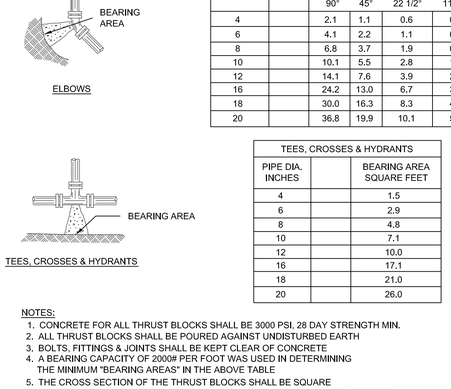
COVER DETAIL



DITCH & STREAM CROSSING



ASBESTOS CEMENT (AC) WATER MAIN



ELBOWS					
PIPE DIA. INCHES		BEARING AREA SQUARE FEET 90°	45°	22 1/2°	11 1/4°
4		2.1	1.1	0.6	0.3
6		4.1	2.2	1.1	0.6
8		6.8	3.7	1.9	0.9
10		10.1	5.5	2.8	1.4
12		14.1	7.6	3.9	2.0
16		24.2	13.0	6.7	3.3
18		30.0	16.3	8.3	4.2
20		36.8	19.9	10.1	5.1

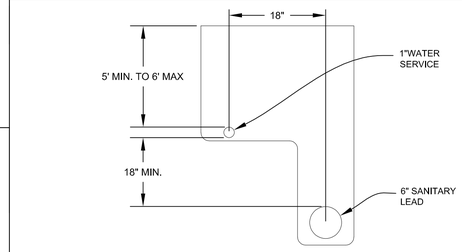
TEES, CROSSES & HYDRANTS		
PIPE DIA. INCHES		BEARING AREA SQUARE FEET
4		1.5
6		2.9
8		4.8
10		7.1
12		10.0
16		17.1
18		21.0
20		26.0

NOTES:
1. CONCRETE FOR ALL THRUST BLOCKS SHALL BE 3000 PSI, 28 DAY STRENGTH MIN.
2. ALL THRUST BLOCKS SHALL BE POURED AGAINST UNDISTURBED EARTH
3. BOLTS, FITTINGS & JOINTS SHALL BE KEPT CLEAR OF CONCRETE
4. A BEARING CAPACITY OF 2000# PER FOOT WAS USED IN DETERMINING THE MINIMUM "BEARING AREAS" IN THE ABOVE TABLE
5. THE CROSS SECTION OF THE THRUST BLOCKS SHALL BE SQUARE
6. IN ADDITION TO THRUST BLOCKS, ALL PIPE JOINTS SHALL BE RESTRAINED WITH LOCKING GASKETS PER DIPRA'S STANDARDS.

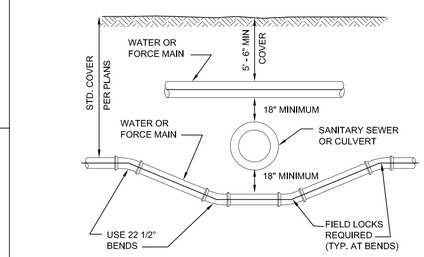
SOIL CHARACTERISTICS	FACTOR
(A) LOOSE COARSE OR MEDIUM SAND; COMPACT FINE SAND; COMPACT SAND-CLAY SOILS; STIFF CLAY	0.33
(B) FIRM FINE SAND; COMPACT INORGANIC SILT; FIRM SAND-CLAY SOILS; MEDIUM CLAY	0.50
(C) LOOSE FINE SAND; FIRM INORGANIC SILT	0.67
(D) LOOSE SAND-CLAY SOILS; LOOSE INORGANIC SILT SOFT CLAY	1.00

"BEARING AREA" x FACTOR = ACTUAL BEARING AREA
2.1 x .5 = 1.05 SQ. FT.
BASED UPON 150# TEST PRESSURE

THRUST BLOCK



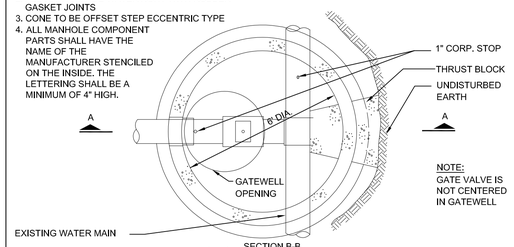
TYPICAL L TRENCH DETAIL HOUSE LEADS

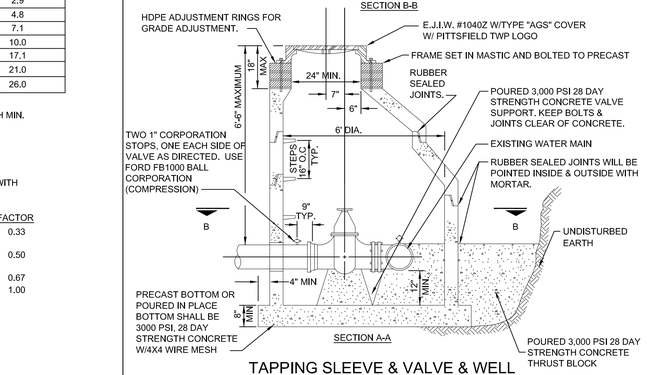


SEWER OR CULVERT CROSSING

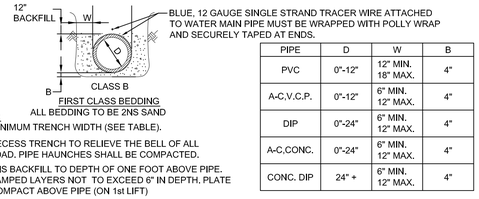
WATER MAIN CONNECTION

PRE-CAST CONCRETE MANHOLE
1. SECTIONS SHALL MEET ASTM C478.
2. ALL JOINTS MADE WATERTIGHT WITH RUBBER GASKET JOINTS
3. CONE TO BE OFFSET STEP ECCENTRIC TYPE
4. ALL MANHOLE COMPONENT PARTS SHALL HAVE THE NAME OF THE MANUFACTURER STENCILED ON THE INSIDE. THE LETTERING SHALL BE A MINIMUM OF 4" HIGH.





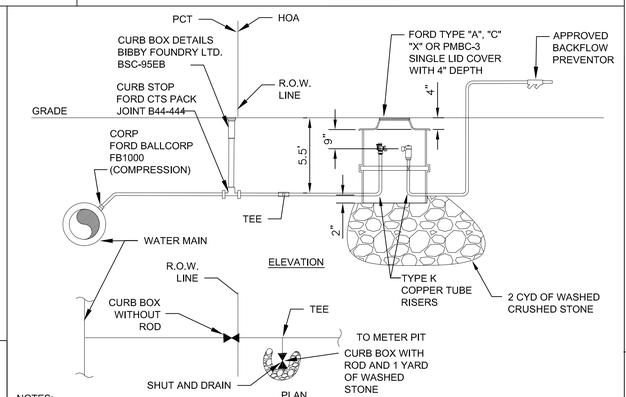
TAPPING SLEEVE & VALVE & WELL



PIPE	D	W	B
PVC	0"-12"	12" MIN. 18" MAX.	4"
A-C,V,C,P.	0"-12"	6" MIN. 12" MAX.	4"
DIP	0"-24"	6" MIN. 12" MAX.	4"
A-C,CONC.	0"-24"	6" MIN. 12" MAX.	4"
CONC. DIP	24" +	6" MIN. 12" MAX.	4"

NOTES:
1. MINIMUM TRENCH WIDTH (SEE TABLE).
2. RECESS TRENCH TO RELIEVE THE BELL OF ALL LOAD. PIPE HAUNCHES SHALL BE COMPACTED.
3. 2NS BACKFILL TO DEPTH OF ONE FOOT ABOVE PIPE. TAMPED LAYERS NOT TO EXCEED 6" IN DEPTH, PLATE COMPACT ABOVE PIPE (ON 1st LIFT)
4. ALL PIPE TO BE PLACED AND JOINTED IN A DRY TRENCH AND LAID ACCURATELY TO LINE AND GRADE WITH BELLS UPHILL.
5. ALL CONCRETE ENCASEMENT AND CRADLING TO BE CLASS "A" CONCRETE.

BEDDING

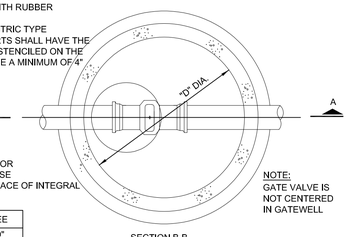


NOTES:
1. SADDLE MAY BE REQUIRED ON MAIN BASED ON LEAD SIZE, MAIN SIZE, AND MAIN PRESSURE
2. ALL WATER MAIN TAPS AND COMPONENT PARTS SHALL BE APPROVED BY THE PITTSFIELD TOWNSHIP UTILITIES DEPARTMENT PRIOR TO INSTALLATION.
3. INSTALLATION SHALL BE INSPECTED AND APPROVED BY THE PITTSFIELD TOWNSHIP UTILITIES DEPARTMENT.

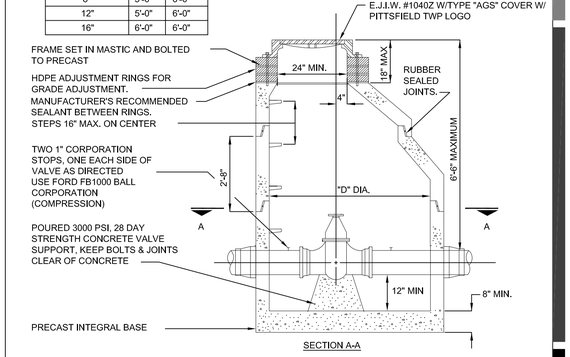
IRRIGATION METER PIT DETAIL

FIRE DEPARTMENT CONNECTION LABEL DETAIL

PRE-CAST CONCRETE MANHOLE
1. SECTIONS SHALL MEET ASTM C478.
2. ALL JOINTS MADE WATERTIGHT WITH RUBBER GASKET JOINTS
3. CONE TO BE OFFSET STEP ECCENTRIC TYPE
4. ALL MANHOLE COMPONENT PARTS SHALL HAVE THE NAME OF THE MANUFACTURER STENCILED ON THE INSIDE. THE LETTERING SHALL BE A MINIMUM OF 4" HIGH.
5. PROVIDE INTEGRAL BASE.
6. KOR-N-SEAL BOOTS OR APPROVED EQUAL TO BE INSTALLED AT PIPE PENETRATIONS.
7. WHERE GATE WELLS ARE CONSTRUCTED OVER EXISTING WATERMAIN, POURED IN PLACE OR PRECAST COOKIE AND DOGHOUSE STRUCTURES MY BE USED IN PLACE OF INTEGRAL BASE.



STRAIGHT THRU	TEE
VALVE SIZE	"D"	"D"
8"	5'-0"	6'-0"
12"	5'-0"	6'-0"
16"	6'-0"	6'-0"



STANDARD GATE VALVE & WELL

NOTES:
-PROVIDE ONE 4-INCH STORZ CONNECTION ON EACH HYDRANT ON THE LEFT NOZZLE WHEN FACING THE HYDRANT
-HYDRANTS SHALL FACE THE PARKING LOT OR DRIVEWAY OR AS DIRECTED BY THE FIRE MARSHALL

STANDARD FIRE HYDRANT

METER ROOM DETAIL

Pittsfield Charter Township
6201 W. Michigan Ave.
Ann Arbor, MI 48108-9721
48108-9721
Tel. 734.822.3101
www.pittsfield-mi.gov

Revision	By	Appd.	YY.MM.DD
UPDATES	MRH	DRW	14.01.24
FDC UPDATE	BWA	DRW	11.09.13
TWP REV	BWA	DRW	11.04.27
HYDRANT, MANHOLE UPDATE	BWA	DRW	10.10.25
UPDATES	TTN	DRW	10.01.20

Issued	By	Appd.	YY.MM.DD
File Name: W-01	BWA	DRW	DRW	07.10.01
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

Client/Project
PITTSFIELD TOWNSHIP

Pittsfield Township, Michigan

Title
WATER MAIN DETAILS

Project No.
2075001300

Scale
NOT TO SCALE

Revision