

CITY OF ANN ARBOR
INVITATION TO BID



Plymouth Road and Green Road Water Main Replacement

ITB No. 4470

Due Date: Thursday, March 2, 2017, at 2:00 PM (Local Time)

Public Works Unit

Issued By:

City of Ann Arbor
Procurement Unit
301 E. Huron Street
Ann Arbor, MI 48104

TABLE OF CONTENTS

TABLE OF CONTENTS..... TC-1 to 2
 NOTICE OF PRE-BID CONFERENCE.....NP-1
 INSTRUCTIONS TO BIDDERS.....IB-1 to 5
 INVITATION TO BID..... ITB-1 to 3
 BID FORMS.....BF-1 to 7
 CONTRACT.....C-1 to 4
 BOND FORMS.....B-1 to 2
 GENERAL CONDITIONS.....GC-1 to 18
 STANDARD SPECIFICATIONS..... SS-17
 DETAILED SPECIFICATION.....DS-1 to 102

<u>Section Number</u>	<u>Title</u>	<u>Pages</u>
100	Notice to Bidders	DS - 1 to 2
101	Construction Sequencing	DS - 3 to 5
201	Project Supervision	DS - 6 to 9
201A	Project Schedule	DS - 10 to 11
202	General Conditions	DS - 12 to 13
202A	Vacuum Type Cleaning Equipment	DS - 14 to 14
202B	Material and Supplies Certifications	DS - 15 to 15
203	Minor Traffic Control	DS - 16 to 17
204	Audio-Visual Recording	DS - 18 to 21
205	Removing Miscellaneous Concrete Items	DS - 22 to 23
207	Machine Grading, Modified	DS - 24 to 30
208	Subgrade Undercutting	DS - 31 to 31
209	Soil Erosion and Sedimentation Control	DS - 32 to 32
211	Temporary Water Main Line Stop	DS - 33 to 37
214	Water Main and Appurtenances, Remove or Abandon	DS - 38 to 39
218	Adjust Structure Cover	DS - 41 to 42
219	Subgrade Underdrain	DS - 43 to 44
220A	HMA Application Estimate	DS - 45 to 45
220B	HMA Paving	DS - 46 to 48
220C	Acceptance of HMA Mixtures	DS - 49 to 52
223	Concrete Curb and Gutter, and Driveway Openings	DS - 53 to 54
223A	Concrete Placement and Protection	DS - 55 to 56
224	Concrete Sidewalk, Sidewalk Ramps and Driveway Approaches	DS - 57 to 58
225	Protective Fencing	DS - 59 to 60
226	Detectable Warning Surface	DS - 61 to 62

<u>Section Number</u>	<u>Title</u>	<u>Pages</u>
227	Slope Restoration	DS - 63 to 64
228	Aggregates	DS - 65 to 66
230	Maintaining Traffic	DS - 67 to 70
251	Temporary Pedestrian Type II Barricade	DS - 71 to 72
252	Temporary Pedestrian Type II Channelizer	DS - 73 to 74
253	Temporary Pedestrian Path	DS - 75 to 76
254	Temporary Pedestrian Ramp	DS - 77 to 78
255	Pavement Markings	DS - 79 to 80
268	Recessed Pavement Markings	DS - 81 to 82
270	Handhole	DS - 83 to 84
272	Structure Covers	DS - 85 to 86
273	Non-Structural Flowable Fill	DS - 87 to 87
401	Water Main and Appurtenances	DS - 88 to 105
4921	Water Main CIPP Lining	DS - 106 to 112
425	Water Main Testing	DS - 113 to 114

APPENDIX A

- Geotechnical Subsurface Investigation

ATTACHMENTS

City of Ann Arbor Prevailing Wage Declaration Form

City of Ann Arbor Living Wage Forms

City of Ann Arbor Vendor Conflict of Interest Disclosure Form

City of Ann Arbor Non-Discrimination Ordinance Notice and Declaration Form

NOTICE OF PRE-BID CONFERENCE

A pre-bid conference for this project will be held on **Tuesday, February 16, 2017 at 10:00 AM (local time)** at **301 East Huron Street, Basement, Ann Arbor, MI.**

Attendance at this conference is highly recommended. Administrative and technical questions regarding this project will be answered at this time. The pre-bid conference is for information only. Any answers furnished will not be official until verified in writing by the Financial Service Area, Procurement Unit. Answers that change or substantially clarify the bid will be affirmed in an addendum.

INSTRUCTIONS TO BIDDERS

General

Work to be done under this Contract is generally described through the detailed specifications and must be completed fully in accordance with the contract documents. All work to be done under this Contract is located in or near the City of Ann Arbor.

Any Bid which does not conform fully to these instructions may be rejected.

Preparation of Bids

Bids should be prepared providing a straight-forward, concise description of the Bidder's ability to meet the requirements of the ITB. Bids shall be written in ink or typewritten. No erasures are permitted. Mistakes may be crossed out and corrected and must be initialed and dated in ink by the person signing the Bid.

Bids must be submitted on the "Bid Forms" provided with each blank properly filled in. If forms are not fully completed it may disqualify the bid. No alternative bid will be considered unless alternative bids are specifically requested. If alternatives are requested, any deviation from the specification must be fully described, in detail on the "Alternate" section of Bid form.

Each person signing the Bid certifies that he/she is the person in the Bidder's firm/organization responsible for the decision as to the fees being offered in the Bid and has not and will not participated in any action contrary to the terms of this provision.

Questions or Clarification on ITB Specifications

All questions regarding this ITB shall be submitted via email. Emailed questions and inquires will be accepted from any and all prospective Bidders in accordance with the terms and conditions of the ITB.

All questions shall be due on or before **5:00 PM Thursday, February 24th, 2017** and should be addressed as follows:

Specification/Scope of Work questions emailed to joe.siwek@tetrattech.com
Bid Process and Compliance questions emailed to cspencer@a2gov.org

Any error, omissions or discrepancies in the specification discovered by a prospective contractor and/or service provider shall be brought to the attention of Colin Spencer at cspencer@a2gov.org after discovery as possible. Further, the contractor and/or service provide shall not be allowed to take advantage of errors, omissions or discrepancies in the specifications.

Addenda

If it becomes necessary to revise any part of the ITB, notice of the Addendum will be posted to Michigan Inter-governmental Trade Network (MITN) www.mitn.info and/or City of Ann Arbor web site www.A2gov.org for all parties to download.

Each Bidder must in its Bid, to avoid any miscommunications, acknowledge all addenda which it has received, but the failure of a Bidder to receive, or acknowledge receipt of; any addenda shall not relieve the Bidder of the responsibility for complying with the terms thereof.

The City will not be bound by oral responses to inquiries or written responses other than written addenda.

Bid Submission

All Bids are due and must be delivered to the City of Ann Arbor Procurement Unit on or before **Tuesday March 7th, at 2:00 PM EST**. Bids submitted late or via oral, telephonic, telegraphic, electronic mail or facsimile **will not** be considered or accepted.

Each Bidder must submit one (1) original Bid and **Two (2)** Bid copies in a sealed envelope clearly marked: **ITB No. 4470**.

Bids must be addressed and delivered to:

City of Ann Arbor
Procurement Unit,
c/o Customer Services, 1st Floor
301 East Huron Street
P.O. Box 8647
Ann Arbor, MI 48107

All Bids received on or before the Due Date will be publicly opened and recorded immediately. No immediate decisions are rendered.

The following forms provided within this 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.

Hand delivered bids will be date/time stamped/signed by the Procurement Unit at the address above in order to be considered. Normal business hours are 9:00 a.m. to 3:00 p.m. Monday through Friday, excluding Holidays. The City will not be liable to any Bidder for any unforeseen circumstances, delivery or postal delays. Postmarking to the Due Date will not substitute for receipt of the Bid. Each Bidder is responsible for submission of their Bid.

Additional time for submission of bids past the stated due date and time will not be granted to a single Bidder; however, additional time may be granted to all Bidders when the City determines in its sole discretion that circumstances warrant it.

Award

The City intends to award a Contract(s) to the lowest responsible Bidder(s). On multi-divisional contracts, separate divisions may be awarded to separate Bidders. The City may also utilize alternatives offered in the Bid Forms, if any, to determine the lowest responsible Bidder on each division, and award multiple divisions to a single Bidder, so that the lowest total cost is achieved for the City. For unit price bids, the Contract will be awarded based upon the unit prices and the

lump sum prices stated by the bidder for the work items specified in the bid documents, with consideration given to any alternates selected by the City. If the City determines that the unit price for any item is materially different for the work item bid than either other bidders or the general market, the City, in its sole discretion, in addition to any other right it may have, may reject the bid as not responsible or non-conforming.

The acceptability of major subcontractors will be considered in determining if a Bidder is responsible. In comparing Bids, the City will give consideration to alternate Bids for items listed in the bid forms. All key staff and subcontractors are subject to the approval by the City.

Official Documents

The City of Ann Arbor officially distributes bid documents from the Procurement Unit or through the Michigan Intergovernmental Trade Network (MITN). Copies of the bid documents obtained from any other source are not Official copies. Addenda and other bid information will only be posted to these official distribution sites. If you obtained City of Ann Arbor Bid documents from other sources, it is recommended that you register on www.MITN.info and obtain an official Bid.

Bid Security

Each bid must be accompanied by a certified check, or Bid Bond by a surety licensed and authorized to do business within the State of Michigan, in the amount of 5% of the total of the bid price.

Withdrawal of Bids

After the time of opening, no Bid may be withdrawn for the period of ninety (90) days

Contract Time

Time is of the essence in the performance of the work under this Contract. The available time for work under this Contract is indicated on page C-2, Article III of the Contract. If these time requirements cannot be met, the Bidder must stipulate on Bid Form Section 3 - Time Alternate its schedule for performance of the work. Consideration will be given to time in evaluating bids.

Liquidated Damages

A liquidated damages clause, as given on page C-2, Article III of the Contract, provides that the Contractor shall pay the City as liquidated damages, and not as a penalty, a sum certain per day for each and every day that the Contractor may be in default of completion of the specified work, within the time(s) stated in the Contract, or written extensions.

Liquidated damages clauses, as given in the General Conditions, provide further that the City shall be entitled to impose and recover liquidated damages for breach of the obligations under Chapter 112 of the City Code.

The liquidated damages are for the non-quantifiable aspects of any of the previously identified events and do not cover actual damages that can be shown or quantified nor are they intended to preclude recovery of actual damages in addition to the recovery of liquidated damages.

Human Rights Information

All contractors proposing to do business with the City shall satisfy the contract compliance administrative policy adopted by the City Administrator in accordance with the Section 9:158 of the Ann Arbor City Code. Breach of the obligation not to discriminate as outlined in Section 5, beginning at page GC-3 shall be a material breach of the contract. Contractors are required to post a copy of Ann Arbor's Non-Discrimination Ordinance attached at all work locations where its employees provide services under a contract with the City.

Wage Requirements

Section 4, beginning at page GC-2, outlines the requirements for payment of prevailing wages and for payment of a "living wage" to employees providing service to the City under this contract. The successful bidder and its subcontractors must comply with all applicable requirements and provide documentary proof of compliance when requested.

For laborers whose wage level are subject to federal, state and/or local prevailing wage law the appropriate Davis-Bacon wage rate classification is identified based upon the work including within this contract. **The wage determination(s) current on the date 10 days before bids are due shall apply to this contract.** The U.S. Department of Labor (DOL) has provided explanations to assist with classification in the following resource link: www.wdol.gov

Conflict Of Interest Disclosure

The City of Ann Arbor Purchasing Policy requires that prospective Vendors complete a Conflict of Interest Disclosure form. A contract may not be awarded to the selected Vendor unless and until the Procurement Unit and the City Administrator have reviewed the Disclosure form and determined that no conflict exists under applicable federal, state, or local law or administrative regulation. Not every relationship or situation disclosed on the Disclosure Form may be a disqualifying conflict. Depending on applicable law and regulations, some contracts may awarded on the recommendation of the City Administrator after full disclosure, where such action is allowed by law, if demonstrated competitive pricing exists and/or it is determined the award is in the best interest of the City. A copy of the Vendor Conflict of Interest Disclosure Form is attached.

Major Subcontractors

The Bidder shall identify on Bid Form Section 4 each major subcontractor it expects to engage for this Contract if the work to be subcontracted is 15% or more of the bid sum or over \$50,000, whichever is less. The Bidder also shall identify the work to be subcontracted to each major subcontractor. The Bidder shall not change or replace a subcontractor without approval by the City.

Debarment

Submission of a Bid in response to this ITB is certification that the Bidder is not currently debarred, suspended, proposed for debarment, and declared ineligible or voluntarily excluded from participation in this transaction by any State or Federal departments or agency. Submission is also agreement that the City will be notified of any changes in this status.

Disclosures

After bids are opened, all information in a submitter's bid is subjected to disclosure under the provisions of Michigan Public Act No. 442 of 1976, as amended (MCL 15.231 et seq.) known as the "Freedom of Information Act." The Freedom of Information Act also provides for the complete disclosure of contracts and attachments thereto except where specifically exempted.

Bid Protest

All Bid protests must be in writing and filed with the Purchasing Agent within five (5) business days of the award action. The bidder must clearly state the reasons for the protest. If a bidder contacts a City Service Area/Unit and indicates a desire to protest an award, the Service Area/Unit shall refer the bidder to the Purchasing Agent. The Purchasing Agent will provide the bidder with the appropriate instructions for filing the protest. The protest shall be reviewed by the City Administrator or designee whose decision shall be final.

Cost Liability

The City of Ann Arbor assumes no responsibility or liability for costs incurred by the Bidder prior to the execution of a contract with the City. By submitting a bid, a bidder agrees to bear all costs incurred or related to the preparation, submission and selection process for the bid.

Reservation of Rights

The City of Ann Arbor reserves the right to accept any bid or alternative bid proposed in whole or in part, to reject any or all bids or alternatives bids in whole or in part and to waive irregularity and/or informalities in any bid and to make the award in any manner deemed in the best interest of the City.

INVITATION TO BID

City of Ann Arbor
Guy C. Larcom Municipal Building
Ann Arbor, Michigan 48107

Ladies and Gentlemen:

The undersigned, as Bidder, declares that this Bid is made in good faith, without fraud or collusion with any person or persons bidding on the same Contract; that this Bidder has carefully read and examined the bid documents, including City Nondiscrimination requirements and Declaration of Compliance Form, Living Wage requirements and Declaration of Compliance Form, Prevailing Wage requirements and Declaration of Compliance Form, Vendor Conflict of Interest Form, Notice of Pre-Bid Conference, Instructions to Bidders, Bid, Bid Forms, Contract, Bond Forms, General Conditions, Standard Specifications, Detailed Specifications, all Addenda, and the Plans (if applicable) and understands them. The Bidder declares that it conducted a full investigation at the site and of the work proposed and is fully informed as to the nature of the work and the conditions relating to the work's performance. The Bidder also declares that it has extensive experience in successfully completing projects similar to this one.

The Bidder acknowledges that it has not received or relied upon any representations or warrants of any nature whatsoever from the City of Ann Arbor, its agents or employees, and that this Bid is based solely upon the Bidder's own independent business judgment.

The undersigned proposes to perform all work shown on the plans or described in the bid documents, including any addenda issued, and to furnish all necessary machinery, tools, apparatus, and other means of construction to do all the work, furnish all the materials, and complete the work in strict accordance with all terms of the Contract of which this Bid is one part.

In accordance with these bid documents, and Addenda numbered _____, the undersigned, as Bidder, proposes to perform at the sites in and/or around Ann Arbor, Michigan, all the work included herein for the amounts set forth in the Bid Forms.

The Bidder declares that it has become fully familiar with the liquidated damage clauses for completion times and for compliance with City Code Chapter 112, understands and agrees that the liquidated damages are for the non-quantifiable aspects of non-compliance and do not cover actual damages that may be shown and agrees that if awarded the Contract, all liquidated damage clauses form part of the Contract.

The Bidder declares that it has become fully familiar with the provisions of Chapter 14, Section 1:320 (Prevailing wages) and Chapter 23 (Living Wage) of the Code of the City of Ann Arbor and that it understands and agrees to comply, to the extent applicable to employees providing services to the City under this Contract, with the wage and reporting requirements stated in the City Code provisions cited. Bidder certifies that the statements contained in the City Prevailing Wage and Living Wage Declaration of Compliance Forms are true and correct. Bidder further agrees that the cited provisions of Chapter 14 and Chapter 23 form a part of this Contract.

The Bidder declares that it has become familiar with the City Conflict of Interest Disclosure Form and certifies that the statement contained therein is true and correct.

The Bidder encloses a certified check or Bid Bond in the amount of 5% of the total of the Bid Price. The Bidder agrees both to contract for the work and to furnish the necessary Bonds and insurance documentation within 10 days after being notified of the acceptance of the Bid.

If this Bid is accepted by the City and the Bidder fails to contract and furnish the required Bonds and insurance documentation within 10 days after being notified of the acceptance of this Bid, then the Bidder shall be considered to have abandoned the Contract and the certified check or Bid Bond accompanying this Bid shall become due and payable to the City.

If the Bidder enters into the Contract in accordance with this Bid, or if this Bid is rejected, then the accompanying check or Bid Bond shall be returned to the Bidder.

In submitting this Bid, it is understood that the right is reserved by the City to accept any Bid, to reject any or all Bids, to waive irregularities and/or informalities in any Bid, and to make the award in any manner the City believes to be in its best interest.

SIGNED THIS _____ DAY OF _____, 2017.

Bidder's Name

Authorized Signature of Bidder

Official Address

(Print Name of Signer Above)

Telephone Number

Email Address for Award Notice

LEGAL STATUS OF BIDDER

(The Bidder shall fill out the appropriate form and strike out the other three.)

Bidder declares that it is:

* A corporation organized and doing business under the laws of the State of _____, for whom _____, bearing the office title of _____, whose signature is affixed to this Bid, is authorized to execute contracts.

NOTE: If not incorporated in Michigan, please attach the corporation's Certificate of Authority

• A limited liability company doing business under the laws of the State of _____, whom _____ bearing the title of _____ whose signature is affixed to this proposal, is authorized to execute contract on behalf of the LLC.

* A partnership, organized under the laws of the state of _____ and filed in the county of _____, whose members are (list all members and the street and mailing address of each) (attach separate sheet if necessary):

* An individual, whose signature with address, is affixed to this Bid: _____ (initial here)

Authorized Official

_____ **Date** _____, 201__

(Print) Name _____ Title _____

Company: _____

Address: _____

Contact Phone () _____ Fax () _____

Email _____

BID FORM

Section 1 – Schedule of Prices

Company: _____

Project: **Plymouth Road and Green Road Water Main Replacement**

Unit Price Bid –

<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Estimated Quantity</u>	<u>Unit Price</u>	<u>Total Cost</u>
130	Protective Fencing	FT	50	\$ _____	\$ _____
140	Exploratory Excavations (0-10 deep) Tr Det 1	Each	5	\$ _____	\$ _____
201	Project Supervision, Max	LS	1	\$ _____	\$ _____
202	General Conditions, Max	LS	1	\$ _____	\$ _____
203	Minor Traffic Control, Max	LS	1	\$ _____	\$ _____
204	Audiovisual Tape Coverage	LS	1	\$ _____	\$ _____
205	Curb, Gutter, and Curb and Gutter, Any Type, Rem	LF	591	\$ _____	\$ _____
206	Sidewalk, Sidewalk Ramp and Driveway Approach, Any Thickness, Rem	SF	1136	\$ _____	\$ _____
207	Machine Grading , Modified	SYD	7143	\$ _____	\$ _____
208	Subgrade Undercutting	CYD	2500	\$ _____	\$ _____
209	Erosion Control, Inlet Filter	EA	12	\$ _____	\$ _____
210	Erosion Control, Silt Fence	FT	500	\$ _____	\$ _____
211	Water Main, Team Insert Valve, 12 inch	EA	3	\$ _____	\$ _____
212	Temporary 14" Water Main Line Stop	EA	1	\$ _____	\$ _____
213	Temporary 16" Water Main Line Stop	EA	1	\$ _____	\$ _____
214	Water Main, Abandon	FT	1225	\$ _____	\$ _____
215	Fire Hydrant, Rem	FT	1	\$ _____	\$ _____
216	Gate Valve-in-Well Abandonment	EA	9	\$ _____	\$ _____
217	Gate Valve-in-Box Abandonment	EA	1	\$ _____	\$ _____
218	Adjust Structure Cover	EA	8	\$ _____	\$ _____
219	Underdrain, Subgrade, 6 inch, Special	FT	591	\$ _____	\$ _____
220	HMA Pavement Base Course 3E10	TON	1375	\$ _____	\$ _____
221	HMA Pavement Leveling Course 4E10 High Stress	TON	786	\$ _____	\$ _____
222	HMA Pavement Wearing Course 5E10 High Stress	TON	590	\$ _____	\$ _____
223	Curb and Gutter, Conc.	FT	591	\$ _____	\$ _____
224	Sidewalk, Conc, 4 inch, Modified	SF	554	\$ _____	\$ _____
225	Sidewalk Ramp, Conc, 6 inch, Modified	SF	582	\$ _____	\$ _____
226	Detectable Warning Surface, Modified	SF	100	\$ _____	\$ _____
227	Slope Restoration	SYD	322	\$ _____	\$ _____

<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Estimated Quantity</u>	<u>Unit Price</u>	<u>Total Cost</u>
228	Aggregate Base 21AA-C.I.P	CY	1587	\$ _____	\$ _____
229	Sand Subbase CI II-C.I.P	CY	2381	\$ _____	\$ _____
230	Rem Spec Mrkg	SF	560	\$ _____	\$ _____
231	Pavt Mrkg, Longit, 6 inch or Less Width, Rem	FT	10008	\$ _____	\$ _____
232	Pavt Mrkg, Longit, Greater than 6 inch Width, Rem	FT	48	\$ _____	\$ _____
233	Pavt Mrkg, Wet Reflective, Type R, Tape, 4 inch, White, Temp	FT	7360	\$ _____	\$ _____
234	Pavt Mrkg, Wet Reflective, Type R, Tape, 4 inch, Yellow, Temp	FT	11725	\$ _____	\$ _____
235	Sign Cover	EA	10	\$ _____	\$ _____
236	Barricade, Type III, High Intensity, Lighted, Furn	EA	15	\$ _____	\$ _____
237	Barricade, Type III, High Intensity, Lighted, Oper	EA	15	\$ _____	\$ _____
238	Lighted Arrow, Type C, Furn	EA	4	\$ _____	\$ _____
239	Lighted Arrow, Type C, Oper	EA	4	\$ _____	\$ _____
240	Plastic Drum, High Intensity, Furn	EA	460	\$ _____	\$ _____
241	Plastic Drum, High Intensity, Oper	EA	460	\$ _____	\$ _____
242	Sign, Portable, Changeable Message, Furn	EA	4	\$ _____	\$ _____
243	Sign, Portable, Changeable Message, Oper	EA	4	\$ _____	\$ _____
244	Sign, Type B, Temp, Prismatic, Furn	SF	1500	\$ _____	\$ _____
245	Sign, Type B, Temp, Prismatic, Oper	SF	1500	\$ _____	\$ _____
246	Sign, Type B, Temp, Prismatic, Special, Furn	SF	175	\$ _____	\$ _____
247	Sign, Type B, Temp, Prismatic, Special, Furn	SF	175	\$ _____	\$ _____
248	Witness, Log, Layout, \$1,000.00	Dir	1	\$ _____	\$ _____
249	Traf Regulator Control	LS	1	\$ _____	\$ _____
250	Minor Traffic Control, Max	LS	1	\$ _____	\$ _____
251	Pedestrian Type II Barricade, Temp, Furn & Oper	EA	5	\$ _____	\$ _____
252	Pedestrian Type II Channelizer, Temp	FT	161	\$ _____	\$ _____
253	Pedestrian Path, Temp	FT	328	\$ _____	\$ _____
254	Pedestrian Ramp, Temp	EA	8	\$ _____	\$ _____
255	Pavt Mrkg Hot-Applied Thermoplastic 4 inch White	FT	2523	\$ _____	\$ _____
256	Pavt Mrkg Hot-Applied Thermoplastic 4 inch Yellow	FT	4133	\$ _____	\$ _____
257	Pavt Mrkg Hot-Applied Thermoplastic 6 inch White	FT	1055	\$ _____	\$ _____
258	Pavt Mrkg Hot-Applied Thermoplastic 8 inch White	FT	55	\$ _____	\$ _____
259	Cold Plastic Pavement Marking, White Bike Arrow	EA	1	\$ _____	\$ _____
260	Cold Plastic Pavement Marking, White Bike Symbol	EA	1	\$ _____	\$ _____
261	Cold Plastic Pavement Marking, White L Arrow	EA	5	\$ _____	\$ _____
262	Cold Plastic Pavement Marking, White R Arrow	EA	4	\$ _____	\$ _____
263	Cold Plastic Pavement Marking, White Thru Arrow	EA	2	\$ _____	\$ _____
264	Pavt Mrkg, Ovly Cold Plastic, 4 inch, White	FT	36	\$ _____	\$ _____
265	Pavt Mrkg, Ovly Cold Plastic, 12 inch, Yellow	FT	131	\$ _____	\$ _____

<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Estimated Quantity</u>	<u>Unit Price</u>	<u>Total Cost</u>
266	Pavt Mrkg, Ovly Cold Plastic, 12 inch, Crosswalk	FT	960	\$ _____	\$ _____
267	Pavt Mrkg, Ovly Cold Plastic, 24 inch, Stop Bar	FT	183	\$ _____	\$ _____
268	Recessing Pavt Mrkg, Transv	SF	100	\$ _____	\$ _____
269	Recessing Pavt Mrkg, Turning Guide Line	SF	9	\$ _____	\$ _____
270	Handhole Assembly, 17" x 30"	EA	1	\$ _____	\$ _____
271	Handhole Assembly, 24" x 36"	EA	3	\$ _____	\$ _____
272	Structure Cover, Type B	LBS	1440	\$ _____	\$ _____
401	Class 50 W/Poly-Wrap 6 inch SD-TD-1	FT	3	\$ _____	\$ _____
402	Class 50 W/Poly-Wrap 8 inch SD-TD-1	FT	6	\$ _____	\$ _____
403	Class 50 W/Poly-Wrap 12 inch SD-TD-1	FT	137	\$ _____	\$ _____
404	Class 50 W/Poly-Wrap 16 inch SD-TD-1	FT	911	\$ _____	\$ _____
405	DIP 12" 45 Degree Bend	EA	6	\$ _____	\$ _____
406	DIP 16" 22.5 Degree Bend	EA	1	\$ _____	\$ _____
407	DIP 16" 90 Degree Bend	EA	1	\$ _____	\$ _____
408	DIP 6" x 8" Reducer	EA	1	\$ _____	\$ _____
409	DIP 14" x 16" Reducer	EA	1	\$ _____	\$ _____
410	DIP 16" x 16" x 6" Tee	EA	1	\$ _____	\$ _____
411	DIP 12" x 12" x 12" Tee	EA	1	\$ _____	\$ _____
412	DIP 16" x 16" x 12" Tee	EA	2	\$ _____	\$ _____
413	DIP 16" x 16" x 14" Tee	EA	1	\$ _____	\$ _____
414	DIP 16" x 16" x 16" Tee	EA	2	\$ _____	\$ _____
415	DIP 16" x 16" x 16" Cross	EA	1	\$ _____	\$ _____
416	Fire Hydrant Assembly	EA	1	\$ _____	\$ _____
417	Gate Valve-in-Box, 12 inch	EA	5	\$ _____	\$ _____
418	Gate Valve-in-Well 16 inch	EA	4	\$ _____	\$ _____
419	Water Main, Tie-in	EA	7	\$ _____	\$ _____
420	2 inch Copper Water Service, Bored	FT	75	\$ _____	\$ _____
421	Water Main, CIPP Lining, 8 inch	FT	128	\$ _____	\$ _____
422	Water Main, CIPP Lining, 12 inch	FT	1436	\$ _____	\$ _____
423	Temporary Water Main, 2 inch	FT	700	\$ _____	\$ _____
460	Excavate and Backfill for Water Services and Leads	FT	65	\$ _____	\$ _____
613	3 inch Schedule 80 PVC Conduit	FT	525	\$ _____	\$ _____
891	Cleanup & Restoration	LS	1	\$ _____	\$ _____

ESTIMATED TOTAL

\$ _____

BID FORM

Section 2 - Material and Equipment Alternates

The Base Bid proposal price shall include materials and equipment selected from the designated items and manufacturers listed in the bidding documents. This is done to establish uniformity in bidding and to establish standards of quality for the items named.

If the Contractor wishes to quote alternate items for consideration by the City, it may do so under this Section. A complete description of the item and the proposed price differential must be provided. Unless approved at the time of award, substitutions where items are specifically named will be considered only as a negotiated change in Contract Sum.

<u>Item Number</u>	<u>Description</u>	<u>Add/Deduct Amount</u>
--------------------	--------------------	--------------------------

If the Bidder does not suggest any material or equipment alternate, the Bidder **MUST** complete the following statement:

For the work outlined in this request for bid, the bidder does NOT propose any material or equipment alternate under the Contract.

Signature of Authorized Representative of Bidder _____ Date _____

BID FORM

Section 3 - Time Alternate

If the Bidder takes exception to the time stipulated in Article III of the Contract, Time of Completion, page C-2, it is requested to stipulate below its proposed time for performance of the work. Consideration will be given to time in evaluating bids.

If the Bidder does not suggest any time alternate, the Bidder **MUST** complete the following statement:

For the work outlined in this request for bid, the bidder does NOT propose any time alternate under the Contract.

Signature of Authorized Representative of Bidder _____ Date _____

BID FORM

Section 4 - Major Subcontractors

For purposes of this Contract, a Subcontractor is anyone (other than the Contractor) who performs work (other than or in addition to the furnishing of materials, plans or equipment) at or about the construction site, directly or indirectly for or on behalf of the Contractor (and whether or not in privity of Contract with the Contractor), but shall not include any individual who furnishes merely the individual's own personal labor or services.

Contractor agrees that all subcontracts entered into by the Contractor shall contain similar wage provision to Section 4 of the General Conditions covering subcontractor's employees who perform work on this contract.

For the work outlined in these documents the Bidder expects to engage the following major subcontractors to perform the work identified:

<u>Subcontractor (Name and Address)</u>	<u>Work</u>	<u>Amount</u>
---	-------------	---------------

If the Bidder does not expect to engage any major subcontractor, the Bidder **MUST** complete the following statement:

For the work outlined in this request for bid, the bidder does NOT expect to engage any major subcontractor to perform work under the Contract.

Signature of Authorized Representative of Bidder _____ Date _____

Plymouth Road and Green Road
Water Main Replacement

BF-3

SAMPLE STANDARD CONTRACT

If a contract is awarded, the selected contractor will be required to adhere to a set of general contract provisions which will become a part of any formal agreement. These provisions are general principles which apply to all contractors of service to the City of Ann Arbor such as the following:

CONTRACT

THIS AGREEMENT is made on the _____ day of _____, 2017, between the CITY OF ANN ARBOR, a Michigan Municipal Corporation, 301 East Huron Street, Ann Arbor, Michigan 48104 ("City") and _____ ("Contractor")

(An individual/partnership/corporation, include state of incorporation)

(Address)

Based upon the mutual promises below, the Contractor and the City agree as follows:

ARTICLE I - Scope of Work

The Contractor agrees to furnish all of the materials, equipment and labor necessary; and to abide by all the duties and responsibilities applicable to it for the project titled [Insert Title of Bid and Bid Number] in accordance with the requirements and provisions of the following documents, including all written modifications incorporated into any of the documents, which are incorporated as part of this Contract:

Non-discrimination and Living Wage
Declaration of Compliance Forms (if
applicable)
Vendor Conflict of Interest Form
Prevailing Wage Declaration of
Compliance Form (if applicable)
Bid Forms
Contract and Exhibits
Bonds

General Conditions
Standard Specifications
Detailed Specifications
Plans
Addenda

ARTICLE II - Definitions

Administering Service Area/Unit means **Public Works Unit**

Project means **Plymouth Road and Green Road Water Main Replacement ITB No. 4470**

ARTICLE III - Time of Completion

- (A) The work to be completed under this Contract shall begin immediately on the date specified in the Notice to Proceed issued by the City.
- (B) The entire work for this Contract shall be completed by August 25, 2017.

- (C) Failure to complete all the work within the time specified above, including any extension granted in writing by the Supervising Professional, shall obligate the Contractor to pay the City, as liquidated damages and not as a penalty, an amount equal to \$1,000 for each calendar day of delay in the completion of all the work. If any liquidated damages are unpaid by the Contractor, the City shall be entitled to deduct these unpaid liquidated damages from the monies due the Contractor.

The liquidated damages are for the non-quantifiable aspects of any of the previously identified events and do not cover actual damages that can be shown or quantified nor are they intended to preclude recovery of actual damages in addition to the recovery of liquidated damages.

ARTICLE IV - The Contract Sum

- (A) The City shall pay to the Contractor for the performance of the Contract, the unit prices as given in the Bid Form for the estimated bid total of:

_____ Dollars (\$_____)

- (B) The amount paid shall be equitably adjusted to cover changes in the work ordered by the Supervising Professional but not required by the Contract Documents. Increases or decreases shall be determined only by written agreement between the City and Contractor.

ARTICLE V - Assignment

This Contract may not be assigned or subcontracted any portion of any right or obligation under this contract without the written consent of the City. Notwithstanding any consent by the City to any assignment, Contractor shall at all times remain bound to all warranties, certifications, indemnifications, promises and performances, however described, as are required of it under this contract unless specifically released from the requirement, in writing, by the City.

ARTICLE VI - Choice of Law

This Contract shall be construed, governed, and enforced in accordance with the laws of the State of Michigan. By executing this agreement, the Contractor and the City agree to venue in a court of appropriate jurisdiction sitting within Washtenaw County for purposes of any action arising under this Contract. The parties stipulate that the venue referenced in this Contract is for convenience and waive any claim of non-convenience.

Whenever possible, each provision of the Contract will be interpreted in a manner as to be effective and valid under applicable law. The prohibition or invalidity, under applicable law, of any provision will not invalidate the remainder of the Contract.

ARTICLE VII - Relationship of the Parties

The parties of the Contract agree that it is not a Contract of employment but is a Contract to accomplish a specific result. Contractor is an independent Contractor performing services for the City. Nothing contained in this Contract shall be deemed to constitute any other relationship between the City and the Contractor.

Contractor certifies that it has no personal or financial interest in the project other than the compensation it is to receive under the Contract. Contractor certifies that it is not, and shall not become, overdue or in default to the City for any Contract, debt, or any other obligation to the City including real or personal property taxes. City shall have the right to set off any such debt against compensation awarded for services under this agreement.

ARTICLE VIII - Notice

All notices given under this Contract shall be in writing, and shall be by personal delivery or by certified mail with return receipt requested to the parties at their respective addresses as specified in the Contract Documents or other address the Contractor may specify in writing. Notice will be deemed given on the date when one of the following first occur: (1) the date of actual receipt; or (2) three days after mailing certified U.S. mail.

ARTICLE IX - Indemnification

To the fullest extent permitted by law, Contractor shall indemnify, defend and hold harmless the City, its officers, employees and agents harmless from all suits, claims, judgments and expenses including attorney's fees resulting or alleged to result, in whole or in part, from any act or omission, which is in any way connected or associated with this Contract, by the Contractor or anyone acting on the Contractor's behalf under this Contract. Contractor shall not be responsible to indemnify the City for losses or damages caused by or resulting from the City's sole negligence. The provisions of this Article shall survive the expiration or earlier termination of this contract for any reason.

ARTICLE X - Entire Agreement

This Contract represents the entire understanding between the City and the Contractor and it supersedes all prior representations, negotiations, agreements, or understandings whether written or oral. Neither party has relied on any prior representations in entering into this Contract. No terms or conditions of either party's invoice, purchase order or other administrative document shall modify the terms and conditions of this Contract, regardless of the other party's failure to object to such form. This Contract shall be binding on and shall inure to the benefit of the parties to this Contract and their permitted successors and permitted assigns and nothing in this Contract, express or implied, is intended to or shall confer on any other person or entity any legal or equitable right, benefit, or remedy of any nature whatsoever under or by reason of this Contract. This Contract may be altered, amended or modified only by written amendment signed by the City and the Contractor.

FOR CONTRACTOR

By _____

Its: _____

FOR THE CITY OF ANN ARBOR

By _____
Christopher Taylor, Mayor

[signatures continue on next page]
By _____
Jacqueline Beaudry, City Clerk

Approved as to substance

By _____
City Administrator

By _____
Services Area Administrator

Approved as to form and content

Stephen K. Postema, City Attorney

PERFORMANCE BOND

- (1) _____ of _____ (referred to as "Principal"), and _____, a corporation duly authorized to do business in the State of Michigan (referred to as "Surety"), are bound to the City of Ann Arbor, Michigan (referred to as "City"), for \$ _____, the payment of which Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, by this bond.
- (2) The Principal has entered a written Contract with the City dated _____, 2017, for: _____ and this bond is given for that Contract in compliance with Act No. 213 of the Michigan Public Acts of 1963, as amended, being MCL 129.201 et seq.
- (3) Whenever the Principal is declared by the City to be in default under the Contract, the Surety may promptly remedy the default or shall promptly:
- (a) complete the Contract in accordance with its terms and conditions; or
 - (b) obtain a bid or bids for submission to the City for completing the Contract in accordance with its terms and conditions, and upon determination by Surety of the lowest responsible bidder, arrange for a Contract between such bidder and the City, and make available, as work progresses, sufficient funds to pay the cost of completion less the balance of the Contract price; but not exceeding, including other costs and damages for which Surety may be liable hereunder, the amount set forth in paragraph 1.
- (4) Surety shall have no obligation to the City if the Principal fully and promptly performs under the Contract.
- (5) Surety agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder, or the specifications accompanying it shall in any way affect its obligations on this bond, and waives notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the work, or to the specifications.

SIGNED AND SEALED this _____ day of _____, 2017.

(Name of Surety Company)
By _____
(Signature)
Its _____
(Title of Office)

(Name of Principal)
By _____
(Signature)
Its _____
(Title of Office)

Approved as to form:

Name and address of agent:

Stephen K. Postema, City Attorney

LABOR AND MATERIAL BOND

- (1) _____
of _____(referred to as "Principal"), and _____, a corporation duly authorized to do business in the State of Michigan, (referred to as "Surety"), are bound to the City of Ann Arbor, Michigan (referred to as "City"), for the use and benefit of claimants as defined in Act 213 of Michigan Public Acts of 1963, as amended, being MCL 129.201 et seq., in the amount of \$ _____, for the payment of which Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, by this bond.
- (2) The Principal has entered a written Contract with the City, dated _____, 2017, for _____; and this bond is given for that Contract in compliance with Act No. 213 of the Michigan Public Acts of 1963 as amended;
- (3) If the Principal fails to promptly and fully repay claimants for labor and material reasonably required under the Contract, the Surety shall pay those claimants.
- (4) Surety's obligations shall not exceed the amount stated in paragraph 1, and Surety shall have no obligation if the Principal promptly and fully pays the claimants.

SIGNED AND SEALED this _____ day of _____, 2017

(Name of Surety Company)

By _____
(Signature)

Its _____
(Title of Office)

Approved as to form:

Stephen K. Postema, City Attorney

(Name of Principal)

By _____
(Signature)

Its _____
(Title of Office)

Name and address of agent:

GENERAL CONDITIONS

Section 1 - Execution, Correlation and Intent of Documents

The contract documents shall be signed in 2 copies by the City and the Contractor.

The contract documents are complementary and what is called for by any one shall be binding. The intention of the documents is to include all labor and materials, equipment and transportation necessary for the proper execution of the work. Materials or work described in words which so applied have a well-known technical or trade meaning have the meaning of those recognized standards.

In case of a conflict among the contract documents listed below in any requirement(s), the requirement(s) of the document listed first shall prevail over any conflicting requirement(s) of a document listed later.

(1) Addenda in reverse chronological order; (2) Detailed Specifications; (3) Standard Specifications; (4) Plans; (5) General Conditions; (6) Contract; (7) Bid Forms; (8) Bond Forms; (9) Bid.

Section 2 - Order of Completion

The Contractor shall submit with each invoice, and at other times reasonably requested by the Supervising Professional, schedules showing the order in which the Contractor proposes to carry on the work. They shall include the dates at which the Contractor will start the several parts of the work, the estimated dates of completion of the several parts, and important milestones within the several parts.

Section 3 - Familiarity with Work

The Bidder or its representative shall make personal investigations of the site of the work and of existing structures and shall determine to its own satisfaction the conditions to be encountered, the nature of the ground, the difficulties involved, and all other factors affecting the work proposed under this Contract. The Bidder to whom this Contract is awarded will not be entitled to any additional compensation unless conditions are clearly different from those which could reasonably have been anticipated by a person making diligent and thorough investigation of the site.

The Bidder shall immediately notify the City upon discovery, and in every case prior to submitting its Bid, of every error or omission in the bidding documents that would be identified by a reasonably competent, diligent Bidder. In no case will a Bidder be allowed the benefit of extra compensation or time to complete the work under this Contract for extra expenses or time spent as a result of the error or omission.

Section 4 - Wage Requirements

Under this Contract, the Contractor shall conform to Chapter 14 of Title I of the Code of the City of Ann Arbor as amended; which in part states "...that all craftsmen, mechanics and laborers employed directly on the site in connection with said improvements, including said employees of subcontractors, shall receive the prevailing wage for the corresponding classes of craftsmen,

mechanics and laborers, as determined by statistics for the Ann Arbor area compiled by the United States Department of Labor. At the request of the City, any contractor or subcontractor shall provide satisfactory proof of compliance with the contract provisions required by the Section."

Where the Contract and the Ann Arbor City Ordinance are silent as to definitions of terms required in determining contract compliance with regard to prevailing wages, the definitions provided in the Davis-Bacon Act as amended (40 U.S.C. 278-a to 276-a-7) for the terms shall be used.

If the Contractor is a "covered employer" as defined in Chapter 23 of the Ann Arbor City Code, the Contractor agrees to comply with the living wage provisions of Chapter 23 of the Ann Arbor City Code. The Contractor agrees to pay those employees providing Services to the City under this Agreement a "living wage," as defined in Section 1:815 of the Ann Arbor City Code, as adjusted in accordance with Section 1:815(3); to post a notice approved by the City of the applicability of Chapter 23 in every location in which regular or contract employees providing services under this Agreement are working; to maintain records of compliance; if requested by the City, to provide documentation to verify compliance; to take no action that would reduce the compensation, wages, fringe benefits, or leave available to any employee or person contracted for employment in order to pay the living wage required by Section 1:815; and otherwise to comply with the requirements of Chapter 23.

Contractor agrees that all subcontracts entered into by the Contractor shall contain similar wage provision covering subcontractor's employees who perform work on this contract.

Section 5 - Non-Discrimination

The Contractor agrees to comply, and to require its subcontractor(s) to comply, with the nondiscrimination provisions of MCL 37.2209. The Contractor further agrees to comply with the provisions of Section 9:158 of Chapter 112 of Title IX of the Ann Arbor City Code, and to assure that applicants are employed and that employees are treated during employment in a manner which provides equal employment opportunity.

Section 6 - Materials, Appliances, Employees

Unless otherwise stipulated, the Contractor shall provide and pay for all materials, labor, water, tools, equipment, light, power, transportation, and other facilities necessary or used for the execution and completion of the work. Unless otherwise specified, all materials incorporated in the permanent work shall be new, and both workmanship and materials shall be of the highest quality. The Contractor shall, if required, furnish satisfactory evidence as to the kind and quality of materials.

The Contractor shall at all times enforce strict discipline and good order among its employees, and shall seek to avoid employing on the work any unfit person or anyone not skilled in the work assigned.

Adequate sanitary facilities shall be provided by the Contractor.

Section 7 - Qualifications for Employment

The Contractor shall employ competent laborers and mechanics for the work under this Contract. For work performed under this Contract, employment preference shall be given to qualified local residents.

Section 8 - Royalties and Patents

The Contractor shall pay all royalties and license fees. It shall defend all suits or claims for infringements of any patent rights and shall hold the City harmless from loss on account of infringement except that the City shall be responsible for all infringement loss when a particular process or the product of a particular manufacturer or manufacturers is specified, unless the City has notified the Contractor prior to the signing of the Contract that the particular process or product is patented or is believed to be patented.

Section 9 - Permits and Regulations

The Contractor must secure and pay for all permits, permit or plan review fees and licenses necessary for the prosecution of the work. These include but are not limited to City building permits, right-of-way permits, lane closure permits, right-of-way occupancy permits, and the like. The City shall secure and pay for easements shown on the plans unless otherwise specified.

The Contractor shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the work as drawn and specified. If the Contractor observes that the contract documents are at variance with those requirements, it shall promptly notify the Supervising Professional in writing, and any necessary changes shall be adjusted as provided in the Contract for changes in the work.

Section 10 - Protection of the Public and of Work and Property

The Contractor is responsible for the means, methods, sequences, techniques and procedures of construction and safety programs associated with the work contemplated by this contract. The Contractor, its agents or sub-contractors, shall comply with the "General Rules and Regulations for the Construction Industry" as published by the Construction Safety Commission of the State of Michigan and to all other local, State and National laws, ordinances, rules and regulations pertaining to safety of persons and property.

The Contractor shall take all necessary and reasonable precautions to protect the safety of the public. It shall continuously maintain adequate protection of all work from damage, and shall take all necessary and reasonable precautions to adequately protect all public and private property from injury or loss arising in connection with this Contract. It shall make good any damage, injury or loss to its work and to public and private property resulting from lack of reasonable protective precautions, except as may be due to errors in the contract documents, or caused by agents or employees of the City. The Contractor shall obtain and maintain sufficient insurance to cover damage to any City property at the site by any cause.

In an emergency affecting the safety of life, or the work, or of adjoining property, the Contractor is, without special instructions or authorization from the Supervising Professional, permitted to act at its discretion to prevent the threatened loss or injury. It shall also so act, without appeal, if authorized or instructed by the Supervising Professional.

Any compensation claimed by the Contractor for emergency work shall be determined by agreement or in accordance with the terms of Claims for Extra Cost - Section 15.

Section 11 - Inspection of Work

The City shall provide sufficient competent personnel for the inspection of the work.

The Supervising Professional shall at all times have access to the work whenever it is in preparation or progress, and the Contractor shall provide proper facilities for access and for inspection.

If the specifications, the Supervising Professional's instructions, laws, ordinances, or any public authority require any work to be specially tested or approved, the Contractor shall give the Supervising Professional timely notice of its readiness for inspection, and if the inspection is by an authority other than the Supervising Professional, of the date fixed for the inspection. Inspections by the Supervising Professional shall be made promptly, and where practicable at the source of supply. If any work should be covered up without approval or consent of the Supervising Professional, it must, if required by the Supervising Professional, be uncovered for examination and properly restored at the Contractor's expense.

Re-examination of any work may be ordered by the Supervising Professional, and, if so ordered, the work must be uncovered by the Contractor. If the work is found to be in accordance with the contract documents, the City shall pay the cost of re-examination and replacement. If the work is not in accordance with the contract documents, the Contractor shall pay the cost.

Section 12 - Superintendence

The Contractor shall keep on the work site, during its progress, a competent superintendent and any necessary assistants, all satisfactory to the Supervising Professional. The superintendent will be responsible to perform all on-site project management for the Contractor. The superintendent shall be experienced in the work required for this Contract. The superintendent shall represent the Contractor and all direction given to the superintendent shall be binding as if given to the Contractor. Important directions shall immediately be confirmed in writing to the Contractor. Other directions will be confirmed on written request. The Contractor shall give efficient superintendence to the work, using its best skill and attention.

Section 13 - Changes in the Work

The City may make changes to the quantities of work within the general scope of the Contract at any time by a written order and without notice to the sureties. If the changes add to or deduct from the extent of the work, the Contract Sum shall be adjusted accordingly. All the changes shall be executed under the conditions of the original Contract except that any claim for extension of time caused by the change shall be adjusted at the time of ordering the change.

In giving instructions, the Supervising Professional shall have authority to make minor changes in the work not involving extra cost and not inconsistent with the purposes of the work, but otherwise, except in an emergency endangering life or property, no extra work or change shall be made unless in pursuance of a written order by the Supervising Professional, and no claim for an addition to the Contract Sum shall be valid unless the additional work was ordered in writing.

The Contractor shall proceed with the work as changed and the value of the work shall be determined as provided in Claims for Extra Cost - Section 15.

Section 14 - Extension of Time

Extension of time stipulated in the Contract for completion of the work will be made if and as the Supervising Professional may deem proper under any of the following circumstances:

- (1) When work under an extra work order is added to the work under this Contract;
- (2) When the work is suspended as provided in Section 20;
- (3) When the work of the Contractor is delayed on account of conditions which could not have been foreseen, or which were beyond the control of the Contractor, and which were not the result of its fault or negligence;
- (4) Delays in the progress of the work caused by any act or neglect of the City or of its employees or by other Contractors employed by the City;
- (5) Delay due to an act of Government;
- (6) Delay by the Supervising Professional in the furnishing of plans and necessary information;
- (7) Other cause which in the opinion of the Supervising Professional entitles the Contractor to an extension of time.

The Contractor shall notify the Supervising Professional within 7 days of an occurrence or conditions which, in the Contractor's opinion, entitle it to an extension of time. The notice shall be in writing and submitted in ample time to permit full investigation and evaluation of the Contractor's claim. The Supervising Professional shall acknowledge receipt of the Contractor's notice within 7 days of its receipt. Failure to timely provide the written notice shall constitute a waiver by the Contractor of any claim.

In situations where an extension of time in contract completion is appropriate under this or any other section of the contract, the Contractor understands and agrees that the only available adjustment for events that cause any delays in contract completion shall be extension of the required time for contract completion and that there shall be no adjustments in the money due the Contractor on account of the delay.

Section 15 - Claims for Extra Cost

If the Contractor claims that any instructions by drawings or other media issued after the date of the Contract involved extra cost under this Contract, it shall give the Supervising Professional written notice within 7 days after the receipt of the instructions, and in any event before proceeding to execute the work, except in emergency endangering life or property. The procedure shall then be as provided for Changes in the Work-Section 13. No claim shall be valid unless so made.

If the Supervising Professional orders, in writing, the performance of any work not covered by the contract documents, and for which no item of work is provided in the Contract, and for which no unit price or lump sum basis can be agreed upon, then the extra work shall be done on a Cost-Plus-Percentage basis of payment as follows:

- (1) The Contractor shall be reimbursed for all reasonable costs incurred in doing the work, and shall receive an additional payment of 15% of all the reasonable costs to cover both its indirect overhead costs and profit;
- (2) The term "Cost" shall cover all payroll charges for employees and supervision required

under the specific order, together with all worker's compensation, Social Security, pension and retirement allowances and social insurance, or other regular payroll charges on same; the cost of all material and supplies required of either temporary or permanent character; rental of all power-driven equipment at agreed upon rates, together with cost of fuel and supply charges for the equipment; and any costs incurred by the Contractor as a direct result of executing the order, if approved by the Supervising Professional;

- (3) If the extra is performed under subcontract, the subcontractor shall be allowed to compute its charges as described above. The Contractor shall be permitted to add an additional charge of 5% percent to that of the subcontractor for the Contractor's supervision and contractual responsibility;
- (4) The quantities and items of work done each day shall be submitted to the Supervising Professional in a satisfactory form on the succeeding day, and shall be approved by the Supervising Professional and the Contractor or adjusted at once;
- (5) Payments of all charges for work under this Section in any one month shall be made along with normal progress payments. Retainage shall be in accordance with Progress Payments-Section 16.

No additional compensation will be provided for additional equipment, materials, personnel, overtime or special charges required to perform the work within the time requirements of the Contract.

When extra work is required and no suitable price for machinery and equipment can be determined in accordance with this Section, the hourly rate paid shall be 1/40 of the basic weekly rate listed in the Rental Rate Blue Book published by Dataquest Incorporated and applicable to the time period the equipment was first used for the extra work. The hourly rate will be deemed to include all costs of operation such as bucket or blade, fuel, maintenance, "regional factors", insurance, taxes, and the like, but not the costs of the operator.

Section 16 - Progress Payments

The Contractor shall submit each month, or at longer intervals, if it so desires, an invoice covering work performed for which it believes payment, under the Contract terms, is due. The submission shall be to the City's Finance Department - Accounting Division. The Supervising Professional will, within 10 days following submission of the invoice, prepare a certificate for payment for the work in an amount to be determined by the Supervising Professional as fairly representing the acceptable work performed during the period covered by the Contractor's invoice. To insure the proper performance of this Contract, the City will retain a percentage of the estimate in accordance with Act 524, Public Acts of 1980. The City will then, following the receipt of the Supervising Professional's Certificate, make payment to the Contractor as soon as feasible, which is anticipated will be within 15 days.

An allowance may be made in progress payments if substantial quantities of permanent material have been delivered to the site but not incorporated in the completed work if the Contractor, in the opinion of the Supervising Professional, is diligently pursuing the work under this Contract. Such materials shall be properly stored and adequately protected. Allowance in the estimate shall be at the invoice price value of the items. Notwithstanding any payment of any allowance, all risk of loss due to vandalism or any damages to the stored materials remains with the Contractor.

In the case of Contracts which include only the Furnishing and Delivering of Equipment, the payments shall be; 60% of the Contract Sum upon the delivery of all equipment to be furnished, or in the case of delivery of a usable portion of the equipment in advance of the total equipment delivery, 60% of the estimated value of the portion of the equipment may be paid upon its delivery

in advance of the time of the remainder of the equipment to be furnished; 30% of the Contract Sum upon completion of erection of all equipment furnished, but not later than 60 days after the date of delivery of all of the equipment to be furnished; and payment of the final 10% on final completion of erection, testing and acceptance of all the equipment to be furnished; but not later than 180 days after the date of delivery of all of the equipment to be furnished, unless testing has been completed and shows the equipment to be unacceptable.

With each invoice for periodic payment, the Contractor shall enclose a Contractor's Declaration - Section 43, and an updated project schedule per Order of Completion - Section 2.

Section 17 - Deductions for Uncorrected Work

If the Supervising Professional decides it is inexpedient to correct work that has been damaged or that was not done in accordance with the Contract, an equitable deduction from the Contract price shall be made.

Section 18 - Correction of Work Before Final Payment

The Contractor shall promptly remove from the premises all materials condemned by the Supervising Professional as failing to meet Contract requirements, whether incorporated in the work or not, and the Contractor shall promptly replace and re-execute the work in accordance with the Contract and without expense to the City and shall bear the expense of making good all work of other contractors destroyed or damaged by the removal or replacement.

If the Contractor does not remove the condemned work and materials within 10 days after written notice, the City may remove them and, if the removed material has value, may store the material at the expense of the Contractor. If the Contractor does not pay the expense of the removal within 10 days thereafter, the City may, upon 10 days written notice, sell the removed materials at auction or private sale and shall pay to the Contractor the net proceeds, after deducting all costs and expenses that should have been borne by the Contractor. If the removed material has no value, the Contractor must pay the City the expenses for disposal within 10 days of invoice for the disposal costs.

The inspection or lack of inspection of any material or work pertaining to this Contract shall not relieve the Contractor of its obligation to fulfill this Contract and defective work shall be made good. Unsuitable materials may be rejected by the Supervising Professional notwithstanding that the work and materials have been previously overlooked by the Supervising Professional and accepted or estimated for payment or paid for. If the work or any part shall be found defective at any time before the final acceptance of the whole work, the Contractor shall forthwith make good the defect in a manner satisfactory to the Supervising Professional. The judgment and the decision of the Supervising Professional as to whether the materials supplied and the work done under this Contract comply with the requirements of the Contract shall be conclusive and final.

Section 19 - Acceptance and Final Payment

Upon receipt of written notice that the work is ready for final inspection and acceptance, the Supervising Professional will promptly make the inspection. When the Supervising Professional finds the work acceptable under the Contract and the Contract fully performed, the Supervising Professional will promptly sign and issue a final certificate stating that the work required by this Contract has been completed and is accepted by the City under the terms and conditions of the Contract. The entire balance found to be due the Contractor, including the retained percentage, shall be paid to the Contractor by the City within 30 days after the date of the final certificate.

Before issuance of final certificates, the Contractor shall file with the City:

- (1) The consent of the surety to payment of the final estimate;
- (2) The Contractor's Affidavit in the form required by Section 44.

In case the Affidavit or consent is not furnished, the City may retain out of any amount due the Contractor, sums sufficient to cover all lienable claims.

The making and acceptance of the final payment shall constitute a waiver of all claims by the City except those arising from:

- (1) unsettled liens;
- (2) faulty work appearing within 12 months after final payment;
- (3) hidden defects in meeting the requirements of the plans and specifications;
- (4) manufacturer's guarantees.

It shall also constitute a waiver of all claims by the Contractor, except those previously made and still unsettled.

Section 20 - Suspension of Work

The City may at any time suspend the work, or any part by giving 5 days notice to the Contractor in writing. The work shall be resumed by the Contractor within 10 days after the date fixed in the written notice from the City to the Contractor to do so. The City shall reimburse the Contractor for expense incurred by the Contractor in connection with the work under this Contract as a result of the suspension.

If the work, or any part, shall be stopped by the notice in writing, and if the City does not give notice in writing to the Contractor to resume work at a date within 90 days of the date fixed in the written notice to suspend, then the Contractor may abandon that portion of the work suspended and will be entitled to the estimates and payments for all work done on the portions abandoned, if any, plus 10% of the value of the work abandoned, to compensate for loss of overhead, plant expense, and anticipated profit.

Section 21 - Delays and the City's Right to Terminate Contract

If the Contractor refuses or fails to prosecute the work, or any separate part of it, with the diligence required to insure completion, ready for operation, within the allowable number of consecutive calendar days specified plus extensions, or fails to complete the work within the required time, the City may, by written notice to the Contractor, terminate its right to proceed with the work or any part of the work as to which there has been delay. After providing the notice the City may take over the work and prosecute it to completion, by contract or otherwise, and the Contractor and its sureties shall be liable to the City for any excess cost to the City. If the Contractor's right to proceed is terminated, the City may take possession of and utilize in completing the work, any materials, appliances and plant as may be on the site of the work and useful for completing the work. The right of the Contractor to proceed shall not be terminated or the Contractor charged with liquidated damages where an extension of time is granted under Extension of Time - Section 14.

If the Contractor is adjudged a bankrupt, or if it makes a general assignment for the benefit of creditors, or if a receiver is appointed on account of its insolvency, or if it persistently or repeatedly refuses or fails except in cases for which extension of time is provided, to supply enough properly skilled workers or proper materials, or if it fails to make prompt payments to subcontractors or for material or labor, or persistently disregards laws, ordinances or the instructions of the Supervising Professional, or otherwise is guilty of a substantial violation of any provision of the Contract, then the City, upon the certificate of the Supervising Professional that sufficient cause exists to justify such action, may, without prejudice to any other right or remedy and after giving the Contractor 3

days written notice, terminate this Contract. The City may then take possession of the premises and of all materials, tools and appliances thereon and without prejudice to any other remedy it may have, make good the deficiencies or finish the work by whatever method it may deem expedient, and deduct the cost from the payment due the Contractor. The Contractor shall not be entitled to receive any further payment until the work is finished. If the expense of finishing the work, including compensation for additional managerial and administrative services exceeds the unpaid balance of the Contract Sum, the Contractor and its surety are liable to the City for any excess cost incurred. The expense incurred by the City, and the damage incurred through the Contractor's default, shall be certified by the Supervising Professional.

Section 22 - Contractor's Right to Terminate Contract

If the work should be stopped under an order of any court, or other public authority, for a period of 3 months, through no act or fault of the Contractor or of anyone employed by it, then the Contractor may, upon 7 days written notice to the City, terminate this Contract and recover from the City payment for all acceptable work executed plus reasonable profit.

Section 23 - City's Right To Do Work

If the Contractor should neglect to prosecute the work properly or fail to perform any provision of this Contract, the City, 3 days after giving written notice to the Contractor and its surety may, without prejudice to any other remedy the City may have, make good the deficiencies and may deduct the cost from the payment due to the Contractor.

Section 24 - Removal of Equipment and Supplies

In case of termination of this Contract before completion, from any or no cause, the Contractor, if notified to do so by the City, shall promptly remove any part or all of its equipment and supplies from the property of the City, failing which the City shall have the right to remove the equipment and supplies at the expense of the Contractor.

The removed equipment and supplies may be stored by the City and, if all costs of removal and storage are not paid by the Contractor within 10 days of invoicing, the City upon 10 days written notice may sell the equipment and supplies at auction or private sale, and shall pay the Contractor the net proceeds after deducting all costs and expenses that should have been borne by the Contractor and after deducting all amounts claimed due by any lien holder of the equipment or supplies.

Section 25 - Responsibility for Work and Warranties

The Contractor assumes full responsibility for any and all materials and equipment used in the construction of the work and may not make claims against the City for damages to materials and equipment from any cause except negligence or willful act of the City. Until its final acceptance, the Contractor shall be responsible for damage to or destruction of the project (except for any part covered by Partial Completion and Acceptance - Section 26). The Contractor shall make good all work damaged or destroyed before acceptance. All risk of loss remains with the Contractor until final acceptance of the work (Section 19) or partial acceptance (Section 26). The Contractor is advised to investigate obtaining its own builders risk insurance.

The Contractor shall guarantee the quality of the work for a period of one year. The Contractor shall also unconditionally guarantee the quality of all equipment and materials that are furnished and installed under the contract for a period of one year. At the end of one year after the Contractor's receipt of final payment, the complete work, including equipment and materials furnished and installed under the contract, shall be inspected by the Contractor and the Supervising Professional. Any defects shall be corrected by the Contractor at its expense as soon as practicable but in all cases within 60 days. Any defects that are identified prior to the end of one year shall also be inspected by the Contractor and the Supervising Professional and shall be corrected by the Contractor at its expense as soon as practicable but in all cases within 60 days. The Contractor shall assign all manufacturer or material supplier warranties to the City prior to final payment. The assignment shall not relieve the Contractor of its obligations under this paragraph to correct defects.

Section 26 - Partial Completion and Acceptance

If at any time prior to the issuance of the final certificate referred to in Acceptance and Final Payment - Section 19, any portion of the permanent construction has been satisfactorily completed, and if the Supervising Professional determines that portion of the permanent construction is not required for the operations of the Contractor but is needed by the City, the Supervising Professional shall issue to the Contractor a certificate of partial completion, and immediately the City may take over and use the portion of the permanent construction described in the certificate, and exclude the Contractor from that portion.

The issuance of a certificate of partial completion shall not constitute an extension of the Contractor's time to complete the portion of the permanent construction to which it relates if the Contractor has failed to complete it in accordance with the terms of this Contract. The issuance of the certificate shall not release the Contractor or its sureties from any obligations under this Contract including bonds.

If prior use increases the cost of, or delays the work, the Contractor shall be entitled to extra compensation, or extension of time, or both, as the Supervising Professional may determine.

Section 27 - Payments Withheld Prior to Final Acceptance of Work

The City may withhold or, on account of subsequently discovered evidence, nullify the whole or part of any certificate to the extent reasonably appropriate to protect the City from loss on account of:

- (1) Defective work not remedied;
- (2) Claims filed or reasonable evidence indicating probable filing of claims by other parties against the Contractor;
- (3) Failure of the Contractor to make payments properly to subcontractors or for material or labor;
- (4) Damage to another Contractor.

When the above grounds are removed or the Contractor provides a Surety Bond satisfactory to the City which will protect the City in the amount withheld, payment shall be made for amounts withheld under this section.

Section 28 - Contractor's Insurance

- (1) The Contractor shall procure and maintain during the life of this Contract, including the guarantee period and during any warranty work, such insurance policies, including those set forth below, as will protect itself and the City from all claims for bodily injuries, death or property damage which may arise under this Contract; whether the act(s) or omission(s) giving rise to the claim were made by the Contractor or by any subcontractor or anyone employed by them directly or indirectly. In the case of all contracts involving on-site work, the Contractor shall provide to the City, before the commencement of any work under this contract, certificates of insurance and other documentation satisfactory to the City demonstrating it has obtained the policies and endorsements required on behalf of itself, and when requested, any subcontractor(s). The certificates of insurance endorsements and/or copies of policy language shall document that the Contractor satisfies the following minimum requirements.
 - (a) Worker's Compensation Insurance in accordance with all applicable state and federal statutes. Further, Employers Liability Coverage shall be obtained in the following minimum amounts:
 - Bodily Injury by Accident - \$500,000 each accident
 - Bodily Injury by Disease - \$500,000 each employee
 - Bodily Injury by Disease - \$500,000 each policy limit
 - (b) Commercial General Liability Insurance equivalent to, as a minimum, Insurance Services Office form CG 00 01 07 98 or current equivalent. The City of Ann Arbor shall be named as an additional insured. There shall be no added exclusions or limiting endorsements specifically for the following coverages: Products and Completed Operations, Explosion, Collapse and Underground coverage or Pollution. Further there shall be no added exclusions or limiting endorsements which diminish the City's protections as an additional insured under the policy. The following minimum limits of liability are required:
 - \$1,000,000 Each occurrence as respect Bodily Injury Liability or Property Damage Liability, or both combined.
 - \$2,000,000 Per Job General Aggregate
 - \$1,000,000 Personal and Advertising Injury
 - \$2,000,000 Products and Completed Operations Aggregate
 - (c) Motor Vehicle Liability Insurance, including Michigan No-Fault Coverages, equivalent to, as a minimum, Insurance Services Office form CA 00 01 07 97 or current equivalent. Coverage shall include all owned vehicles, all non-owned vehicles and all hired vehicles. The City of Ann Arbor shall be named as an additional insured. There shall be no added exclusions or limiting endorsements which diminish the City's protections as an additional insured under the policy. Further, the limits of liability shall be \$1,000,000 for each occurrence as respects Bodily Injury Liability or Property Damage Liability, or both combined.
 - (d) Umbrella/Excess Liability Insurance shall be provided to apply excess of the Commercial General Liability, Employers Liability and the Motor Vehicle coverage enumerated above, for each occurrence and for aggregate in the amount of \$1,000,000.
- (2) Insurance required under subsection (1)(b) and (1)(c) above shall be considered primary as respects any other valid or collectible insurance that the City may possess, including any self-insured retentions the City may have; and any other insurance the City does

possess shall be considered excess insurance only and shall not be required to contribute with this insurance. Further, the Contractor agrees to waive any right of recovery by its insurer against the City.

- (3) Insurance companies and policy forms are subject to approval of the City Attorney, which approval shall not be unreasonably withheld. Documentation must provide and demonstrate an unconditional 30 day written notice of cancellation in favor of the City of Ann Arbor. Further, the documentation must explicitly state the following: (a) the policy number; name of insurance company; name and address of the agent or authorized representative; name and address of insured; project name; policy expiration date; and specific coverage amounts; (b) any deductibles or self-insured retentions which shall be approved by the City, in its sole discretion; (c) that the policy conforms to the requirements specified Contractor shall furnish the City with satisfactory certificates of insurance and endorsements prior to commencement of any work. Upon request, the Contractor shall provide within 30 days a copy of the policy(ies) to the City. If any of the above coverages expire by their terms during the term of this Contract, the Contractor shall deliver proof of renewal and/or new policies and endorsements to the Administering Service Area/Unit at least ten days prior to the expiration date.
- (4) Any Insurance provider of Contractor shall be admitted and authorized to do business in the State of Michigan and shall carry and maintain a minimum rating assigned by A.M. Best & Company's Key Rating Guide of "A-" Overall and a minimum Financial Size Category of "V". Insurance policies and certificates issued by non-admitted insurance companies are not acceptable unless approved in writing by the City.
- (5) City reserves the right to require additional coverage and/or coverage amounts as may be included from time to time in the Detailed Specifications for the Project.
- (6) The provisions of General Condition 28 shall survive the expiration or earlier termination of this contract for any reason.

Section 29 - Surety Bonds

Bonds will be required from the successful bidder as follows:

- (1) A Performance Bond to the City of Ann Arbor for the amount of the bid(s) accepted;
- (2) A Labor and Material Bond to the City of Ann Arbor for the amount of the bid(s) accepted.

Bonds shall be executed on forms supplied by the City in a manner and by a Surety Company authorized to transact business in Michigan and satisfactory to the City Attorney.

Section 30 - Damage Claims

The Contractor shall be held responsible for all damages to property of the City or others, caused by or resulting from the negligence of the Contractor, its employees, or agents during the progress of or connected with the prosecution of the work, whether within the limits of the work or elsewhere. The Contractor must restore all property injured including sidewalks, curbing, sodding, pipes, conduit, sewers or other public or private property to not less than its original condition with new work.

Section 31 - Refusal to Obey Instructions

If the Contractor refuses to obey the instructions of the Supervising Professional, the Supervising Professional shall withdraw inspection from the work, and no payments will be made for work performed thereafter nor may work be performed thereafter until the Supervising Professional shall have again authorized the work to proceed.

Section 32 - Assignment

Neither party to the Contract shall assign the Contract without the written consent of the other. The Contractor may assign any monies due to it to a third party acceptable to the City.

Section 33 - Rights of Various Interests

Whenever work being done by the City's forces or by other contractors is contiguous to work covered by this Contract, the respective rights of the various interests involved shall be established by the Supervising Professional, to secure the completion of the various portions of the work in general harmony.

The Contractor is responsible to coordinate all aspects of the work, including coordination of, and with, utility companies and other contractors whose work impacts this project.

Section 34 - Subcontracts

The Contractor shall not award any work to any subcontractor without prior written approval of the City. The approval will not be given until the Contractor submits to the City a written statement concerning the proposed award to the subcontractor. The statement shall contain all information the City may require.

The Contractor shall be as fully responsible to the City for the acts and omissions of its subcontractors, and of persons either directly or indirectly employed by them, as it is for the acts and omissions of persons directly employed by it.

The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work to bind subcontractors to the Contractor by the terms of the General Conditions and all other contract documents applicable to the work of the subcontractors and to give the Contractor the same power to terminate any subcontract that the City may exercise over the Contractor under any provision of the contract documents.

Nothing contained in the contract documents shall create any contractual relation between any subcontractor and the City.

Section 35 - Supervising Professional's Status

The Supervising Professional has the right to inspect any or all work. The Supervising Professional has authority to stop the work whenever stoppage may be appropriate to insure the proper execution of the Contract. The Supervising Professional has the authority to reject all work and materials which do not conform to the Contract and to decide questions which arise in the execution of the work.

The Supervising Professional shall make all measurements and determinations of quantities. Those measurements and determinations are final and conclusive between the parties.

Section 36 - Supervising Professional's Decisions

The Supervising Professional shall, within a reasonable time after their presentation to the Supervising Professional, make decisions in writing on all claims of the City or the Contractor and on all other matters relating to the execution and progress of the work or the interpretation of the contract documents.

Section 37 - Storing Materials and Supplies

Materials and supplies may be stored at the site of the work at locations agreeable to the City unless specific exception is listed elsewhere in these documents. Ample way for foot traffic and drainage must be provided, and gutters must, at all times, be kept free from obstruction. Traffic on streets shall be interfered with as little as possible. The Contractor may not enter or occupy with agents, employees, tools, or material any private property without first obtaining written permission from its owner. A copy of the permission shall be furnished to the Supervising Professional.

Section 38 - Lands for Work

The Contractor shall provide, at its own expense and without liability to the City, any additional land and access that may be required for temporary construction facilities or for storage of materials.

Section 39 - Cleaning Up

The Contractor shall, as directed by the Supervising Professional, remove at its own expense from the City's property and from all public and private property all temporary structures, rubbish and waste materials resulting from its operations unless otherwise specifically approved, in writing, by the Supervising Professional.

Section 40 - Salvage

The Supervising Professional may designate for salvage any materials from existing structures or underground services. Materials so designated remain City property and shall be transported or stored at a location as the Supervising Professional may direct.

Section 41 - Night, Saturday or Sunday Work

No night or Sunday work (without prior written City approval) will be permitted except in the case of an emergency and then only to the extent absolutely necessary. The City may allow night work which, in the opinion of the Supervising Professional, can be satisfactorily performed at night. Night work is any work between 8:00 p.m. and 7:00 a.m. No Saturday work will be permitted unless the Contractor gives the Supervising Professional at least 48 hours but not more than 5 days notice of the Contractor's intention to work the upcoming Saturday.

Section 42 - Sales Taxes

Under State law the City is exempt from the assessment of State Sales Tax on its direct purchases. Contractors who acquire materials, equipment, supplies, etc. for incorporation in City projects are not likewise exempt. State Law shall prevail. The Bidder shall familiarize itself with the State Law and prepare its Bid accordingly. No extra payment will be allowed under this Contract for failure of the Contractor to make proper allowance in this bid for taxes it must pay.

Section 43

CONTRACTOR'S DECLARATION

I hereby declare that I have not, during the period _____, 20____, to _____, 20____, performed any work, furnished any materials, sustained any loss, damage or delay, or otherwise done anything in addition to the regular items (or executed change orders) set forth in the Contract titled _____, for which I shall ask, demand, sue for, or claim compensation or extension of time from the City, except as I hereby make claim for additional compensation or extension of time as set forth on the attached itemized statement. I further declare that I have paid all payroll obligations related to this Contract that have become due during the above period and that all invoices related to this Contract received more than 30 days prior to this declaration have been paid in full except as listed below.

There is/is not (Contractor please circle one and strike one as appropriate) an itemized statement attached regarding a request for additional compensation or extension of time.

Contractor

Date

By _____
(Signature)

Its _____
(Title of Office)

Past due invoices, if any, are listed below.

STANDARD SPECIFICATIONS

All work under this contract shall be performed in accordance with the Public Services Department Standard Specifications in effect at the date of availability of the contract documents stipulated in the Bid. All work under this Contract which is not included in these Standard Specifications, or which is performed using modifications to these Standard Specifications, shall be performed in accordance with the Detailed Specifications included in these contract documents.

Standard Specifications are available online:

<http://www.a2gov.org/departments/engineering/Pages/Engineering-and-Contractor-Resources.aspx>

<u>Section Number</u>	<u>Title</u>	<u>Pages</u>
100	Notice to Bidders	DS - 1 to 2
101	Construction Sequencing	DS - 3 to 5
201	Project Supervision	DS - 6 to 9
201A	Project Schedule	DS - 10 to 11
202	General Conditions	DS - 12 to 13
202A	Vacuum Type Cleaning Equipment	DS - 14 to 14
202B	Material and Supplies Certifications	DS - 15 to 15
203	Minor Traffic Control	DS - 16 to 17
204	Audio-Visual Recording	DS - 18 to 21
205	Removing Miscellaneous Concrete Items	DS - 22 to 23
207	Machine Grading, Modified	DS - 24 to 30
208	Subgrade Undercutting	DS - 31 to 31
209	Soil Erosion and Sedimentation Control	DS - 32 to 32
211	Temporary Water Main Line Stop	DS - 33 to 37
214	Water Main and Appurtenances, Remove or Abandon	DS - 38 to 39
218	Adjust Structure Cover	DS - 41 to 42
219	Subgrade Underdrain	DS - 43 to 44
220A	HMA Application Estimate	DS - 45 to 45
220B	HMA Paving	DS - 46 to 48
220C	Acceptance of HMA Mixtures	DS - 49 to 52
223	Concrete Curb and Gutter, and Driveway Openings	DS - 53 to 54
223A	Concrete Placement and Protection	DS - 55 to 56
224	Concrete Sidewalk, Sidewalk Ramps and Driveway Approaches	DS - 57 to 58
225	Protective Fencing	DS - 59 to 60
226	Detectable Warning Surface	DS - 61 to 62
227	Slope Restoration	DS - 63 to 64
228	Aggregates	DS - 65 to 66
230	Maintaining Traffic	DS - 67 to 70
251	Temporary Pedestrian Type II Barricade	DS - 71 to 72
252	Temporary Pedestrian Type II Channelizer	DS - 73 to 74
253	Temporary Pedestrian Path	DS - 75 to 76
254	Temporary Pedestrian Ramp	DS - 77 to 78
255	Pavement Markings	DS - 79 to 80
268	Recessed Pavement Markings	DS - 81 to 82
270	Handhole	DS - 83 to 84
272	Structure Covers	DS - 85 to 86
273	Non-Structural Flowable Fill	DS - 87 to 87
401	Water Main and Appurtenances	DS - 88 to 105
4921	Water Main CIPP Lining	DS - 106 to 112
425	Water Main Testing	DS - 113 to 114

CITY OF ANN ARBOR

NOTICE TO BIDDERS

100

1 of 2

12/01/16

Utilities Coordination

The Contractor shall cooperate and coordinate construction activities with the owners of utilities as stated in subsection 104.08 of the Standard Specifications for Construction. In addition, for the protection of underground utilities, the Contractor shall follow the requirements in subsection 107.12 of the Standard Specifications for Construction. Contractor delay claims resulting from a utility will be determined based upon subsection 108.09 of the Standard Specifications for Construction.

The following Utility Owners have facilities located within the Right-of-Way:

<u>Utility</u>	<u>Type of Service</u>
City of Ann Arbor W.R. Wheeler Service Center 4251 Stone School Road Ann Arbor, MI 48108 734 794-6351	Sanitary Sewer (Mark Cozart - ext. 43318) Water (Daniel Wooden - ext. 43324) Storm Sewer (Kevin Ernst - ext. 43327) Communications/Signs/Signals/Street Lighting (Chuck Fojtik - ext. 43322)
AT&T 550 South Maple Ann Arbor, MI 48103 Attn: Debora Renner 734-996-5485 debora.a.renner@att.com	Telephone/Fiber Optic
Comcast 27800 Franklin Road Southfield, MI 48034 Attn: Ron Southerland 248-359-6544 ronald_southerland@cable.comcast.com	Cable/Fiber Optic
DTE Energy 2000 2 nd Ave, Room 518 S.B. Detroit, MI 48226 Attn: Julie Gottardi 734-884-0585 gottardij@dteenergy.com	Electric

CITY OF ANN ARBOR

NOTICE TO BIDDERS

100

2 of 2

12/01/16

DTE Energy (Michcon)
17150 Allen Road
Melvindale, MI 48122
Attn: Laurie Forrester
313-389-7261
forresterl@dteenergy.com

Gas

MCI/Verizon
5688 W Grand River Avenue
Lansing, MI 48906
Attn: Rick Chalmers
517-318-8064
rick.chalmers@verizonbusiness.com

Telephone/Fiber Optic

For protection of underground utilities, the Contractor shall call "MISS DIG" toll free at 1-800-482-7171 or call 811 a minimum of three (3) working days prior to excavation within the project limits. The Contractor must also notify utility owners who may not be part of the "MISS DIG" system.

The Contractor shall notify the City of Ann Arbor a minimum of three (3) days prior to beginning construction.

The Owners of public or private utilities which will not interfere with the completed project and which do not present a hazard to the public or an extraordinary hazard to the Contractor's operations will not be required to move their facilities on or from the street right-of-way.

The Contractor shall verify the location and depth of all utilities through Miss Dig and coordinate with the utilities to ensure that all utilities are protected during the project.

Protection of existing utility facilities is necessary during the project. Protection may include: holding utility poles, supporting underground facilities, temporary sheeting, bracing, poles, cables, sand fill or other means to complete the work. The Contractor is responsible for furnishing all labor, equipment and materials required to protect existing facilities during construction. Costs associated with protecting existing utilities will not be paid for separately.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
CONSTRUCTION SEQUENCING

101

1 of 3

12/01/16

This section is intended as an outline of the desired sequence of water main construction and testing and does not include the full range of materials and processes needed to complete the work. Stations referenced are found along the centerline of water main construction.

1. Green Stage 1A - Construct 16" inch water main in, and along, Green Road including 12" water main stubbed to the edge of pavement near Station 206+03 and 16" gate valve in well as shown on the drawings near Station 202+41.

Schedule and coordinate the shutdown of the existing 16" water main such that the water main connection located near Station 206+51 can be prepared for construction. The Contractor shall notify the Engineer a minimum of five (5) days prior to beginning this work to allow for proper coordination. The Contractor shall be aware that the valves on the existing 12" to 16" water main located in the intersection may not shut completely. Consequently, it may be necessary to install temporary insertion valves in the existing water main in order to shut down the water main to perform the initial tie-in near Station 206+51. The existing valve near Station 206+60 should be operable, and used to temporarily shut down the 16" water main to cut and cap the pipe near Station 206+47 so that pressure may be restored south of the connection. The 16-inch water main may only be shut down for a maximum period of 8 hours in any one 24 hour period.

Flush, swab and chlorinate water main; perform bacteriological testing; complete hydrostatic pressure test(s); perform 2nd round of bacteriological testing, if required; upon successful completion of all required bacteriological testing, prepare to construct the remaining water main inter-connection.

Make connection to existing 16" water main at Station 206+51.

2. Plymouth Stage 1B – Construct 16" water main in, and along, Plymouth Road including the 16" cross, stubbing pipe to the edge of pavement to the south and east, 16" gate valve in well as shown on the drawings near Station 100+20, including the 12" water main stubbed south to the edge of pavement. Contractor shall cut, cap and remove the existing 12" water main to facilitate construction of the new main.

Flush, swab and chlorinate water main; perform bacteriological testing; complete hydrostatic pressure test(s); perform 2nd round of bacteriological testing, if required; upon successful completion of all required bacteriological testing, prepare to construct the remaining water main inter-connections.

Connect the proposed 16" water main to the existing 16" water main at Station 101+44 at gate valve in well in Green Road. Schedule and coordinate the shutdown of the existing 12" water main such that the water main connection located near Station 100+15 can be prepared for construction. The Contractor shall notify the Engineer a minimum of five (5) days prior to beginning this work to allow for proper coordination.

The Contractor shall be aware that the valves on the existing 12" to 16" water main located in the intersection may not shut completely. Consequently, it may be necessary to install temporary insertion valves in the existing water main in order to shut down the water main to perform the tie-in near Station 100+15.

Water main rehabilitation by C.I.P.P lining must be completed during this stage and Stage 2 while traffic control is set up along the north side of Plymouth Road. Water main rehabilitation sequencing is to be provided by the Contractor.

3. Green Stage 2 – Construct remaining 12" water main across Green Road at Station 206+03 to 12" gate valve in box behind curb.

Flush, swab and chlorinate water main; perform bacteriological testing; complete hydrostatic pressure test(s); perform 2nd round of bacteriological testing, if required; upon successful completion of all required bacteriological testing, prepare to construct the remaining water main inter-connection.

Schedule and coordinate the shutdown of the existing 16" and 12" water mains such that the 12-inch water main connection located near Station 206+08 can be prepared for construction. The Contractor shall notify the Engineer a minimum of five (5) days prior to beginning this work to allow for proper coordination.

4. Plymouth Stage 2 –Construct 16" water main in, and along, Plymouth Road including stubbing pipe to the edge of pavement east, 16" gate valve in well as shown on the drawings near Station 103+15, including the 16" water main branch south with 16" x16" x 12" tee. Contractor shall cut, cap and remove the existing 16" and 12" water main to facilitate construction of the new main.

Flush, swab and chlorinate water main; perform bacteriological testing; complete hydrostatic pressure test(s); perform 2nd round of bacteriological testing, if required; upon successful completion of all required bacteriological testing, prepare to construct the remaining water main inter-connections.

Connect the proposed 16" water main to the 16" water main at the stage 1B interface. Schedule and coordinate the shutdown of the existing 12" and 14" water mains such that the water main connections located near Station 103+15 can be prepared for construction. The Contractor shall notify the Engineer a minimum of five (5) days prior to beginning this work to allow for proper coordination. The Contractor shall be aware that the valves on the existing 12" to 14" water main may not shut completely. Consequently, it may be necessary to install temporary insertion valves in the existing water main in order to shut down the water main to perform the tie-in near Station 103+15.

Water main rehabilitation by C.I.P.P lining must be completed during this stage and Stage 1B while traffic control is set up along the north side of Plymouth Road. Water main rehabilitation sequencing is to be provided by the Contractor.

Contractor shall install the 2" copper water service lead for 3500 Plymouth by boring in the location shown on the plans and modified by field locations to be determined by City Staff. Contractor shall then complete the work for excavating and backfilling the remaining portion of the water service lead that is installed and connected by the City.

Abandon existing 12" and 14" gate valves in wells in the intersection near Station 102+30.

5. Plymouth Stage 3 / Green Stage 3 – Abandon existing 12" and 16" gates valves in wells near Station 101+83 and 101+91.

6. Plymouth Stage 4 - Construct remaining 12" and 16" water main across Green Road at Stations 100+15 and 101+44 across Plymouth Road.

Flush, swab and chlorinate water mains; perform bacteriological testing; complete hydrostatic pressure test(s); perform 2nd round of bacteriological testing, if required; upon successful completion of all required bacteriological testing, prepare to construct the remaining water main inter-connections.

Connect the proposed 16" water main to the existing 16" water main at the stage interface. Schedule and coordinate the shutdown of the existing 12" water main such that the water main connections located near Station 100+15 can be prepared for construction. The Contractor shall notify the Engineer a minimum of five (5) days prior to beginning this work to allow for proper coordination. The Contractor shall be aware that the valve on the existing 12" water main may not shut completely. Consequently, it may be necessary to install temporary insertion valves in the existing water main in order to shut down the water main to perform the tie-in near Station 100+15.

7. Green Stage 4 - Construct 16" inch water main in, and along, Green Road including fire hydrant assembly near Station 201+0x and 16" gate valve in well as shown on the drawings near Station 200+14.

Flush, swab and chlorinate water main; perform bacteriological testing; complete hydrostatic pressure test(s); perform 2nd round of bacteriological testing, if required; upon successful completion of all required bacteriological testing, prepare to construct the remaining water main inter-connections.

Connect the proposed 16" water main to the existing 16" water main at the stage interface. Schedule and coordinate the shutdown of the existing 16" water main such that the water main connection located near Station 200+08 can be prepared for construction. The Contractor shall notify the Engineer a minimum of five (5) days prior to beginning this work to allow for proper coordination. The Contractor shall be aware that the valve on the existing 16" water main may not shut completely. Consequently, it may be necessary to install temporary insertion valves in the existing water main in order to shut down the water main to perform the tie-in near Station 200+08.

Make connection to existing 16" water main at Station 200+08.

8. Abandon all water mains in accordance with the City of Ann Arbor Standard Specifications and the contract documents.

All water main and appurtenances shall be pressure tested, cleaned, disinfected and bacteriological tested in accordance with the specifications outlined within this Detailed Specification.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
PROJECT SUPERVISION

201

1 of 4

12/01/16

a. Description. The Contractor shall provide supervision in accordance with the City of Ann Arbor Standard Specifications, subsections 104.07 and 107.15 of the Michigan Department of Transportation (MDOT) 2012 Standard Specifications for Construction, and as described herein.

The Contractor shall designate a full-time Project Supervisor to act as the Contractor's agent/representative, and to be responsible for scheduling and coordination of all subcontractors, suppliers, other governmental agencies, and all public and private utility companies.

The Project Supervisor shall not be an active crew member of the Contractor, shall not be an active member or employee of any subcontractor's work force, and shall not perform general or specialized labor tasks. The Project Supervisor shall be a full-time employee of the General Contractor and shall have all needed authority to make binding decisions on behalf of the Contractor in all matters pertaining to performance and execution of the work of the project.

The Project Supervisor shall work exclusively on this project, and shall put forth his/her full effort into the organization and coordination of the work of this project.

One week prior to the pre-construction meeting, the Contractor shall designate a proposed Project Supervisor by name, and shall furnish the Engineer with a current, thorough, detailed summary of the proposed Project Supervisor's work history, outlining all previous supervisory experience on projects of a similar size and nature. The detailed work history shall include personal and professional references (names and phone numbers) of persons (previous owners or agents) who can attest to the qualifications and work history of the proposed Project Supervisor. Proposed candidates for Project Supervisor shall have a demonstrated ability to work harmoniously with the Engineer, the City, the public, subcontractors, and all other parties typically involved with work of this nature. The Engineer will have the authority to reject a proposed Project Supervisor whom he/she considers unqualified.

The Project Supervisor shall be available 24 hours-per-day to provide proper supervision, coordination and scheduling of the project for the duration of the Contract. The Contractor shall furnish the City with telephone numbers of the Project Supervisor in order to provide 24 hour-per-day access during business and non-business hours, including weekends and holidays.

The Project Supervisor shall be equipped by the Contractor with a "smart" mobile telephone with "data" and "text" capabilities to provide the City with 24 hour-per-day access to him/her during daily construction activities, during transit to and from the construction site, and during all non-business hours including weekends and holidays.

The Project Supervisor shall be equipped with assistants as necessary to provide project supervision as specified herein, and in accordance with the Contract.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
PROJECT SUPERVISION

201

2 of 4

12/01/16

1. Duties and Responsibilities. The Project Supervisor shall work harmoniously with the Engineer, the City, the public, subcontractors, and all other parties typically involved with work of this nature.

The Project Supervisor shall have a thorough, detailed understanding and working knowledge of all construction practices and methods specified elsewhere herein, as well as the handling, placement, testing and inspection of aggregates, aggregate products, bituminous concrete, Portland cement concrete materials, and other such materials and products related to the work of this project.

The Project Supervisor shall be responsible for all of the work of all of the Contractor's, subcontractors' and suppliers' work forces.

The Project Supervisor shall be responsible for proper and adequate maintenance (emissions, safety, and general operation) of all of the Contractor's, subcontractors' and suppliers' equipment and vehicles. The Project Supervisor shall make all needed diligent and good-faith efforts to ensure that all equipment utilized in the performance of the work is properly maintained, safe, and complies with all legal and environmental requirements of the work as set forth in section 107.15 of the MDOT 2012 Standard Specifications for Construction.

The Project Supervisor shall be responsible for the legal, proper and safe parking/storage of all of the Contractor's, subcontractors' and suppliers' equipment, work vehicles, and employee's vehicles.

The Project Supervisor shall schedule and coordinate the work of all parties involved in the project, including utility companies, testing agencies, governmental agencies, all City departments (such as Utilities and Transportation), and City inspectors.

The Project Supervisor shall coordinate and schedule the work of any independent survey crews that may be retained by the Engineer or City to witness and reset existing and new geographic/benchmark monuments. Failure to have existing monuments witnessed and reset may result in delays to the Contractor's work. Costs for such delays will be the Contractor's sole responsibility. The Project Supervisor shall also schedule and complete all needed survey request forms that are needed in order to schedule the services of survey personnel to properly layout all elements of the project work in accordance with the City of Ann Arbor Public Services Area Standard Specifications and the MDOT 2012 Standard Specifications for Construction.

The Project Supervisor shall coordinate and schedule inspection performed by the City and Consultants (including material testing firms) in a timely manner, to assure proper and timely testing and inspection of the work.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
PROJECT SUPERVISION

201

3 of 4

12/01/16

The Project Supervisor shall submit to the Engineer, an updated, detailed schedule of the proposed work on a weekly basis, and an update of all proposed changes on a daily basis.

The Project Supervisor and all subcontractors shall attend a weekly progress meeting chaired by the Engineer to discuss the work. Upon the completion of each meeting, the Engineer shall prepare and distribute, to all present, a written summary of the meeting's minutes. Those in attendance shall review the minutes and, if necessary, comment on any deficiencies or errors prior to or at the next scheduled progress meeting.

2. Additional Performance Requirements. If, in the sole opinion of the Engineer, the Project Supervisor is not adequately performing the duties as outlined in this Special Provision, the following system of notices will be given to the contractor with the associated penalties:

First Notice – A warning will be issued in writing to the Contractor detailing the deficiencies in the Project Supervision. The Contractor must respond within 7 calendar days in writing with a plan to correct the stated deficiencies. Failure to respond within 7 calendar days will result in the issuing of a second notice.

Second Notice – A second warning will be issued in writing to the contractor further detailing the deficiencies in the Project Supervision. A deduction of 10%, or \$10,000, whichever is greater, will be made from the original Project Supervision contract amount. The Contractor must respond within 7 calendar days in writing with a plan to correct the stated deficiencies. Failure to respond within 7 calendar days will result in the issuing of a third notice. At this time, the Engineer reserves the right to meet with personnel with the necessary authority within the Contractor's organization to discuss the deficiencies in the Project Supervision.

Third Notice – A third notice will be issued in writing to the Contractor further detailing the deficiencies in the Project Supervision. An additional deduction of 25%, or \$25,000, whichever is greater, will be made from the original Project Supervision contract amount, and the Project Supervisor shall be removed from the project, and replaced immediately with another individual to be approved by the Engineer.

Should, in the sole opinion of the Engineer, the Project Supervisor fail to perform his/her duties and responsibilities as described herein to such a degree that the successful completion of the project is put in jeopardy, the above system of notices may be foregone, and the Contractor shall immediately replace the Project Supervisor upon receipt of written notice. Failure to provide adequate project supervision, as determined by the Engineer, shall be considered basis for the Engineer to suspend work without extension of contract time or additional compensation.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
PROJECT SUPERVISION

201

4 of 4

12/01/16

If the original Project Supervision contract amount is insufficient to cover said deductions, the Project Supervision contract amount will be reduced to zero and a contract modification will be written to assess a penalty to cover the difference between the Project Supervision contract amount and the total amount of the deduction(s). It is fully expected however that the Project Supervision contract amount will be sufficient to cover any deductions.

b. Materials. None Specified.

c. Construction. Not specified.

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

<u>Pay Item</u>	<u>Pay Unit</u>
201 - Project Supervision, Max \$40,000	Lump Sum

The unit price for this item of work shall include all labor, material, and equipment costs to perform all the work specified in the Standard Specifications, and as modified by this Detailed Specification.

Payment for this work will be made with each progress payment, on a pro rata basis, based on the percentage of construction completed. When all of the work of this Contract has been completed, the measurement of this item shall be 1.0 times the Lump Sum bid amount, minus any deductions incurred for inadequate performance as described herein. This amount will not be increased for any reason, including extensions of time, extras, adjustments and/or additional work.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
PROJECT SCHEDULE

201A

1 of 2

12/01/16

The entire work under this Contract shall be completed in accordance with, and subject to, the scheduling requirements as outlined below, and all other requirements of the Contract Documents.

The Contractor is expected to be furnished with two (2) copies of the Contract, for its execution, on or before **April 20, 2017**. The Contractor shall properly execute both copies of the Contract and return them, with the required Bonds and Insurance documentation, to the City by **May 1, 2017**. The Contractor shall not begin the work before the applicable date(s) as described herein without approval from the Project Engineer, and in no case before the receipt of the fully executed Contract and Notice to Proceed.

By no later than **May 5, 2017** the Contractor shall submit a detailed schedule of work (progress schedule) for the Engineer's review and approval. The progress schedule must fully comply with the scheduling requirements contained in this Detailed Specification. Work shall not start until the progress schedule is approved in writing by the Engineer. The Contractor shall update the approved progress schedule each week, and present it to the Engineer at the weekly progress meeting.

The Contractor shall begin the work of this project on or before **May 5, 2017**, and only upon receipt of the fully executed Contract and Notice to Proceed. Appropriate time extensions shall be granted if the Notice to Proceed is delayed beyond this date.

The Contractor shall not begin work on Stage 1B until **9:00 AM June 19, 2017**, in coordination with the full closure of Green Road at Nixon Road by Other Contractor. Contractor shall coordinate the exact timing of that closure with the City of Ann Arbor.

All contract work must be complete and open to traffic with HMA wearing course placed by **August 25, 2017**. Project completion includes, but not limited to: install, swab, chlorinate, pressure test, flush and test the new water main pipe, connect to the existing mains, all water main rehabilitation and completion of all the remaining work under this Contract for Plymouth and Green Roads including, but not limited to the restoration of all disturbed areas, permanent placement of hot mix asphalt, concrete, pavement markings, surface restoration and the removal of any and all traffic control devices.

Failure to complete all work as specified, within the times specified, including time extensions granted thereto as determined by the Engineer, shall entitle the City to deduct from the payments due the Contractor **\$1,000.00** in "Liquidated Damages", and not as a penalty, for each and every calendar day the work remains incomplete beyond the date specified.

Time is of the essence in the performance of the work of this contract. The Contractor is expected to mobilize sufficient personnel and equipment and work throughout all authorized hours to complete the project by the final completion date. Should the Contractor demonstrate that they

must work on some Sundays in order to maintain the project schedule, they may do so between the hours of 9:00 a.m. and 5:00 p.m. with prior approval from the City. There will be no additional compensation due to the Contractor for work performed on Sundays.

The Engineer may delay or stop the work due to threatening weather conditions. The Contractor shall not be compensated for unused materials or downtime due to rain, or the threat of rain. The Contractor is solely responsible for repairing all damages to the work and to the site, including road infrastructures, road subgrades, and any adjacent properties, which are caused as a result of working in the rain.

The Contractor shall not work in the dark except to make specific water main shut downs for connections, final paving, or as approved by the Engineer and only when lighting for night work is provided as detailed elsewhere in this contract. The Engineer may stop the work, or may require the Contractor to defer certain work to another day, if, in the Engineer's opinion, the work cannot be completed within the remaining daylight hours, or if inadequate daylight is present to either properly perform or inspect the work. The Contractor will not be compensated for unused materials or downtime, when delays or work stoppages are directed by the Engineer for darkness and/or inadequate remaining daylight reasons. The Contractor is solely responsible for repairing all damages to the work and to the site, including road infrastructures, road subgrades, and any adjacent properties, which are caused as a result of working in the dark.

Liquidated Damages will be assessed until the required work is completed in the current construction season. If, with the Engineer's approval, work is extended beyond seasonal limitations, the assessment of Liquidated Damages will be discontinued until the work is resumed in the following construction season.

If the construction contract is not completed within the specified period(s) including any extensions of time granted thereto, at the sole discretion of the City of Ann Arbor, this Contract may be terminated with no additional compensation due to the Contractor, and the Contractor may be forbidden to bid on future City of Ann Arbor projects for a period of at least three (3) years. If the Engineer elects to terminate the Contract, contract items paid for on a Lump Sum basis shall be paid up to a maximum percentage equal to the percentage of the contract work that has been completed.

Costs for the Contractor to organize, coordinate, and schedule all of the project work will not be paid for separately, but shall be included in the bid price of the Contract Item "General Conditions, Modified, Maximum, \$_"

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
GENERAL CONDITIONS

202

1 of 2

12/01/16

a. Description. This item shall include all work described and required by the Plans and Specifications at each location for which no item of work is listed in the Bid Form, including but not limited to:

- Scheduling, coordination, and organization of all work, subcontractors, suppliers, testing, inspection, surveying, and staking.
- Coordination of, and cooperation with, other contractors, agencies, departments, and utilities.
- Protection and maintenance of utilities.
- Placing, maintaining, and removing all soil erosion and sedimentation controls, including stone inlets filers (as shown on project plants).
- Maintaining drainage.
- Maintaining driveways drive openings, sidewalks, bike paths, mail deliveries, and solid waste/recycle pick-ups. This includes the placement and maintenance of gravel in driveway openings as directed by the Engineer.
- Storing all materials and equipment off lawn areas.
- Site clean-up.
- Coordination efforts to furnish various HMA mixtures as directed by the Engineer
- Coordination efforts to furnish and operate various-size vehicles/equipment as directed by the Engineer
- Furnishing and operating vacuum-type street cleaning equipment a minimum of once per week or more frequently as directed by the Engineer
- Furnishing and operating vacuum-type utility structure cleaning equipment
- Furnishing and operating both vibratory plate and pneumatic-type (“pogo-stick”) compactors
- Furnishing and operating a backhoe during all work activities
- Furnishing and operating a jackhammer and air compressor during all work activities
- Noise and dust control
- Mobilization(s) and demobilization(s).
- Furnishing submittals and certifications for materials and supplies
- Disposing of excavated materials and debris - The Contractor shall dispose of, at the Contractor’s expense, all excavated material. Costs for this work will not be paid for separately.

- All miscellaneous and incidental items such as overhead, insurance, and permits.
- Meeting all requirements relating to Debarment Certification, Davis Bacon Act, and Disadvantaged Business Enterprise, and providing the necessary documentation.

Data pertaining to existing soil borings and pavement sections, which are included in Appendix A of these Contract Documents, are provided to help the Engineer and Contractor determine the soil conditions existing within the construction area. The City in no way guarantees existing conditions to be the same as shown in the data. The Contractor is solely responsible for any and all conclusions he/she may draw from the data.

Quantities as given are approximate and are estimated for bidding purposes. Quantities are not guaranteed and may vary by any amount. While it is the City's intent to complete the project substantially as drawn and specified herein, quantities may be changed or reduced to zero for cost savings or other reasons. **The City reserves the right to change the quantities, and no adjustment in unit price will be made for any change in any quantity.**

b. Materials. None Specified.

c. Construction. Not specified.

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

<u>Pay Item</u>	<u>Pay Unit</u>
202 - General Conditions, Max \$25,000	Lump Sum

This item of work will be paid for on a pro rata basis at the time of each progress payment. Measurement will be based on the ratio between work completed during the payment period and the total contract amount. When all of the work of this Contract has been completed, the measurement of this item shall be 1.0 Lump Sum, minus any deductions incurred for inadequate performance as described herein. This amount will not be increased for any reason, including extensions of time, extras, and/or additional work.

The unit price for this item of work shall include all labor, material, and equipment costs to perform all the work specified in the Standard Specifications and as modified by this Detailed Specification.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
VACUUM TYPE CLEANING EQUIPMENT

202A

1 of 1

12/01/16

a. Description. This work includes furnishing and operating throughout the construction period, vacuum type street cleaning and utility structure cleaning equipment (Vac-All, Vactor, etc.) approved by the Engineer, as and when directed by the Engineer for dust control, for dirt/debris control, and for street cleaning immediately prior to paving, and for street and utility structure cleaning after any and all paving.

b. Materials. None specified.

c. Construction. The Contractor shall furnish and operate throughout the construction period, vacuum type street cleaning and utility structure cleaning equipment (Vac-All, Vactor, etc.) approved by the Engineer. When directed by the Engineer, the Contractor shall use this equipment to control dust, dirt, and other debris within the project limits and beyond as required, to clean streets surfaces immediately prior to placing HMA pavement mixtures, and for street and utility structure cleaning after any and all paving. The cleaning equipment shall be of sufficient power to remove dust, dirt, and debris from the pavement and from utility structures in and adjacent to the construction area.

d. Measurement and Payment. Costs for this work will not be paid for separately, but shall be included in the Contract pay Item "General Conditions, Maximum, \$___".

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
MATERIAL AND SUPPLIES CERTIFICATIONS

202B

1 of 1

12/01/16

a. Description. This work includes furnishing certifications to the Engineer for review and approval a minimum of three business days prior to any scheduled delivery, installation, and/or construction of same. The following materials and supplies shall be certified by the manufacturer or supplier as having been tested for compliance with the Specifications:

- HMA materials
- Hot-poured Joint Sealants
- Cements, coatings, admixtures and curing materials
- Sands and Aggregates
- Steel and Fabricated metal
- Portland Cement Concrete Mixtures
- Reinforcing Steel for Concrete
- Reinforcing Fibers for Concrete
- Pre-cast Concrete products
- Water Main Pipe
- Edge Drain and Underdrain Pipe
- Geotextile Filter Fabric and Stabilization Fabric/Grids

b. Materials. None specified.

c. Construction. Not specified.

d. Measurement and Payment. Costs for this work will not be paid for separately, but shall be included in the Contract pay Item "General Conditions, Maximum, \$___".

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
MINOR TRAFFIC CONTROL

202B

1 of 2

12/01/16

a. Description. This work shall consist of protecting and maintaining vehicular and pedestrian traffic, in accordance with the City of Ann Arbor Standard Specifications for Construction sections 104.11 and 812 of the Michigan Department of Transportation (MDOT) 2012 Standard Specifications for Construction; Part 6 of the 2011 Edition of the Michigan Manual of Uniform Traffic Control Devices (MMUTCD); and, except as modified herein.

The work shall include, but is not limited to the following:

- The furnishing and operating of miscellaneous signs, warning devices, flags, and cones;
- The operation of additional signs furnished by the City;
- Furnishing and installing meter bags;
- Coordinating with the City to have meter heads removed and reinstalled;
- Maintaining pedestrian traffic;
- Temporarily covering traffic controls;
- Temporarily covering existing signs as directed;
- Any and all other miscellaneous and/or incidental items which are necessary to properly perform the work.

b. Materials. Materials and equipment shall meet the requirements specified in section 812 of the MDOT 2012 Standard Specifications for Construction.

c. Construction. The Contractor shall maintain pedestrian traffic at all times. For maintaining normal pedestrian traffic while performing sidewalk and driveway repair.

All temporary traffic/pedestrian control devices furnished by the Contractor shall remain the property of the Contractor. The City shall not be responsible for stolen or damaged signs, barricades, barricade lights or other traffic maintenance items. The Contractor shall replace missing traffic control devices immediately, at no additional cost to the Contractor or City. All existing signs, and signs erected by the City of Ann Arbor on this project shall be preserved, protected, and maintained by the Contractor. The City will repair any existing City owned signs, at the Contractor's expense, which are damaged by the Contractor during the work.

The Contractor shall temporarily cover conflicting traffic and/or parking signs when directed by the Engineer.

Parking violation citations issued to the Contractor, subcontractor, and material suppliers including each of their respective employees shall be enforced under appropriate City Code. The work shall include: furnishing and operating of miscellaneous signs and warning devices; furnishing cones; operating additional signs furnished by the City throughout the life of the Contract; furnishing and operating pedestrian traffic control devices; maintaining a safe trench

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
MINOR TRAFFIC CONTROL

202B

2 of 2

12/01/16

during all non-working hours; maintaining access to all drives; covering conflicting existing signs and removal of these covers; and any and all other miscellaneous and/or incidental items which are necessary to properly perform the work.

Where there is metered parking, the Contractor shall either rent and install meter bags, or, with the Engineer's authorization, coordinate with the City Field Operation Services to have meter heads removed and reinstalled.

The Contractor shall maintain vehicular and pedestrian traffic during the work by the use of traffic regulators, channelizing devices and signs as necessary, as directed by the Engineer, and in accordance with 2011 Edition of the MMUTCD.

In order to maintain areas of on-street parking available for residents, the Engineer may direct the contractor to cover and uncover temporary "No Parking" signs within the project limits multiple times throughout the course of the project. Such repeated covering and uncovering of signs shall be included in this item of work and shall not be paid for separately.

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

<u>Pay Item</u>	<u>Pay Unit</u>
203 - Minor Traffic Control, Max \$7,500.....	Lump Sum

The unit price for this item of work shall include all labor, material, and equipment costs to perform all the work described by this Detailed Specification.

Costs for transporting barricades and other temporary traffic control devices shall be included in the bid prices for the individual items of work.

This item will be paid for on a pro rata basis with each progress payment. Measurement will be based on the ratio between work completed during the payment period and the total contract amount. When all of the work of this Contract has been completed, the measurement of this item shall be 1.0 Lump Sum minus any deductions incurred for inadequate performance as described herein. This amount will not be increased for any reason, including extensions of time, extras, and/or additional work.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
AUDIO-VISUAL RECORDING

204

1 of 4

12/01/16

a. Description. This work shall include providing a recording of the physical, structural, and aesthetic conditions of the construction site and adjacent areas as provided herein.

The audio-visual recording shall be:

1. Of professional quality, providing a clear and accurate audio and visual record of existing conditions.
2. Prepared during the period prior to bringing any materials or equipment within the areas described in this special provision.
3. Carried-out under the supervision of the Engineer.

The Contractor shall furnish two (2) copies of the completed recording to the Engineer at the preconstruction meeting, or five (5) business days prior to commencing with construction. An index of the recording, which will enable any area of the project to be easily found on the recording, shall be included. The Contractor shall retain a third copy of the recording for its own use.

Any portion of the recording determined by the Engineer to be unacceptable for the documentation of existing conditions shall be recorded again, at the Contractor's sole expense, and submitted to the Engineer prior to mobilizing onto the site.

b. Materials. The audio-visual recording shall be provided using digital video disk (DVD) media, or other media approved by the Engineer.

c. Construction. Complete audio-visual recording work in accordance with the requirements shown below.

1. Production:
 - A. DVD Format / No Editing. The audio-visual recording shall be performed using equipment that allows audio and visual information to be recorded simultaneously and in color. The recording shall be provided on compact discs in DVD format. The quality of the recording shall be equal to or better than the standard in the industry. The recording shall not be edited.
 - B. Perspective / Speed / Pan / Zoom. To ensure proper perspective, the distance from the ground to the camera lens shall not be less than 12 feet and the recording must proceed in the general direction of travel at a speed not to exceed 48 feet per minute (0.55 miles per hour). Pan and zoom rates shall be controlled sufficiently so that playback will ensure quality of the object viewed.
 - C. Display. The recording equipment shall have transparent time, date stamp and digital annotation capabilities. The final copies of the recording shall continuously

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
AUDIO-VISUAL RECORDING

204

2 of 4

12/01/16

D. and simultaneously display the time (hours:minutes:seconds) and the date (month/date/year) in the upper left-hand corner of the frame. Accurate project stationing shall be included in the lower half of the frame in standard station format (i.e. 1+00). Below the stationing periodic information is to be shown, including project name, name of area shown, direction of travel, viewing direction, etc.

E. On streets or in areas where there is no project stationing, assumed stationing shall be used, starting with 0+00 and progressing from west to east or from north to south.

F. Audio Commentary / Visual Features. Locations relative to project limits and landmarks must be identified by both audio and video means at intervals no longer than 100 feet along the recording route. Additional audio commentary shall be provided as necessary during the recording to describe streets, buildings, landmarks, and other details, which will enhance the record of existing conditions.

G. Visibility / Ground Cover. The recording shall be performed during a time of good visibility. The recording shall not be performed during periods of precipitation or when snow, leaves, or other natural debris obstruct the area being recorded.

2. Coverage. The audio-visual recording coverage shall include the following:

A. General Criteria. These general criteria shall apply to all recording and shall include all areas where construction activities will take place or where construction vehicles or equipment will be operated or parked and/or where materials will be stored or through which they will be transported. The recording shall extend an additional 50 feet outside of all areas. The recording shall include all significant, existing man-made and natural features such as driveways, sidewalks, utility covers, utility markers, utility poles, other utility features, traffic signal structures and features, public signs, private signs, fences, landscaping, trees, shrubs, other vegetation, and other similar or significant features.

B. Private Property. Record all private property that may be utilized by the Contractor in conjunction with this project. These project areas must be disclosed by the Contractor prior to using them for the work of this project.

C. Road Construction Area. The recording coverage shall:

- (1) Extend to 50 feet outside of the right-of-way and easements area as shown on the plans.
- (2) Extend 50 feet outside the construction limits on all streets, including side streets.
- (3) Both sides of each street shall be recorded separately.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
AUDIO-VISUAL RECORDING

204

3 of 4

12/01/16

D. Detour Route / Maintenance of Traffic Areas. The entire detour route and maintenance of traffic areas shall be recorded as indicated in this special provision except as follows:

- (1) The recording must proceed in the general direction of travel at a speed not exceeding 176 feet per minute (2 miles per hour).
- (2) The coverage area shall include the street and not go beyond the curb except in areas where there is a fair possibility that the detoured traffic will drive over the curb, such as at intersections.
- (3) The recording shall focus in particular at sidewalk ramps and other features likely to have been damaged or likely to be damaged as a result of existing traffic, temporary detoured traffic and or construction traffic. In these areas, recording may need to proceed much more slowly.

Only the side of street with the detoured traffic must be recorded. However, the Contractor is advised that portions of the detour routes may operate in opposite directions at different times. In these cases, both sides of the street shall be recorded separately.

E. Private Property Bordering the Project Limits or Work Areas. Record all areas bordering the project where work is scheduled to occur or where construction traffic could damage the private property. This is to including buildings, driveways, decks, landscaping, trees, and all other similar features.

F. Other Areas. The Contractor shall record at his sole expense other areas where, in his/her opinion, the establishment of a record of existing conditions is warranted. The Contractor shall notify the Engineer in writing of such areas.

The Engineer may direct the recording of other minor areas not specified above at the Contractor's sole expense.

3. Audio-Visual Recording Services. The following companies are known to be capable of providing the recording services required by this special provision and shall be utilized, unless the Contractor receives prior written approval from the Engineer to utilize another company of comparable or superior qualifications.

- Construction Video Media
- Midwest Company
- Topo Video, Inc.
- Video Media Corp.
- Paradigm 2000, Inc.
- Finishing Touch Photo and Video

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
AUDIO-VISUAL RECORDING

204

4 of 4

12/01/16

c. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price for the following pay item:

<u>Pay Item</u>	<u>Pay Unit</u>
204 - Audio-visual Recording	Lump Sum

Audio-visual Recording shall include all labor, equipment, and materials required to perform the recording and to provide the finished recording the Engineer.

Payment will be made for **Audio-visual Recording** following the review and acceptance of the recording by the Engineer. Within twenty-one (21) days following the receipt of the recording, the Engineer will either accept it and authorize payment or require that any discrepancies in the recording be addressed prior to making payment.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
REMOVING MISCELLANEOUS CONCRETE ITEMS

205

1 of 2

12/01/16

a. Description. This work shall consist of removing concrete curb, gutter, curb and gutter, integral curb, sidewalk, sidewalk ramps, drive openings, and drive approach pavements as shown on the plans, in accordance with section 204 of the Michigan Department of Transportation (MDOT) 2012 Standard Specifications for Construction, except as specified herein, and as directed by the Engineer.

b. Materials. Materials shall be in accordance with those specified in section 204 of the MDOT Standard Specifications for Construction.

c. Construction. Construction methods shall be as described in section 204 of the MDOT 2012 Standard Specifications for Construction, as described below, and as directed by the Engineer.

Curb, gutter, curb and gutter, sidewalk, sidewalk ramps, drive openings, and drives shall be replaced within 24 hours of their removal.

Prior to the start of work, the Engineer and Contractor together shall identify and field measure all items to be removed. The Engineer shall approve of all removal limits prior to any removals being performed by the Contractor.

The Contractor shall perform full-depth saw cutting at removal limits, including those necessary to construct 2-foot wide MDOT Type M drive openings, and including those necessary to provide for the partial removal of existing drive approaches as shown on the Plans, as directed by the Engineer, and as marked for removal. The Contractor shall cut steel reinforcement bars as directed by the Engineer at all areas of removal. All saw cutting shall be performed under wet conditions to prevent excessive airborne dust. All resulting slurry and debris shall be cleaned up to the satisfaction of the Engineer.

The Contractor shall excavate, cut, remove stumps, remove brush, grade, and trim as needed and as directed, and shall import, furnish, fill, place, grade, and compact granular material as needed to complete the following: construct new concrete items; to repair or replace existing concrete items; to relocate existing concrete items to their new specified/directed elevations/locations, including all necessary grading at elevation changes of curb and gutter, sidewalks and ramps; and at locations where existing concrete items are to be removed and turf is to be established in its place.

The Contractor shall coordinate with the City Forester prior to the removal of any tree roots.

At various times throughout the work, the Engineer may direct the Contractor to use smaller and/or lighter equipment, and to defer certain work tasks, in order to protect the grade and/or adjacent areas. The Contractor shall not be entitled to any additional compensation for the use of smaller equipment, lighter equipment, or work task deferral.

The Contractor shall shape, grade, and compact the existing roadbed materials to the cross-section(s) as indicated on the Plans, as detailed in the Specifications, and as directed by the Engineer.

The Contractor shall use blade graders, maintainers, vibratory rollers, and/or other equipment as necessary, and as directed by the Engineer. The use of each specific piece of equipment is subject to the approval of the Engineer.

Where existing concrete curb or curb and gutter is to be replaced on a street with a concrete (or brick) base, the Engineer may direct the Contractor to remove a 1-to-2-foot wide, full-depth section of pavement and pavement base from immediately in front of the curb and gutter. As part of this pavement/base removal, the Contractor shall perform additional (double) full-depth saw-cutting along the entire removal limits, and shall take sufficient care so as not to damage and/or disturb any adjacent pavement, pavement base, and/or any other site feature, all as directed by the Engineer. The removals shall be to a sufficient width and depth to allow for the placement and removal of the curb and gutter formwork. After the removal of the formwork, the Contractor shall replace the concrete base to its original thickness and elevation(s).

Excavated/removal areas shall be adequately protected with barricades and/or fencing at all times.

Removed or excavated materials which are not incorporated into the work shall become the property of the Contractor and shall be immediately removed and properly disposed of off-site. Removed or excavated materials may not be stockpiled overnight on, or adjacent to, the site.

Base, subbase, or subgrade materials removed without authorization by the Engineer shall be replaced and compacted by the Contractor at the Contractor's expense, with materials specified by the Engineer.

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

<u>Pay Item</u>	<u>Pay Unit</u>
205 - Curb, Gutter, and Curb and Gutter, Any Type, Rem	Lineal Foot
206 - Sidewalk, Sidewalk Ramp, and Driveway Approach, Any Thickness, Rem	Sq.Yard

Basis of payment shall be as described in subsection 205.04 of the Standard Specifications for Construction.

All sawcutting required for removals shall be included in the appropriate item of work, and will not be paid for separately. Payment for saw cutting to create or modify Type M openings and to allow for the partial removal of existing drives shall be included in the price of the item of work, "Sidewalk, Sidewalk Ramp, and Driveway Approach, Any Thickness, Rem".

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
MACHINE GRADING, MODIFIED

207

1 of 7

12/01/16

a. Description. Machine grading shall be completed in accordance with section 205 of the Michigan Department of Transportation (MDOT) 2012 Standard Specifications for Construction as shown on the plans, and as specified herein, with the exception that subgrade undercutting shall be paid for separately for applicable work when this pay item is included in the proposal. Machine grading shall include all the work specified herein for which there is no separate pay item. This work shall consist of constructing earth grades by excavating, cutting, filling, trimming, and grading; general restoration, and sign removals in accordance with the Detailed Specifications elsewhere herein; and maintaining the work in a finished condition until such time that it is accepted by the Engineer.

b. Materials. All materials shall meet the requirements as specified in section 205 of the MDOT 2012 Standard Specifications for Construction, except as specified herein.

c. Construction. All construction methods shall meet the requirements as specified in section 205 of the MDOT 2012 Standard Specifications for Construction, except as specified herein.

1. Soils Information - Soil information provided as part of the contract documents is for informational purposes only and shall not relieve the Contractor of the responsibility of investigating all local conditions before bidding.
2. General Provisions - The Contractor shall:
 - A. Maintain access to all drive entrances at all times.
 - B. Maintain pick-up access for garbage and recycle vehicles at all times.
 - C. Maintain access to all mail boxes for users and the U.S. Postal Service at all times. The Engineer may direct the temporary relocation of mail boxes. The Contractor may propose the temporary relocation of mail boxes, subject to the approval of the Engineer. In either case, the temporary relocation of mail boxes will not be paid for separately. There are 22 mailboxes located within the project grading limits that may need to be temporarily relocated and then re-established in their permanent locations.
 - D. Grade around mailboxes, trees, light poles, power poles, and the like, which are to remain in place. The Contractor shall be responsible for any damage caused to such structures.
 - E. Coordinate all work with utility companies and others that need to complete work within the project limits.
 - F. Maintain the work in a finished condition until it is accepted by the Engineer.
3. Pavement Sawcutting - The work shall include the full-depth saw-cutting of pavement at the construction limits, and elsewhere as required, if not paid for as part of another item of work. Pavement sawcutting will not be paid for separately.
4. Removal of Trees and Vegetation - The Contractor shall remove and properly dispose of off-site all vegetation; brush; roots; and trees and stumps less than 6 inch in diameter, as shown on the plans, and as directed by the Engineer as required to complete the project.

5. Removal and Salvaging of Topsoil - The removal, salvaging and stockpiling of topsoil, and all related work, shall be performed in accordance with subsection 205.03.A.1 (Removing and Salvaging Topsoil) of the MDOT 2012 Standard Specifications for Construction and will not be paid for separately.

6. Miscellaneous Removals - The removal of HMA, aggregate, and/or concrete materials from around manholes, structures, and utility covers, and the removal of HMA curbing, HMA driveway wedges, HMA surface on existing curb and gutter, and HMA surfaces required for removal in other miscellaneous areas shall be paid for as "Machine Grading, Modified" and will not be paid for separately.

"Machine Grading, Modified" includes the removal of any surface feature located within the grading limits which must be removed and for which there is no specific pay item established in the proposal for its removal.

7. Protection of the Grade - The work shall be kept well drained at all times. Foundation, roadway embankment or subgrade that becomes damaged by rain shall be undercut and backfilled, or otherwise remedied, by the Contractor, at his/her sole expense, as directed by the Engineer.

The Contractor shall be responsible for the maintenance of the foundation, roadway embankment, and subgrade. Any damage caused, by traffic or the Contractor's operations, to the foundation, roadway embankment or subgrade, in the opinion of the Engineer, shall be remedied by the Contractor at his/her sole expense, as directed by the Engineer.

The Contractor shall not use rubber-tired equipment on the foundation, roadway embankment, or subgrade, when its use causes, in the opinion of the Engineer, unnecessary damage to the foundation, road embankment or subgrade. The Contractor shall conduct his/her operations and provide the necessary equipment to ensure the satisfactory completion of the work without damaging the foundation, roadway embankment or subgrade. This may require the transporting and movement of materials over additional distances.

At various times throughout the work, the Engineer may direct the Contractor to use smaller and/or lighter equipment, and to defer certain work tasks, in order to protect the grade and/or adjacent areas. The Contractor shall not be entitled to an extension of time or any additional compensation for the use of smaller equipment, lighter equipment, or work task deferral.

8. Protection of Utilities - Utility lines may become exposed at, above, or below, the foundation or subgrade elevation during machine grading or subgrade undercutting operations. If this occurs, the Contractor shall excavate around, above and/or below the utility lines, as directed, to complete the machine grading or subgrade undercutting operations. Payment, at contract unit prices, for "Machine Grading, Modified" or "Subgrade Undercutting, Type __," whichever applies, will be considered as payment in full for this work.

9. Removal of Cable, Conduits and Pipe - The Contractor shall remove, and properly dispose of off-site, all abandoned cables, conduit, and pipe encountered at, or above the bottom of any earthwork excavation or undercut. Where the inverts of abandoned, or to be abandoned or removed, conduits or pipe are less than 16 inches below the bottom of any earth excavation or undercut, the conduits and/or pipe shall be removed and the resulting void filled with an Engineer approved material. The fill material shall be compacted to 95% of its maximum unit weight in lifts not exceeding 12 inches. No separate payment will be made for removal of conduit or pipe, or any of the work, described in this section.

10. Foundation Preparation - Foundation is defined as the original earth grade upon which roadway embankment is placed. The foundation work shall be completed in accordance with subsection 205.03.A (Preparing Roadway Foundation) of the MDOT 2012 Standard Specifications for Construction as shown on the plans, and as specified herein.

The foundation shall be compacted to 95% of its maximum unit weight, as measured by the AASHTO T-180 method, to a depth of at least 10 inches. If this cannot be achieved, in the opinion of the Engineer, he/she will direct the Contractor to perform "Subgrade Undercutting, Type ___" or "Subgrade Manipulation," as described herein, on the foundation.

11. Roadway Embankment Construction - Roadway embankment is defined as the construction of earth on the prepared foundation to form the subgrade. Roadway embankment work shall be completed in accordance with subsection 205.03 H (Roadway Embankment) of the MDOT 2012 Standard Specifications for Construction as shown on the plans, and as specified herein. Roadway embankment shall be compacted to a minimum of 95% of its maximum unit weight, as measured by the AASHTO T-180 method.

12. Subgrade Construction - Subgrade is defined as the final earth grade which extends from grading limit to grading limit. The subgrade shall be constructed by performing earth excavation and roadway embankment work in accordance with subsection 205.03.G (Earth Excavation) and subsection 205.03 H (Roadway Embankment) of the MDOT 2012 Standard Specifications for Construction, as shown on the plans, and as specified herein.

The subgrade shall be constructed to the contours and cross-sections shown on the plans, as specified herein, and as directed by the Engineer. To achieve this, the work shall include, but not be limited to:

- A. Removal and disposal off-site of any surplus or unsuitable materials.
- B. Furnishing from off-site any additional Engineer approved fill materials necessary.
- C. Moving existing and/or furnished materials longitudinally and transversely as necessary.
- D. Cutting, placing, compacting, and trimming existing and/or furnished materials to construct the roadway embankment and subgrade to the specified tolerances.
- E. Stockpiling, and moving again, any cut materials which cannot be immediately placed upon excavation due to construction staging.

The subgrade shall be graded to accommodate all subbases and aggregate bases wherever used, all bioswale and adjacent planting beds, all roadway pavements, curb and gutter, driveways, sidewalks, bicycle paths, other similar structures, bioswale planting mix, topsoil and any other features which the subgrade supports.

The subgrade shall be prepared so as to ensure uniform support for the pavement structure. The finished subgrade shall be placed to within 1 inch below and $\frac{3}{4}$ inch above plan grade. Variations within this tolerance shall be gradual.

The subgrade shall be compacted to a minimum of 95% of its maximum unit weight, as measured by the AASHTO T-180 method, to a depth of 10 inches. If this cannot be achieved, in the opinion of the Engineer, he/she will direct the Contractor to perform "Subgrade Undercutting, Type ___" or "Subgrade Manipulation" as described herein.

The Contractor shall use equipment and methods of construction best suited, in the opinion of the Engineer, to the earthwork operations being performed and the project requirements. The use of various equipment and methods of construction are subject to the approval of the Engineer. The Engineer may disallow the use of certain equipment and methods of construction and require the use of other equipment and/or methods of construction. No additional compensation or extensions of contract time will be allowed for additional measures that are required for the protection of the grade as specified herein.

13. Test Rolling - The Contractor shall test-roll the foundation and/or subgrade with a pneumatic tired roller with a suitable body for ballast loading and a gross load capacity that can be varied from 25 and 40 tons. In lieu of this test roller, with the approval of the Engineer, the Contractor may use a fully loaded single axle or tandem axle dump truck.

14. Subgrade Undercutting - "Subgrade Undercutting" shall be performed on the foundation or subgrade in accordance with section 205.03.E (Subgrade Undercutting) of the MDOT 2012 Standard Specifications for Construction, as shown on the plans, as specified herein, and as directed by the Engineer.

15. Subgrade Manipulation - "Subgrade Manipulation" shall be performed on the foundation or subgrade in accordance with section 205.03.F (Subgrade Manipulation) of the MDOT 2012 Standard Specifications for Construction, as shown on the plans, as specified herein, and as directed by the Engineer.

Where subgrade manipulation is required, the foundation or subgrade shall be thoroughly scarified, blended, and mixed to a depth of 12 inches. The work shall be accomplished by means of a large diameter disc, motor grader, or other equipment approved by the Engineer. After the foundation or subgrade has been manipulated to the satisfaction of the Engineer and allowed to dry, the soil shall be compacted to 95% of its maximum dry density as measured by the AASHTO T-180 method. The time required for drying the soil will not be a basis for an extension of time.

The cost of Subgrade Manipulation shall be included in the cost of "Machine Grading, Modified" unless a pay item for "Subgrade Manipulation" is included in the Proposal.

16. Rock Excavation - Rock excavation shall be performed in accordance with section 205.03.B (Rock Excavation) of the MDOT 2012 Standard Specifications for Construction, as shown on the plans, and as directed by the Engineer.

The pay item "Rock Excavation" will apply only to boulders over ½ cubic yard in volume. Boulders will be measured individually and the volume computed from the average dimension measured in three directions. The removal of rocks, concrete and masonry less than ½ cubic yard in volume shall not be included in the pay item "Rock Excavation," but shall be included in the pay item "Machine Grading, Modified."

If the proposal does not include a pay item for "Rock Excavation," rocks measuring over ½ cubic yard in volume shall be paid for as extra work.

17. Lowering Structures - Prior to cutting the subgrade, the Contractor shall remove structure covers, lower the structures to a point between 8 inches and 12 inches below the proposed subgrade, and cover the structures with a steel plate. Structures shall not be raised prior to placing roadway embankment.

The steel plates for covering structure openings shall conform to the plan detail, be pegged and properly placed to prevent their movement under all traffic, be thick enough to carry all traffic, and prevent the infiltration of debris into the structures.

The Contractor shall lower valve boxes to a point between 8 inches and 12 inches below the proposed subgrade. Valve boxes shall not be raised prior to placing roadway embankment.

The void in the grade above the steel plates used for structure lowering and valve box lowering shall be backfilled, and compacted to 95% of its maximum dry density, with an Engineer approved coarse aggregate.

The Contractor shall coordinate the lowering of private utility structures with the private utility companies.

18. Structure Covers - As directed by the Engineer and within two days of their removal, the Contractor shall stockpile on-site, in a location that is mutually agreeable to the Engineer and Contractor, the existing structure covers. The City of Ann Arbor's forces will pick-up the structure covers at a time that is convenient to them and mutually agreeable to the Contractor. The Contractor shall provide the equipment and manpower to load the castings on the City's vehicle(s) so that they can be removed from the site by the City.

19. Structure and Sewer Cleanliness - All sewers, and structures, including manholes, gate wells, valve boxes, inlet structures and curbs shall be protected from damage and contamination by debris and construction materials. Structures shall be maintained clean of construction debris and properly covered at all times during the construction. The Contractor shall immediately clean any structures and/or sewers that become contaminated with construction debris. The Contractor shall be responsible for all direct and indirect damages which are caused by sewers or structures which have been made unclean or have been damaged by the Contractor.

20. Contractor's Calculations - Existing and proposed cross sections are provided in the plans. The Contractor shall perform his/her own computations and is responsible to inspect the site to determine his/her own estimate of the quantities of work involved. Deviations between the existing contours and the existing and proposed cross-sections shown on the plans shall not be cause for additional compensation.

21. Estimated Earthwork Quantities - The table shown below contains the Engineer's estimate of the earth excavation (cut), the embankment (fill), and topsoil stripping required to prepare the foundation as defined herein for the project. These quantities do not take into consideration the suitability of the soils for their intended use, their possible availability due to construction staging or storage limitations, bulking of the material upon excavation, changes in volumes due to moisture content or soil types, or other similar related issues. The Contractor shall remain responsible for determining the actual amount(s) of work to be performed to complete the project as shown on the plans and as specified herein.

Machine Grading Modified Item of Work	Est. volume of earth excavation (cut), cubic yards	Est. volume of embankment (fill), cubic yards	*Topsoil and/or sub-soil to be stripped and removed, cubic yards
Plymouth Road			
Green Road			

*The estimated volume for topsoil and/or sub-soil stripping has been estimated based upon the assumption that approximately 6" of topsoil and other deleterious soils exist that must be removed prior to exposing suitable soils for road building or other similar purposes. The estimated thickness can, and will, vary throughout the project limits.

22. Tree trimming - The Contractor shall coordinate with the City Field Services Unit to schedule trimming of trees by City forces or authorized subcontractor. The Contractor shall not be entitled to an extension of time or any additional compensation for the coordination of this work.

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

<u>Pay Item</u>	<u>Pay Unit</u>
207 - Machine Grading, Modified	Square Yard

Measurement for payment for the item **Machine Grading, Modified** shall be the computed in square yard quantity of excavated material (pavement, soil, rock, brick, etc.) from the top of existing grade down to the bottom of the excavation. Embankment, fill, subgrade protection/maintenance, drainage maintenance, topsoil, seeding, and restoration quantities will not be paid for separately, and are included in this item of work.

Machine Grading, Modified will be measured in area of the feature being constructed by the unit square yard, and include all labor, materials and equipment required to complete the work.

The Contractor shall include all of its costs to complete all of the work in the **Machine Grading, Modified** pay item and plan quantities included in the proposal. No additional payment will be made for this work, which is shown on the plans and specified herein as work which needs to be completed, and may not be described as included in the pay item. Plan quantities will be paid for the work, and will only be adjusted due to changes in the limits of the work, as directed by the Engineer, in writing.

The pay item **Machine Grading, Modified** shall include all the work specified herein, including, but not limited to, the removal and offsite disposal of any surplus or unsuitable materials and the furnishing from off-site any additional Engineer approved fill materials necessary to construct the embankment and subgrade to the contours and cross-sections shown on the plans.

The Contractor is advised that due to the phasing of the project and the probable unsuitability of some or all of the excavated material for use as approved fill material, there may be imbalances between the amount of earth cut which is suitable for reuse as fill, and the amount of earth needed to construct the lines and grades shown on the plans, or as directed by the Engineer. The Contractor shall make provisions for such imbalances and shall include in the bid price for this work the cost of importing/furnishing, placement, and compaction of the material, as well as the cost of stockpiling and re-handling of imported and/or on-site Engineer approved materials as necessary to complete the work of constructing the embankment and subgrade to the cross sections shown on the plans.

Subgrade Manipulation will be measured in square yards. Only areas designated by the Engineer as requiring subgrade manipulation will be measured for payment.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
SUBGRADE UNDERCUTTING

208

1 of 1

12/01/16

a. Description. This work shall include the removal of unsuitable subgrade material(s) which may be susceptible to frost heaving or differential frost action in the areas and limits identified by the Engineer, and backfilling to replace these material(s) and remedy unstable soil conditions. This work shall be done in accordance with section 205 of the Michigan Department of Transportation (MDOT) 2012 Standard Specifications for Construction, as directed by the Engineer, and as modified herein.

b. Materials. Provide materials in accordance with Granular Material Class II, and 21AA and 22A dense-graded aggregates as specified in section 902 of the MDOT 2012 Standard Specifications for Construction.

c. Construction. Construction methods shall be as described in subsection 205.03.E of the Standard Specifications for Construction, and as directed by the Engineer.

After the pavement has been removed, and/or after rough/finish grading, and/or at the time of proof rolling, the Engineer may inspect the grade to determine the need for, and the limits of, undercuts. After undercut areas are excavated to the depths as directed by the Engineer, the areas shall be trimmed, shaped, evenly graded and re-compacted to not less than 95% of the soils maximum unit weight as determined by the AASHTO T-180 test. The Contractor shall properly dispose of all excess materials.

Backfill areas of subgrade undercutting with Granular Material Class II, or 21AA or 22A dense-graded aggregates, as directed by the Engineer.

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

<u>Pay Item</u>	<u>Pay Unit</u>
208 - Subgrade Undercutting	Cyd

Basis of payment shall be as described in subsection 205.04 of the Standard Specifications for Construction.

CITY OF ANN ARBOR
 SPECIAL PROVISION
 FOR
SOIL EROSION AND SEDIMENTATION CONTROL

209

1 of 1

12/01/16

a. Description. This work consists of installing and maintaining inlet filters and silt fencing, as shown on the plans, in accordance with Section 208 of the Michigan Department of Transportation (MDOT) 2012 Standard Specifications for Construction and. Filters shall be installed in existing and proposed inlets in order to minimize the erosion of soil and the sedimentation of water courses. Silt fencing shall be installed on the downstream side of any exposed area with runoff potential to undisturbed areas. The related work includes the installation, maintenance and removal of the filter cloth or silt fencing, cleaning as required during the performance of the project work, removing and disposing of accumulated sediment, and replacement of filters or fencing if required by the Engineer so as to provide properly products and a well-drained site.

b. Materials. The inlet filters shall be in accordance with the REGULAR FLOW SILTSACK® manufactured by ACF Environmental (800) 448-3636; FLEXSTORM® Style FX manufactured by Advanced Drainage Systems, Inc. (800) 821-6710; CATCH-ALL® manufactured by Price & Company (866) 960-4300, or Engineer approved equal.

The Contractor shall submit product data sheets and a sample of the filter material for inlet filters for Engineer approval prior to ordering materials.

c. Methods of Construction. The Contractor shall install, maintain, clean, and re-install and/or replace inlet filters and silt fencing in accordance with the manufacturer's specifications and as directed by the Engineer. The Contractor shall dispose of debris off-site.

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

<u>Pay Item</u>	<u>Pay Unit</u>
209 - Erosion Control, Inlet Filter	Each
210 - Erosion Control, Silt Fence	Feet

Erosion Control, Inlet Filter will be measured by the unit installed and will be paid for at the contract unit price per each, for which price shall be payment in full for all labor, equipment, and materials needed to furnish, install, maintain, clean and remove the inlet filter, and re-install and/or replace the inlet filter as needed.

Erosion Control, Silt Fence will be measured by the feet installed and will be paid for at the contract unit price for linear feet of fence installed, for which price shall be payment in full for all labor, equipment, and materials needed to furnish, install, maintain, clean and remove the silt fence, and re-install and/or replace the silt fence as needed.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
TEMPORARY WATER MAIN LINE STOP

211

1 of 5

12/01/16

a. Description. The Contractor shall furnish all materials, labor and equipment to properly install and set water main line stops into the existing Ductile Iron Main(s) at the locations as shown on the plans and as directed by the Engineer. All work shall be performed in accordance with the requirements as detailed herein.

The existing mains, upstream and downstream of the proposed line stop(s) cannot be shut down or taken out of service. To ensure that the entire operation shall be accomplished without interruption of service or flow, the installation shall be accomplished by Contractor personnel skilled and experienced in the procedures specific to line stops of the required size(s).

The work shall include, but not be limited to; pavement saw-cutting; excavation and disposal of excavated material; the furnishing, installation, and removal of sheeting and/or shoring where needed; the furnishing, placement and compaction of approved bedding and backfill materials; furnishing and placing suitable, clean, gravel to create a stable working surface at the bottom of the excavation; de-watering; pipe cleaning, measuring, and performing all advance work necessary to prepare for the performance of the line stop; nighttime lighting as required; the removal of all materials and equipment associated with the work when no longer needed; and, any other items needed to complete the work as detailed on the plans and as specified herein.

b. Materials. Bedding and trench backfill materials and compaction requirements shall be in accordance with the detailed specifications, or the details shown on the plans. Granular Material Class II shall meet the requirements of section 902 of the Michigan Department of Transportation 2012 Standard Specifications for Construction. The Engineer shall approve any native materials to be placed as trench backfill.

Line Stops up to 12" in diameter shall be insertion valves from Team Industrial Services that will remain in service after completion of the work. Where shown, Team Valves will require a valve box per specification section 401.

The Contractor shall submit to the Engineer two (2) sets of drawings, furnished by manufacturers, fully and distinctly illustrated and describing the Line Stop fittings proposed to be furnished. Work shall not commence until such time as the drawings have been reviewed and accepted by the Engineer.

Line Stop Fittings shall be full encirclement, pressure retention type split tee. It shall consist of two steel weldments; an upper line stop flange saddle plate and a lower saddle plate. These two saddle plates shall be contiguous.

1. Line Stop Flange: The outlet of each fitting shall be machined from a 150 lb. forged steel flange (ASTM A181 or A105) or from pressure vessel quality steel plate (ASTM A285, Grade C); flat faced and drilled per ANSI B16.5). Suitable independently operated locking devices shall be provided in the periphery of the flange to secure the completion plug.

2. Line stop Nozzle: The nozzle, which lies between the saddle and the flange shall be fabricated from steel pipe (ASTM A234). After welding and stress relief, the nozzle shall be accurately bored as follows to accommodate the Line stop plugging head:
3. Machine an internal circular shoulder to seal against the circumferential gasket carried on the plugging head.
4. Completion Plug: The completion plug shall be machined from a stress relieved carbon steel weldment. It shall contain two (2) circumferential grooves: one to receive the locking devices from the Line stop flange, and the second to contain a compressible "O" ring to seal pressure tight against the bore of the flange.
5. Blind Flange: Each Line stop fitting shall be closed with a blind flange. Facing and drilling of the blind flange shall be compatible with that of the Line stop flange. Minimum blind flange thickness shall be that of AWWA Spec. 207, Class D.
6. Saddle Alignment Marking: Each saddle-half shall be matched and marked with serial numbers, to insure proper alignment in the field.
7. Fasteners: All bolts, studs, and nuts used on Line stop, drain/equalization fittings, blind flange, and other elements that shall remain upon completion of the work shall be stainless steel and meet the requirements of ASTM F 593.
8. General: Manufacturer will exercise extreme care to insure that weldments are of adequate strength, properly shaped, securely reinforced, and free from distortion that could stress the ductile iron main during installation, pressure tapping, or Line stopping operations. All steel shall meet the requirements of ASTM A36, as a minimum. All weldments shall be braced and stress relieved.
9. Gaskets: Shall be molded from elastomer compounds that resist compression setting and are compatible with water in the 32 to 140 deg. F temperature range.
10. Upper Line stop Flange Saddle: Shall consist of a saddle plate, a Line stop flange, and a Line Stop nozzle. The interior of the saddle plate, adjacent to and concentric with the O.D. of the nozzle, shall be grooved to retain a gasket which shall seal the saddle plate to the exterior of the ductile iron main. This gasket shall constitute the only seal between the main and the fitting. The flange saddle shall also meet the following requirements:
 - A. Saddle plate shall be of a minimum of 0.375" in thickness. It shall be shaped to be concentric to the outside of the ductile iron main. The smallest I.D. of the saddle and its interior rings shall exceed the O.D. of the main by a minimum of 0.250" to allow for ovality of the main.
 - B. Line stop nozzle of 0.375" min. wall thickness shall be securely welded to the saddle plate.
 - C. The Line Stop flange shall be securely welded to the nozzle. After welding, the assembly shall be braced, stress relieved, and bored to receive the completion plug and the circumferential gasket of the Line Stop machine plugging head.

D. Bolt, nut of stud, nut, and washer assemblies shall be furnished to draw the upper and lower saddles together for sealing. Bolting brackets shall be gusseted.

11. Lower Saddle Plate: Saddle plate shall be of a minimum 0.375" thickness and shall be shaped to be concentric to the outside brackets shall match upper half.

c. Construction. Installation of proposed line stops mains will require work in close proximity to existing utilities. This must be taken into consideration when the contractor determines the required trench safety requirements. All excavation shall conform to MIOSHA Standards; the Contractor is solely responsible for determining all excavation and trench safety requirements.

If necessary, The City will reduce the pressure to 100 psig or less for the duration of the installations. The entire operation of installing the line stop shall be accomplished without reduction of water pressure in the main(s) below 100 psig. It shall be the responsibility of the Contractor to verify pressure prior to commencing the installation.

1. Equipment. The equipment shall consist of a cylindrical plugging head that contains a flat, expandable elastomer sealing element. The plugging head shall be advanced into and retracted from the main by means of a linear actuator. When retracted, the plugging head and carrier are housed in an adapter, bolted pressure tight between the tapping valve and the actuator.

A. Sealing Element: The element shall be monolithically molded from a suitable polyurethane compound. The element shall be flat in a plane perpendicular to the flow in the main. Minimum thickness of the element shall be 4". The bottom of the element shall be semi-circular to conform to the bore of the main.

B. Drilling equipment: Shall be in good working condition, equipped with power drive to insure smooth cutting, and to minimize shock and vibration. Cutting equipment shall be carbide tipped and capable of being replaced without removal from the jobsite.

C. Plugging Head: The diameter of the cylindrical plugging head shall be slightly smaller than the bore of the Line Stop nozzle. The plugging head shall have a suitable circumferential gasket to seal against the shoulder in the Line stop nozzle. This gasket shall also seal against the sealing element to prevent bypass flow around the Line stop.

D. Deposits in Bore of Main: The semi-cylindrical bottom of the plugging head shall be designed to break and dislodge tuberculation and other deposits in the bore of the main which might interfere with a satisfactory Line stop.

2. Preliminary Field Inspection of Water Main:

A. Dimensional, specification, and other data regarding the existing mains have been taken from existing records. This information may be inaccurate, out of date, and/or inadequate. The data have not been verified by field inspections. Further, the water main consists of ductile iron pipe which may contain dimensional and structural flaws. In addition, the Contractor shall anticipate that exterior main conditions, bells, service connections, or presence of adjoining utilities may require relocation of proposed line

stop. Prior to proceeding with the installation of any line stop, it is necessary to know the exact main outside diameter of the water main, if it has any ovality, and the internal diameter of the pipe before line stop fittings and plugging head sealing elements can be manufactured and/or ordered.

B. Prior to ordering material, Contractor shall excavate at each proposed location and carefully measure the outside diameter of the water main with calipers along at least four (4) locations to determine ovality and the critical outside diameter of the water main. The Contractor shall determine main wall thickness, uniformity, and structural integrity by means of ultrasonic testing. Data shall be taken to determine extent of internal deposits, tuberculation, etc.

C. If the Engineer determines that Contractor's data are not adequate, the Engineer may direct Contractor to make one or more pressure taps on main to obtain test pipe coupons for the Engineer's evaluation. The minimum size of the test coupon shall be 5" diameter, drilled through a nominal 6" valve. Pressure tapping saddles and other materials used for inspection taps shall conform to the requirements of this Special Provision. The Contractor shall anticipate that heavy interior corrosion and/or tuberculation exists within the water main.

D. If, in Engineer's opinion, the proposed location is unsatisfactory based on measurements of the existing pipe at the locations of the proposed line stops, the Engineer will direct excavation at another site. Excavating, de-watering, inspections, backfill, and restoration will be paid for separately in accordance with the applicable contract unit prices or Section 109.05.C and 109.05.D whichever the Engineer deems most appropriate.

Because of possible internal corrosion and deposits in existing water mains, a "bottle-tight" shut down may not occur. A satisfactory shutdown which allows the work to be accomplished (i.e. valve replacement, water main tie-in, etc.) using drainage pumps to de-water excavations, with workmen wearing boots and raingear, if necessary, must be obtained. The Contractor will not be allowed to proceed with further work until an acceptable shutdown is achieved. The Contractor shall be aware that this may require the halting of work and re-scheduling of all work operations.

Contractor shall power wire brush and grind the exterior of the water main to remove any debris, corrosion deposits, or other surface irregularities that might interfere with proper seating and sealing of each line stop fitting against each main. Any structural defects in the water main, service connections, appurtenances, adjacent utilities, etc., that could interfere with the line stop installation shall be immediately reported to Engineer.

All line stop fittings and appurtenances shall be cleaned and disinfected in accordance with the current City of Ann Arbor Public Services Area Standard Specifications prior to bolting any of the line stop fittings in place or commencing any pipe cutting.

Contractor shall fit upper and lower saddle plate assemblies to main, thoroughly checking for proper fit to main. Under no circumstances shall Contractor attempt to force, reshape, or bend saddle plates by excessive tightening of saddle studs while the line stop fitting is assembled around the main. Any required retrofitting shall be accomplished with the fitting removed from the main. Any damage to fitting, accessories, or main shall be repaired at Contractor's expense to the satisfaction of Engineer.

Upper and Lower saddle halves shall be drawn together by bolt assemblies and the Saddle plates shall be bolted together in the horizontal position.

All line stop work shall be performed in accordance with the equipment manufacturers approved work procedures and installation guidelines.

Final closure of the water main shall be accomplished by insertion of a manufacturer-approved completion plug. The Contractor shall test the completion plug sealing through the use of a bleed off assembly in the machine housing.

The Contractor shall remove the temporary valve and the installation of a blind flange shall be completed.

The Contractor shall backfill water mains within the limits of the roadbed with granular material Class II. Place backfill in layers no greater than 10 inches thick and compact each layer to at least 95 percent of the maximum unit weight. Backfill water main outside the limits of the roadbed with Engineer approved granular or suitable material, compacted to 90% of the maximum unit weight, in lifts of 12 inches or less, unless otherwise noted on the plans.

The Contractor shall place polyethylene encasement meeting the requirements of the City of Ann Arbor Standard Specifications for Construction around the upper and lower saddle halves, the blind flange, and to a point at least 1 foot on either side of the saddle halves. All polyethylene encasement shall be securely taped to the water main such that water entry is minimized to the greatest extent possible.

Existing water main piping may not be restrained, thus exposing risk to having joints separate once line stop is installed and closed. When there is not space available to install the line stop 50 feet upstream of the proposed tie-in point,, the Contractor shall propose means for restraining the pipeline at the line stop through installation of thrusts blocks, sheeting or other means to fully restrain the pipe at the line stop and submit to the Engineer for approval prior to installation of the line stop.

d. Measurement and Payment. The completed work, as described, will be paid for at the contract unit price for the following pay item:

<u>Contract Item (Pay Item)</u>	<u>Pay Unit</u>
211 - Water Main, Team Insert Valve, 12 inch	Each
212 - Water Main, Line Stop, Temp, 14 inch.....	Each
213 - Water Main, Line Stop, Temp, 16 inch.....	Each

All work shall be paid in full at the contract unit prices which shall include all the labor, materials, and equipment required to perform the work as detailed herein. This shall also include all required costs associated with night time work, design and submittal of means of restraint, supplemental lighting, and all other required elements of the work.

Valve box shall be included in the cost of **Water Main, Team Insert Valve, __inch.**

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
WATER MAIN AND APPURTENANCES, REMOVE OR ABANDON

214

1 of 2

12/01/16

a. Description. This work shall include abandoning or removing existing water mains, valves, valve wells, valve boxes, and fire hydrant assemblies of various sizes as required by the Plans. All work shall be performed in accordance with the project plans, as detailed in this Special Provision, and as directed by the Engineer.

b. Materials. All materials shall meet the requirements specified in the following sections of the Michigan Department of Transportation (MDOT) 2012 Standard Specifications for Construction as follows:

Mortar Type II.....	Section 702
Granular Material, Class II	Section 902
Masonry Units	Section 913

Push-on joint plugs and thrust blocks shall conform to the requirements as detailed in the Special Provision entitled “Water Main and Appurtenances.”

Non-structural flowable fill grout shall be per the detailed specification.

c. Construction. The Contractor shall abandon water mains where shown on the Plans. This includes, but is not limited to, cutting the main at each end, plugging the live main at the end(s) with push-on joint plug(s) and thrust block(s), filling with non-structural flowable fill grout, plugging the abandoned main at its end(s) with brick and mortar, concrete, or mechanical joint plug, breaking down any manholes (remove manhole ring and cover and the top 4' of manhole structure, breaking out the manhole base, and backfilling as specified herein) in the abandoned line, removing and salvaging any valves and fittings, plugging the pipe in manholes with brick and mortar, concrete, or mechanical joint plugs.

In locations as shown on the Plans or where abandoned water main, valves or valve wells are within 30 inches of the proposed subgrade, the pipe, valves or valve wells shall be removed completely. The resulting hole or trench shall be backfilled with Granular Material Class II in maximum lifts of 10 inches, and be compacted to 95% of its maximum dry density, if located within the public rights-of-way, or within the influence of paved surfaces or structures. Otherwise, backfill shall be Engineer approved native material, compacted to 90% of its maximum dry density, in lifts of 12 inches or less, unless otherwise noted on the plans.

Abandoned (salvaged) or removed valves and fire hydrant assemblies shall be neatly stacked on-site in a single location so that City of Ann Arbor forces can retrieve them at a later date. The Contractor shall assist City forces by loading them into City trucks.

d. Measurement and Payment.- The completed work, as described, shall be paid at the contract unit prices respectively for the following pay items:

<u>Pay Item</u>	<u>Pay Unit</u>
214 - Water Main, Abandon	Foot
215 - Fire Hydrant, Rem.....	Each
216 – Gate Valve-in-Well, Abandon.....	Each
217 – Gate Valve-in-Box, Abandon.....	Each

Water Main, Abandon shall be measured and paid for by length in lineal feet and shall include all labor, materials, and equipment necessary to abandon or remove the pipe including, but not limited to, excavation, cutting of pipe, push-on joint plugs and thrust blocks, filling of pipes with non-structural grout, brick and mortar bulkheads, the furnishing, placement, and compaction of approved granular backfill material, as required, and the removal and proper disposal off-site of excess materials.

Water Main that is removed will not be paid for as a separate item. Water main that is incidentally removed during construction shall be paid for using the pay item **Water Main, Abandon**.

Fire Hydrant, Rem shall be paid for at the contract unit price for each unit removed and includes payment for storing, stockpiling, and loading hydrants into City vehicles, and for abandoning or removing the companion valve, as directed by the Engineer.

Gate Valve-in-Well, Abandon and Gate Valve-in-Box, Abandon shall be paid for at the contract unit price for each type of gate valve that is abandoned and shall include all labor, materials, and equipment necessary to abandon or remove the valve inside a well or box including, but not limited to, excavation, cutting of pipe and concrete, the furnishing, placement, and compaction of approved granular backfill material, as required, and the removal and proper disposal off-site of excess materials.

CITY OF ANN ARBOR
SPECIAL PROVISION
FOR
ADJUST STRUCTURE COVER

218

1 of 2

12/01/16

a. Description. This work shall include the final adjustment of structure covers in accordance with section 403 of the Michigan Department of Transportation (MDOT) 2012 Standard Specifications for Construction, as shown on the plans, and as specified herein. The adjustment of existing valve wells, existing valve boxes, and monument boxes will also be included in this item of work.

The Contractor shall also be required to coordinate the adjustment of private utility structure covers and ensure that the adjustment has been properly performed with the respective utility prior to placing any final paving materials.

b. Materials. In bituminous pavement areas, adjustments shall be made using MDOT HE, 8.4 sack concrete per Section 601. In areas of concrete pavement, adjustments shall be made at the time of paving and encased with the grade of concrete used in the roadway.

c. Construction. Structure Covers, monument boxes, water valve boxes and all other public utility underground access or control point covers shall be adjusted to conform to the finished surface section and elevation. The adjusting of castings in lawn areas shall be performed in a one-step process. The adjusting of castings in a bituminous pavement area shall be performed in two steps: step one is the lowering of the structure cover to below the subgrade elevation and plating of the structure; step two is the final adjustment to finish grade made prior to placing the bituminous wearing surface. In areas of concrete pavement, the final adjustment of the structure to finish grade shall be made at the time of concrete pavement forming. All structures in areas of concrete pavement shall be approved by the Engineer prior to the placement of any concrete pavement.

All structures final adjustment is to be to the elevation which results in their top surface being flush with the finished grade. The work is to be accomplished and checked by using a 10 foot straight edge that is placed parallel, and then perpendicular to, the pavement centerline. Failure to meet these conditions will result in the readjustment of the structure and finish patching of the area, as directed by the Engineer, at the Contractor's expense.

All private utility manholes and valve covers (Electric, Gas, Telecommunications, etc.) will be adjusted during this project by the Utility. It is the responsibility of the Contractor to coordinate with these private utilities by giving adequate notice and arranging for any adjustment of structures or valves by these utilities. It shall be the sole responsibility of the Contractor to ensure that this work is completed in a timely manner.

The Contractor shall replace all existing structures covers, top portions of valve boxes and monument boxes.

As directed by the Engineer and within two days of their removal, the Contractor shall stockpile on-site, in a location that is mutually agreeable to the Engineer and Contractor, the existing structure covers. The City of Ann Arbor's forces will pick-up the structure covers at a time that is convenient to them and mutually agreeable to the Contractor. The Contractor shall provide

the equipment and manpower to load the castings on the City's vehicle(s) so that they can be removed from the site by the City.

All adjustments in areas of proposed bituminous pavement shall be backfilled with MDOT HE, 8.4 sack concrete, from the depth of excavation necessary for adjustment, to an elevation 2 inches below the top flange or adjusted casting. This material shall be included in this item of work and will not be paid for separately.

Structure covers shall be adjusted to between flush and ¼ inch below final pavement surfaces.

There is a possibility that the Contractor may find hidden utility structures during the work. It is the Contractor's responsibility to inform the respective utility owner(s) of the findings. In such instances, the City may direct the Contractor to adjust the structure(s) to grade. This work will be paid as "Adjust Structure Cover."

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

<u>Pay Item</u>	<u>Pay Unit</u>
218 - Adjust Structure Cover	Each

Adjust Structure Cover will be measured and paid for at the contract unit price for each structure that is adjusted, which price shall be payment in full for all labor, equipment and material needed to accomplish this work.

Payment for adjusting for new drainage structures, new manholes, new valves-in-wells and new valves-in-boxes shall be included in the respective items and will not be paid for under this item. The work for adjusting these items, however, shall be performed in accordance with this special provision.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
SUBGRADE UNDERDRAIN

219

1 of 2

12/01/16

a. Description. The work shall include installing 6-inch geotextile-wrapped perforated or slotted underdrain in accordance with attached detail, as shown on the plans, as described herein, and as directed by the Engineer.

b. Material. The materials shall meet the requirements specified in section 404 of the Michigan Department of Transportation (MDOT) 2012 Standard Specifications for Construction, and as specified herein:

Fine Aggregate, 2NS.....	902
Underdrain Pipe, Perforated or Slotted.....	909.07.B

Geotextile (Filter Fabric) - The geotextile fabric for encasing the pipe shall be an approved material such as nylon, polypropylene, fiberglass, or polyester and shall be either woven, heat bonded, knitted or of continuous fibers. The geotextile shall completely cover and be secured to the pipe. In an unstretched condition, knitted polyester fabrics shall weigh at least 3.0 ounces per square yard and all other geotextiles shall weigh at least 3.5 ounces per square yard. The fabric shall be strong and tough and have porosity such that the fabric will retain soil particles larger than 0.106 mm (No. 140 sieve) and shall pass aggregate particles finer than 0.025 mm. Geotextiles shall be stored and handled carefully and in accordance with the manufacturer's recommendations and shall not be exposed to heat or direct sunlight to such extent as to significantly affect its strength or toughness. Torn or punctured geotextiles shall not be used.

c. Construction Methods. Geotextile-wrapped underdrain for subgrade drainage shall be installed as shown on the plans and as specified in section 404 of the 2012 MDOT Standard Specifications for Construction, with the following exceptions and additions:

1. The trench shall be constructed to have a minimum width of 18 inches and the underdrain shall be installed at the line grade and depth as indicated on the plans. The contractor shall maintain line and grade by means of a laser. The Engineer will not set line, grade or provide staking.
2. The trench shall then be backfilled with 2NS Fine Aggregate compacted to 95% of its maximum unit weight. The first lift of backfill material shall be placed at a maximum thickness of 3 inches. The second and subsequent lifts, or portions thereof, shall be placed at a maximum thickness of 12 inches up to an elevation level with the bottom of the existing aggregate base course, or as directed by the Engineer.
3. Upgrade ends of the pipe shall be closed with suitable plugs to prevent entrance of any material. All couplings, tees and other fitting shall be manufactured and installed so as to prevent infiltration of any material. If during the course of construction, existing edge drains are encountered; their ends shall be plugged to the satisfaction of the Engineer such that material can not enter the pipe(s).

4. Downgrade ends of the pipe shall generally be tapped into existing or new drainage structures. However, it may be necessary to tap underdrain into either existing or new storm sewer, or into existing or new inlet leads as directed by the Engineer.

5. The trench bottom and edge drain shall be constructed to the percent of grade indicated on the plans or as determined by the Engineer, with the minimum percent of grade being 0.5%. In addition, the underdrain shall be constructed to have a minimum cover, from top of pipe to finished pavement grade, of 36 inches.

6. During the construction of underdrain runs, it may be necessary to terminate construction due to conflicts with buried obstructions or at such time when the minimum cover is reached. The Engineer will review conflicts on a case by case basis and make a decision on whether to continue installing pipe or terminate runs prematurely. The Contract unit price will not be adjusted or additional payments made, for changes in the contract quantity due to Engineer ordered field changes associated when buried obstructions are encountered.

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

<u>Pay Item</u>	<u>Pay Unit</u>
219 - Underdrain, Subgrade, 6 inch, Special	Foot

Underdrain, Subgrade, 6 inch, Special, will be measured in length by feet and will be paid for at the contract unit price, which price shall be payment in full for all labor, equipment and material needed to accomplish this work.

The unit price shall include the cost of the 6-inch perforated or slotted pipe, geotextile wrap, pipe fittings and/or plugs, 2NS granular bedding material, compaction and trench backfill, taps to new and existing drainage structures and storm sewers or inlet leads, all excavation, final trimming required to meet the dimensions of the typical and specific cross-sections, and the disposal of all surplus excavated materials.

CITY OF ANN ARBOR
 DETAILED SPECIFICATION
 FOR
HMA APPLICATION ESTIMATE

220a

1 of 1

12/01/16

a. Description. The work shall be performed in accordance with the requirements of Division 5 of the Michigan Department of Transportation (MDOT) 2012 Standard Specifications for Construction, and as herein specified.

b. Materials.

PAY ITEM	HMA MIX	APPLICATION RATE	EST. THICKNESS	PERFORMANCE GRADE	AWI (min)
HMA, Approach	HMA, 5E10 (top)	220 lb/Syd	1.50"	PG 64-28	260
HMA, Approach	HMA, 4E10 (leveling)	220 lb/Syd	2.00"	PG 64-28	N/A
HMA, Approach	3E10 (base)	330 lb/Syd	3.50"	PG 58-28	N/A

The Performance Grade asphalt binder range for the HMA mixture shall be as noted above. The Bond Coat material shall be applied in accordance with the requirements of the Detailed Specification entitled "HMA Paving". The uniform rate of application shall be a minimum of 0.10 gallons per square yard, and be approved by the Engineer. This work will not be paid for separately, but shall be included in the cost of the HMA pay items.

c. Measurement and Payment. The work shall be measured and paid for as provided elsewhere in the contract documents.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
HMA PAVING

220B

1 of 3

12/01/16

a. Description. Hot Mix Asphalt (HMA) pavement base, leveling, and top courses shall be constructed in accordance with section 501 of the Michigan Department of Transportation (MDOT) 2012 Standard Specifications for Construction, except as modified herein, and as directed by the Engineer.

b. Materials. None specified.

c. Construction Methods.

1. Equipment: All equipment shall conform to subsection 501.03.A of the MDOT 2012 Standard Specifications for Construction, except as modified herein.

The Contractor shall have a 10 foot long straight edge, rubber-tired backhoe (Case 580 type, or equivalent), air-compressor with the ability to develop a minimum pressure of 100 pounds per square inch and continuous rated capacity of 150 cubic feet per minute of air flow, and jackhammer available during all paving operations. The Contractor shall be required to perform any miscellaneous cleaning, trimming, material removal, and other tasks as required by the Engineer in order to ensure the proper and orderly placement of all HMA materials on this project.

The Contractor shall provide sufficient rollers to achieve the specified asphalt densities.

At various times throughout the work, the Engineer may direct the Contractor to use smaller and/or lighter equipment, and to defer certain work tasks, in order to protect the grade and/or adjacent areas; including hauling units. The Contractor shall not be entitled to any additional compensation for the use of smaller equipment, lighter equipment, or work task deferral.

2. Cleaning and Bond Coat Application: Cleaning and bond coat application shall be performed in accordance with subsections 501.03.C and 501.03.D of the MDOT 2012 Standard Specifications for Construction, except as modified herein, and as directed by the Engineer.

The Contractor shall furnish and operate throughout the construction period, vacuum-type street cleaning and utility structure cleaning equipment (Vac-All, Vactor, etc.) approved by the Engineer, and when directed by the Engineer, for street cleaning immediately prior to, and for street and utility structure cleaning after any and all paving. The cleaning equipment shall be of sufficient power to remove dust, dirt, and debris from the pavement and from utility structures in and adjacent to the construction area. The vac-all or similar equipment and shall be approved by the Engineer prior to beginning the work. The equipment used shall have an effective means for preventing any dust resulting from the operation from escaping into the air.

The bond coat shall be applied at a rate of 0.10 gallons per square yard. Before placing the bond coat, the existing pavement surface shall be thoroughly cleaned. The Contractor shall also thoroughly clean all joints, cracks, and edges to a minimum depth of one inch with compressed air, vac-all type equipment, or other approved mechanical or hand methods, to remove all dirt, debris, and all foreign material.

3. HMA Placement: Placement shall conform to subsection 501.03.F of the MDOT 2012 Standard Specifications for Construction, except as modified herein, and as directed by the Engineer.

HMA placement shall not commence until a "Permit to Place" (no additional costs are required to obtain this permit) has been issued in writing by the Engineer. The Permit to Place shall be issued after the aggregate base course or the adjacent, underlying layer of pavement section has been approved by the Engineer.

The final structure adjustments must be approved by the Engineer prior to the issuance of the "Permit to Place" for the top course.

The top course shall be placed with a ¼" lip at the gutter edge of metal.

All HMA thickness dimensions are compacted-in-place.

4. Paving Operation Scheduling: The Contractor shall schedule the paving operation to avoid longitudinal cold joints that would be required to be left "open" over night.

In all cases, the Contractor shall pave the primary road's through-traffic lanes ("main line") first, from point-of-beginning to the point-of-ending. All other paving including, but not limited to; acceleration and deceleration lanes, intersection approaches, and center left-turn lanes shall be paved following completion of main line paving, unless authorized by the Engineer prior to the placement of any pavement.

5. Rate of Paver Operation: The rate of the paver's travel shall be maintained such that the paving operation will be continuous; resulting in no transverse cold joints, but shall never exceed the rate of 50 feet per minute.

The Contractor shall furnish and operate enough material, equipment, and hauling units so as to keep the paving machine(s) moving continuously at all times. Failure to do so shall be cause for the suspension of the paving operation until the Contractor can demonstrate to the satisfaction of the Engineer, that sufficient resources have been dedicated to perform the work in accordance with the project specifications.

6. Longitudinal and Transverse Joints: These joints shall conform to subsection 502.03.F of the MDOT 2012 Standard Specifications for Construction, and as specified herein.

For mainline HMA paving, the width of the mat for each pass of the paver shall be not less than 10.5 feet, or greater than 15 feet, except as noted in the plans and as directed by the Engineer. The Engineer will direct the layout of all HMA longitudinal joints during construction. Paving shall be scheduled to avoid longitudinal cold joints.

7. Feather Joints – shall be constructed so as to vary the thickness of the HMA from zero inches to the required paving thickness at the rate of approximately 1.5” over a distance of 5 to 15 feet, or as directed by the Engineer. The Contractor shall rake the larger pieces of aggregate out of feather joints prior to compaction.

8. Butt Joints: Construction of butt joints, where directed by the Engineer, shall conform to subsections 501.03.C.3 and 501.03.C.4 of the MDOT 2012 Standard Specifications for Construction, except as modified herein.

When a butt joint is specified or directed to be placed by the Engineer, remove the existing HMA surface to the thickness of the proposed overlay, or full-depth, as directed by the Engineer, for the full width or length of the joint. The HMA material shall be sawcut to the directed depth along the pavement edge or removal line to prevent tearing of the pavement surface. Cut joints that will be exposed in the completed surface must be cut with a saw or a cold-milling machine or other methods approved by the Engineer. Joints that will be covered by HMA must be cut with a saw, a cold-milling machine, or other methods approved by the Engineer.

Construction of butt joints, where directed by the Engineer, shall be measured and paid for as “Remove HMA Pavement”.

9. Rakers: The Contractor shall provide a minimum of two asphalt rakers during the placement of all wearing and leveling courses.

10. Faulty Mixtures: The Contractor and Engineer shall carefully observe the paving operation for signs of faulty mixtures. Points of weakness in the surface shall be removed or corrected by the Contractor, at his/her sole expense, prior to paving subsequent lifts of bituminous material. Such corrective action may include the removal and replacement of thin or contaminated sections of pavement, segregated HMA, and any sections that are weak or unstable. Once the Contractor or his representative is notified by the Engineer that the material being placed is out of allowable tolerances, or that there is a problem with the paving operation, the Contractor shall stop the paving operation at once, and shall not be permitted to continue placing bituminous material until again authorized by the Engineer. Any costs associated with meeting the requirements specified herein shall not be paid for separately, but shall be included in the item(s) of work being performed at the time the faulty mixture was discovered.

d. Measurement and Payment. Unused HMA remaining in trucks after the work is completed shall be returned to the plant and re-weighed, and the corrected weight slip shall be provided to the Engineer. No payment will be made for the unused HMA material. All weight slips must include the type of mixture (codes are not acceptable), as well as vehicle number, gross weight, tare weight and net weight.

<u>Pay Item</u>	<u>Pay Unit</u>
220 – HMA Pavement Base Course 3E10.....	Ton
221 – HMA Pavement Base Course 4E10 High Stress	Ton
222 – HMA Pavement Base Course 5E10 High Stress	Ton

All costs of meeting the requirements of this special provision shall be included in the bid prices for HMA items in the proposal and will not be paid for separately.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
ACCEPTANCE OF HMA MIXTURES

220C

1 of 4

12/01/16

a. Description. This special provision establishes acceptance criteria for HMA Mixtures on City of Ann Arbor projects. The HMA mixtures shall meet all the requirements of section 501 of the Michigan Department of Transportation (MDOT) 2012 Standard Specifications for Construction, except as modified herein.

b. Contractor Quality Control. The Contractor must have a quality control plan as required by subsection 501.03.M of the MDOT 2012 Standard Specifications for Construction, and as stipulated herein. The Quality Control (QC) Plan shall be submitted to the Engineer within 30 days of contract award or 14 days before the placement of any HMA materials, whichever date comes first. The QC Plan shall cover all aspects of HMA production, transportation, placement, and compaction. The Contractor shall have a QC representative on-site at all times during the paving operations to monitor and direct all paving-related operations. The placement of HMA shall not commence until such time as the QC Plan has been accepted by the Engineer. The Engineer's acceptance of the QC Plan shall not be construed as a basis of acceptance of any HMA materials, HMA placement results, or a waiver of any requirement(s) of the project specifications.

c. Materials. Aggregates, mineral filler (if required), and asphalt binder shall be combined as necessary to produce a mixture proportioned within the specification requirements including aggregate gradation; the mix design criteria including volumetric properties; the Superpave Gyrotory (SGC) compaction criteria; and the uniformity tolerances listed in Table 1. Topsoil, clay, or loam shall not be added to aggregates which are to be used in plant mixed HMA mixtures.

d. Mix Designs. The Contractor shall submit mix designs for evaluation in accordance with the Michigan Department of Transportation Hot Mix Asphalt Production Manual. All mix designs shall be submitted for review a minimum of 3 weeks prior to the anticipated placement of the HMA. The Contractor's production and paving schedules shall be considered to include the mix design review and approval process. Delays associated with the submittal, or re-submittal, of the required information shall not be a basis for an extension of contract time.

e. Construction. Target air voids shall be 4% in leveling courses, top courses and shoulders paved in the same operation as the leveling and top courses. Target air voids shall be 3% in base courses and shoulders not paved in the same operation as the leveling and top courses. Pedestrian paths shall have a target air void content of 3%.

After the job-mix-formula (JMF) is established, the parameters identified in Table 1 shall be maintained within the Range 1 tolerance limits of Table 1. If deviations are predominately below or above the JMF the Engineer may order alterations in the plant to bring the mixture into better conformance with the JMF.

Should the HMA furnished fail to meet the Range 1 acceptance criteria for any parameter, the Contractor shall suspend all operations. Contract time will continue during these times when the plant is down. Before resuming any production, the Contractor shall propose, for the Engineer's approval, all necessary alterations to the materials or plant so that the JMF can be maintained. The Engineer, after evaluating for effects on the AWI and mix design properties, will approve or disapprove such alterations.

Acceptance sampling and testing will be performed by the Engineer using the sampling method and testing option selected by the Engineer. Quality control measures to ensure job control are the responsibility of the Contractor.

The crushed particle content of the aggregate used in the HMA mixture shall not be more than 10 percentage points above or below the crushed particle content used in the JMF, nor less than the minimum specified for the aggregates in the contract documents.

Pavement density will be measured by the Engineer with a nuclear density gauge using the G_{mm} from the JMF for the density control target. The required in-place density of the HMA shall be between 92.0 and 96.0 percent of the density control target. The Contractor is responsible for establishing a rolling pattern that will achieve the required in-place density. Should the specified target densities not be met, the material shall be considered to have a Range 2 failure and shall be rejected. If the Engineer determines that the material is suitable to remain in place, a 50% reduction to the unit price of all material affected shall be enacted by the Engineer. Should the Engineer determine that the material cannot remain in place; the affected material will be removed and replaced at the Contractor's sole expense as detailed in the Section entitled "Price Adjustments".

Acceptance Criteria

Table 1 – Uniformity Tolerance Limits for HMA Mixtures

Parameter	Top and Leveling Courses		Base Course	
	*Range 1	Range 2	*Range 1	Range 2
Air Voids	± 0.60	± 1.00	± 0.60	± 1.00
VMA	± 0.60	± 1.00	± 0.60	± 1.00
G_{mm} (maximum specific gravity of mixture)	± 0.013	± 0.020	± 0.013	± 0.020
Fines to Effective Binder Ratio (this parameter is independent of JMF)	0.6 to 1.2	0.6 to 1.4	0.6 to 1.2	0.6 to 1.4
Binder Content	± 0.30	± 0.40	± 0.30	± 0.40
Percent Passing No. 8 and Larger Sieves	± 5.0	± 8.0	± 7.0	± 9.0
Percent Passing No. 30 Sieve	± 4.0	± 6.0	± 6.0	± 9.0
Percent Passing No. 200 Sieve	± 1.0	± 2.0	± 2.0	± 3.0
*This range allows for normal mixture and testing variations. The mixture shall be proportioned to test as closely as possible to the Job-Mix-Formula.				

The tolerances specified in Table 1, with the exception of the Fines to Effective Binder Ratio, reflect variations from the approved job-mix formula.

Extraction and volumetric tests will be performed by the Engineer to confirm conformance to the specifications and the tolerances identified in Table 1. The minimum number of field extractions to be performed shall be in accordance with Table 2. The Engineer may elect to perform a minimum of 3 extractions per mixture, per day, for quantities less than 1000 tons.

Table 2 – Minimum Number of Extractions

Quantity (tons) of Single Mixture Placed per Day	Minimum Number of Extractions per Mixture per Day
<250	0
250 - 1000	2
1000 - 1500	3
1500 - 2000	4
2000 - 2500	5
2500 - 3000	6

e. Rejected Mixtures. If more than one half the extractions and/or volumetric tests for a single mixture, batched on a single day, exceed the uniformity tolerance of Range 2 for any parameter in Table 1, or do not meet the minimum requirements for crushed particle content specified in the project documents, the mixture will be rejected.

If such mixtures are placed in a pavement, the remaining portions of the failing field samples (split samples) will be tested by an independent, accredited, private laboratory, the MDOT Region Laboratory, or the MDOT Central Laboratory (for the purposes of this contract, any of these laboratories can be considered a 3rd Party testing laboratory) to confirm the field test results. If necessary, to obtain additional HMA material, the Engineer will take pavement cores. The Contractor may only take cores if approved in writing by the Engineer. If the 3rd Party test results do not confirm the original field test results, then no price adjustments will be made for the mixture involved.

If the 3rd Party's test results confirm the original field test results and, if in the Engineer's judgment, the mixture warrants removal, the Contractor shall remove and replace the entire mixture placed on a given day, at the Contractor's expense, with a mixture meeting the specification requirements.

If the 3rd Party's test results confirm the original field test results and, if in the Engineer's judgment, the mixture can remain in place, the contract unit price for the entire mixture placed on a given day will be decreased as described in the Section entitled "Price Adjustments".

If no field extractions are performed on a given day because the quantity being placed is less than 250 tons, and if there is reason to believe that the mixture exceeds Range 2, or if the crushed particle content is less than the established criteria, based on test results from a different day, the price reduction may also be applied, or removal may be required, based on extraction tests performed by the Engineer from pavement cores.

f. Price Adjustments. If more than one half of the field extractions for a single mixture, batched on a single day, exceed the uniformity tolerance of Range 1, but not Range 2, for any parameter in Table 1, the contract unit price will be reduced by 10 percent. Field tests indicating that mixtures are subject to the 10 percent penalty will be confirmed by 3rd party testing as described in the Section entitled "Rejected Mixtures".

If more than one half of the field extractions for a single mixture, batched on a single day, meet or exceed the uniformity tolerance of Range 2 for any parameter in Table 1, the material shall be removed and replaced at the Contractor's sole expense. These costs shall be deemed to include all costs associated with the material removal and replacement including, but not limited to; costs associated with re-mobilization of labor and equipment; traffic control; removal and disposal of the rejected material; transportation costs to provide material meeting the requirements of the specification; and any other cost associated with the work. Contract time shall continue during the period of time that the rejected material is investigated and re-tested, as well as, during the removal and replacement operations.

If no field extractions are performed on a given day because the quantity being placed is less than 250 tons, and the Engineer believes that the mixture exceeds Range 1 tolerances based on test results from a different day, the price reduction may also be applied, or removal may be required, based on material tests performed by the Engineer's representative from pavement core(s).

The Contractor will be back-charged for additional testing performed by the Engineer associated with mixtures which are rejected or penalized.

CITY OF ANN ARBOR
 DETAILED SPECIFICATION
 FOR
CONCRETE CURB AND GUTTER, AND DRIVEWAY OPENINGS

223

1 of 2

12/01/16

a. Description. This work shall consist of constructing concrete curb and gutter, and concrete driveway openings in accordance with attached details, section 802 of the Michigan Department of Transportation (MDOT) 2012 Standard Specifications for Construction, as shown on the plans, and as specified herein.

b. Materials. The materials shall meet the requirements as specified in section 802 of the MDOT 2012 Standard Specifications for Construction and as specified herein:

The concrete mixture for Driveway Opening, Conc, Det M, Modified shall be Grade P-NC (658 lbs/cyd cement content) concrete with 6AA coarse aggregate.

All other concrete curb and gutter specified herein shall be Grade P1, 6-Sack with 6AA coarse aggregate. The Contractor may elect to add GGBFS to P1 mixtures in accordance with the requirements of the contract documents. No additional payment will be made for concrete mixtures containing GGBFS.

All concrete mixtures shall contain 6AA coarse aggregates which are either natural or limestone and meet the requirements of section 902 the MDOT 2012 Standard Specifications for Construction.

It shall be the Contractor's sole responsibility to propose specific concrete mix designs which meet the requirements of this Detailed Specification.

c. Construction. Construction methods shall be in accordance with section 802 of the MDOT 2012 Standard Specifications for Construction. Curb and Gutter, Conc shall be 2 feet wide barrier curb and gutter and constructed where shown in the plans.

Expansion joints of the thickness shown on the details shall be placed as directed by the Engineer.

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

<u>Pay Item</u>	<u>Pay Unit</u>
223 - Curb and Gutter, Conc,	Foot

The pay items will be measured in length by the foot and will be payment in full for all labor, equipment and material needed to properly complete this work.

At curb openings for sidewalk ramps, the concrete curb and gutter (without the curb face) will be measured and paid for at the contact unit price for curb and gutter.

Where the Engineer directs the use of high early strength concrete for pay items that are not specifically designated to use Grade HE – 8.4 sack concrete, the additional cement shall be paid for separately. No additional payment will be made for cement for pay items that are designated to use Grade HE – 8.4 sack concrete.

CITY OF ANN ARBOR
SPECIAL PROVISION
FOR
CONCRETE PLACEMENT AND PROTECTION

223A

1 of 2

12/01/16

a. Description. This work shall consist of furnishing all labor, material, and equipment needed to furnish, place, and protect all concrete material in accordance with the requirements of this special provision. These requirements shall not apply to concrete bridge decks, unless otherwise noted.

b. Materials. The concrete shall meet the requirements of sections 601 and 701 of the Michigan Department of Transportation (MDOT) 2012 Standard Specifications for Construction.

The Contractor shall propose specific concrete mix designs for the intended project purpose in accordance with the requirements of this special provision and other applicable special provisions and/or project requirements. The Engineer's acceptance of a mix design shall not relieve the Contractor of their responsibility for the manufacture of the concrete mixture(s), its placement, or performance.

c. Construction. The Contractor shall perform all concrete placement operations in weather that is suitable for the successful placement and curing of the concrete materials. Concrete shall not be placed during periods of active precipitation.

The Contractor shall complete all needed formwork, base and/or sub-base preparation, and any other related items that are deemed necessary for the proper completion of the work. The Contractor shall not commence the placement of concrete until they receive all needed approvals from the Engineer for placement. The Engineer's approval of the Contractor to place concrete shall not relieve the Contractor of their responsibility for the proper placement and protection of the concrete materials or its long-term performance.

During periods when precipitation is threatening, provide durable, plastic sheeting, approved by the Engineer, in sufficient quantity to cover and protect all freshly placed concrete such that precipitation does not come into contact with the concrete. The Contractor shall arrange the placement of the plastic sheeting such that the surface of any freshly placed concrete is not marred by contact with the plastic; any seams in the plastic sheeting shall be water tight. The Contractor shall place adequate supports along and over the freshly placed concrete to prevent contact of the plastic and concrete. The Contractor shall ensure that sufficient dams or barriers are placed along the edges of the freshly placed concrete to prevent erosion of the underlying materials or damage to the edges of the freshly placed concrete. All measures shall be effective.

Any concrete damaged by precipitation shall be removed and replaced at the Contractor's expense. The Engineer shall decide if the concrete has been damaged and the limits of removal and replacement.

Concrete shall only be placed when the rate of surface evaporation at the site is less than 0.20 pounds per square foot per hour, according to figure 706-1 of the MDOT 2012 Standard Specifications for Construction. The Contractor shall provide approved equipment for determining the relative humidity and wind velocity at the site.

Water shall not be added to the placed concrete in order to aid finishing. Any water added to the concrete for slump adjustments shall be done by adding water to the mixing unit and thoroughly re-mixing the concrete for 30 revolutions of the mixing unit at mixing speed. Water shall not be added such that the design water-to-cement ratio of the concrete mixture or the design slump of the concrete mix is exceeded.

Concrete curing shall be performed in accordance with subsection 602.03.M of the MDOT 2012 Standard Specifications for Construction. Curing operations shall take precedence over texturing operations and continued concrete placement. All curing compound applied shall provide uniform coverage over the entire surface being protected. The placement of curing compound shall be free of spots, blotches, or uncovered or non-uniformly covered areas. Should any areas be determined to exist by the Engineer, the curing compound shall be immediately re-applied by the Contractor at no additional cost to the project.

The Contractor shall take all precautions when placing concrete to protect it from damage due to the elements. Concrete shall not be placed during precipitation events.

Concrete shall be protected from weather and temperature according to the requirements of subsection 602.03.T MDOT 2012 Standard Specifications for Construction. Concrete shall not be placed when the temperature of the plastic concrete mixture itself is greater than 90° F. In conditions where low temperature protection is required, the Contractor shall cover the concrete with insulated blankets, or other means as approved by the Engineer, to protect the concrete from damage. The concrete shall remain protected until it has reached a compressive strength of at least 1000 psi, or as directed by the Engineer.

d. Measurement and Payment. All costs associated with the conformance to the requirements of this Special Provision will not be paid for separately, but shall be considered to be included in the respective items of work.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
CONCRETE SIDEWALK, SIDEWALK RAMPS, AND DRIVEWAY APPROACHES

224

1 of 2

12/01/16

a. Description. This work shall consist of constructing concrete sidewalks, sidewalk ramps, or driveway approaches of the types as indicated on the plans in accordance with attached details, and as directed by the Engineer. All work shall be in accordance with sections 801 and 803 of the Michigan Department of Transportation (MDOT) 2012 Standard Specifications for Construction, and as specified herein.

b. Materials. The materials shall meet the requirements as specified sections 801 and 803 of the MDOT 2012 Standard Specifications for Construction and as required herein. The concrete mixture for driveway approaches shall be Grade P-NC (658 lbs/yd³ cement content) as specified in section 601 of the MDOT 2012 Standard Specifications.

The grade of concrete for all remaining items covered by this Detailed Specification shall be Grade P1 as specified in section 601 of the 2012 MDOT Standard Specifications for Construction. The Contractor may elect to add GGBFS to P1 mixtures in accordance with the requirements of the contract documents. No additional payment will be made for concrete mixtures containing GGBFS.

All concrete mixtures shall contain 6AA coarse aggregates which are either natural or limestone and meet the requirements of section 902 of the MDOT 2012 Standard Specifications for Construction.

It shall be the Contractor's sole responsibility to propose specific concrete mix designs which meet the requirements of this Detailed Specification.

c. Construction Methods. The Contractor is responsible to construct all sidewalks, sidewalk ramps, curbs, and all other concrete items within ADAAG compliance. All sidewalk and curb ramps must be constructed in accordance with MDOT Standard Plan Series R-28.

Where concrete is to be placed, it shall be placed on a minimum of 4 inches of Granular Material Class II compacted to 95% of its maximum dry density.

Prior to placing any concrete, the subgrade shall be completed and trimmed to final elevation. If a cold joint is required, the existing concrete is to be cleaned with compressed air to expose the aggregate in the concrete.

Where indicated on the plans, the Contractor shall horizontally sawcut curbs to provide openings for sidewalk ramps. The Engineer shall define the extent of sawcutting both horizontally and vertically. This work will not be paid for separately, but shall be included in the corresponding price of the ADA ramp to be placed.

All sidewalk ramps shall be installed with detectable warning units. Reference the Detailed Specification entitled "Detectable Warning Surface" for additional requirements.

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

<u>Pay Item</u>	<u>Pay Unit</u>
224 - Sidewalk, Conc, ___ inch, Modified.....	Square Foot
225 - Sidewalk Ramp, Conc, ___ inch, Modified.....	Square Foot

The above items will be measured by area in square feet and be paid for at their respective contract unit price, which price shall be payment in full for all labor, equipment and material needed to accomplish this work. The unit price shall also include all costs associated with sawcutting curbs to provide openings for sidewalk ramps as indicated on the plans.

Where the Engineer directs the use of high early strength concrete for pay items that are not specifically designated to use Grade "P-NC" concrete, the additional cement shall be paid for separately. No additional payment will be made for cement for pay items that are designated to use Grade "P-NC." concrete.

Excavation for placement of Granular Material Class II bedding material shall be included in the item of work **Machine Grading, Modified**, and shall not be paid for separately.

Detectable warning units shall be paid for in accordance with the Detailed Specification for Detectable Warning Surface.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
FENCE, PROTECTIVE, MODIFIED

225

1 of 2

12/01/16

a. Description. This work shall consist of taking all reasonable measures to protect all existing trees and vegetation designated to remain and be protected within the project limits and the construction influence area, in accordance with subsection 201.03.A.2 and section 808 of the Michigan Department of Transportation (MDOT) 2012 Standard Specifications for Construction, except as specified herein. The work shall also consist of installing protective fencing at the limits of the construction area as shown on the plans or in areas directed by the Engineer.

b. Materials. Fabric shall be orange, vinyl, snow fence material, 4 feet tall. Posts shall be 6 foot long, T-shaped, metal posts or 2 inch square hardwood stakes.

c. Construction. Install protective fence at the limits of the construction area as shown on the plans or as directed by the Engineer.

The Contractor shall not operate equipment within the tree protection fence of any existing tree without the approval of the Engineer.

Construction material, supplies, or equipment shall not be stockpiled or stored within the limits of the tree protection fence.

Vehicles and personnel are not permitted within the limits of the tree protection fence.

The Contractor shall not attach chains, cables, ropes, nails, or other articles to any tree at any time.

Tree roots 1-1/2 inch or greater in diameter exposed during construction must be pruned. All pruning operations shall be reviewed and approved by the Engineer. All root pruning shall be performed with sharp tools and shall provide clean cuts that do not unnecessarily damage the remaining bark or root. The Contractor shall not perform any backfilling operations until all root maintenance has been performed.

Any damage to trees owned by the City of Ann Arbor or other trees designated to be protected due to the Contractor's activities or activities of the Contractor's subcontractors or suppliers shall be repaired under the direction of the City Forester by an approved forestry specialist. The costs of these repairs shall be the sole responsibility of the Contractor.

Should the Contractor's operations damage a plant's roots to the extent that it must be removed, the Contractor shall either replace the plant with a commensurate number of plants, 2½" caliper trees of the species as determined by the City, or compensate the City of Ann Arbor for the cash value of the plant or tree as determined by the City of Ann Arbor's Forester. The City of Ann Arbor shall be solely responsible for determining which compensation method is used.

The City Forester shall supervise the replacement of any trees at the sole expense of the Contractor.

Remove tree protection fence when directed by the Engineer.

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

<u>Pay Item</u>	<u>Pay Unit</u>
225 - Fence, Protective, Modified	Foot

Fence, Protective, Modified will be measured in length, by feet of protective fence used, and will be paid for at the contract unit price which shall be payment in full for all labor, materials, and equipment needed to accomplish this work. No additional payment will be made for maintenance or reinstallation of fence during the construction period. No additional payment will be made for repair or replacement of vegetation as noted above.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
DETECTABLE WARNING SURFACE

226

1 of 2

12/01/16

a. Description. This work shall consist of furnishing and installing cast in place detectable warning units in compliance to the Americans with Disabilities Act (ADA) Title 49 CFR Transportation, Part 37.9 Standards for Accessible Transportation Facilities, Appendix A, section 4.29.2 Detectable Warnings on Walking Surfaces. All work shall be in accordance with the Special Provision for “Concrete Sidewalk and Sidewalk Ramps”, section 803 of the Michigan Department of Transportation (MDOT) 2012 Standard Specifications for Construction, MDOT Standard Plan Series R-28, as indicated on the plans, and as modified herein.

b. Materials. The detectable warning tiles shall be colored as Federal Number 22144 (frequently referred to as “Colonial Red” or “Brick Red”).

American Society for Testing and Materials (ASTM) Test Methods B117, C1028, D543, D570, D638, D695, D790, D2486, D2565, D5420, and E84 will apply.

The detectable warning tiles shall meet the following material properties, dimensions, and tolerances using the most current test methods:

1. Length = 24”
2. Width = Full width of the approaching walk (60” for typical sidewalk)
3. Water Absorption: Not to exceed 0.35% when tested in accordance with ASTM-D570
4. Slip Resistance: 0.80 minimum combined wet/dry static coefficient of friction on top domes and field area, when tested in accordance with ASTM C1028.
5. Compressive Strength: 18,000 psi minimum, when tested in accordance with ASTM D695.
6. Tensile Strength: 10,000 psi minimum, when tested in accordance with ASTM D638.
7. Flexural Strength: 24,000 psi minimum, when tested in accordance with ASTM D790.
8. Chemical Stain Resistance: No reaction to 1% hydrochloric acid, urine, chewing gum, soap solution, motor oil, bleach, calcium chloride, when tested in accordance with ASTM D543 or D1308.
9. Wear Depth: 300 minimum, when tested in accordance with ASTM C501.
10. Flame Spread: 25 maximum, when tested in accordance with ASTM E84.
11. Gardner Impact: 50 in.-lbs. minimum, when tested in accordance with Geometry “GE” of ASTM D5420.
12. Accelerated Weathering of Tile when tested by ASTM-G155 or ASTM G151 shall exhibit the following result- $\Delta E < 6.0$ as well as no deterioration, fading or chalking of surface when exposed to 3000 hours minimum exposure.

- 13. Wheel Loading: The cast in place tile shall be mounted on a concrete platform with a ½” airspace at the underside of the tile top plate then subjected to the specified maximum load of 10,400 lbs., corresponding to an 8,000 lb individual wheel load and a 30% impact factor. The tile shall exhibit no visible damage at the maximum load of 10,400 lbs using AASHTO-HB17 single sheet HS20-44 loading “Standard Specifications for Highways and Bridges.”
- 14. Salt and Spray Performance of Tile and Adhesive System when tested to ASTM-B117 not to show any deterioration or other defects after 100 hours of exposure

Submit manufacturer’s literature describing products, installation procedures and maintenance instructions. Provide cast-in-place detectable surface tiles and accessories as produced by a single manufacturer.

Samples for Verification Purposes: Submit two (2) tile samples minimum 6” x 8” of the kind proposed for use. Samples shall be properly labeled and shall contain the following information: Name of Project; Submitted by; Date of Submittal; Manufacture’s Name; Catalog No.; and Date of Fabrication.

Material Test Reports: Submit current test reports from a qualified, independent, testing laboratory indicating that materials proposed for use are in compliance with requirements and meet the properties indicated. The required tests listed elsewhere in this Special Provision shall be performed by a certified and qualified independent testing laboratory on a cast-in-place tactile warning system. All test reports submitted shall be certified by the testing laboratory and shall clearly state that all tests were completed within 5 years of the date of the submittal. The manufacturer shall certify in writing that the materials provided to the project are manufactured with the same materials and manufacturing procedures as those used in the materials on which the test were performed.

c. Construction. Installer’s Qualifications: Engage an experienced Installer who has successfully completed tile installations similar in material, design, and extent to that indicated for this Project.

The contractor shall follow manufacturer specifications for installation, except where they conflict with MDOT Standard Plan Series R-28, or other project requirements.

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

<u>Pay Item</u>	<u>Pay Unit</u>
226 - Detectable Warning Surface, Modified	Foot

The unit price for this item shall include all labor, material, and equipment costs required to complete the work.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
SLOPE RESTORATION

227

1 of 2

12/01/16

a. Description. This work consists of preparing all manicured lawns and slopes on non-freeway projects designated for slope restoration on the plans or by the Engineer, and applying topsoil, fertilizer, seed, and mulch to those areas. Turf establishment shall be in accordance with section 816 of the Michigan Department of Transportation (MDOT) 2012 Standard Specifications for Construction and Standard Plan Series R-100, except as modified herein or otherwise directed by the Engineer.

b. Materials. The materials and application rates specified in sections 816 and 917 of the MDOT 2012 Standard Specifications for Construction apply unless modified by this special provision or otherwise directed by the Engineer.

1. Topsoil Surface: Place **4 inches** of topsoil in area disturbed areas to be restored. Topsoil shall be free of all stones one inch in diameter or greater.
2. Turf Seed Mixture: Use seed mixture type THM (Turf Loamy to Heavy).
3. Chemical Fertilizer Nutrient: Use Class A fertilizer.
4. Use Mulch Blankets on all areas to be restored. Mulch blankets shall be 100% coconut fiber (0.50 lbs/syd), with 100% biodegradable jute fiber netting (Top - 9.30lbs/1000sft, Bottom - 7.7lbs/1000sft).

c. Construction. Construction methods shall be in accordance to subsection 816.03 of the MDOT 2012 Standard Specifications for Construction. Begin this work as soon as possible after final grading of the areas designated for slope restoration but no later than the maximum time frames stated in subsection 208.03 of the Standard Specifications for Construction. It may be necessary, as directed by the Engineer, to place materials by hand.

Prior to placing topsoil, shape, compact and assure all areas to be seeded **are weed free**. Place topsoil to the minimum depth indicated above, to meet proposed finished grade. Remove any stones greater than or equal to 1 inch in diameter. If the area being restored requires more than the minimum depth of topsoil to meet finished grade, this additional depth must be filled using topsoil. Furnishing and placing this additional material is included in this item of work.

Topsoil shall be **weed and weed seed free** and friable prior to placing seed. Remove all stones from the topsoil greater than 1 inch in diameter. Apply seed mixture and fertilizer to prepared soil surface. Seed shall be incorporated into top ½ inch of topsoil.

If an area washes out after this work has been properly completed and approved by the Engineer, make the required corrections to prevent future washouts and replace the topsoil, fertilizer, seed and mulch blankets. This replacement will be paid for as additional work using the applicable contract items.

If an area washes out for reasons attributable to the Contractor's activity or failure to take proper precautions, replacement shall be at the Contractor's expense.

The Engineer will inspect the seeded turf to ensure the end product is well established, weed free, in a vigorous growing condition, and contains the species called for in the seeding mixture. **If areas do not promote growth, the Contractor shall apply new seed at its expense.**

If weeds are determined by the Engineer to cover more than ten percent of the total area of slope restoration, the Contractor shall provide weed control in accordance to subsection 816.03.J of the MDOT 2012 Standard Specifications for Construction. Weed control shall be at the Contractor's expense with no additional charges to the project for materials, labor or equipment.

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

<u>Pay Item</u>	<u>Pay Unit</u>
227 - Slope Restoration	Square Yard

Slope Restoration shall be performed in all areas disturbed by the Contractor to construct the Project as shown on the plans and as directed by the Engineer. The Contractor will restore areas disturbed by its operations not required by the Project at its own expense.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
AGGREGATES

228

1 of 2

12/01/16

a. Description. This work shall consist of constructing an aggregate subbase or base course on an existing aggregate surface, or on a prepared subgrade in accordance with Sections 301, 302 and 307 of the 2012 edition of the MDOT Standard Specifications for Construction, except as specified herein.

b. Materials. The materials used for this work shall be MDOT 21AA and Class II granular material meeting the requirements of the City of Ann Arbor Standard Specifications. Material for aggregate shoulders shall be MDOT 22A.

c. Construction. Sand or aggregate courses shall not be placed if, in the opinion of the Engineer, there are any indications that they may become frozen before their specified densities are obtained.

Sand or aggregate courses shall not be placed on a frozen base, subbase or subgrade.

The Contractor shall not use rubber-tired equipment on the grade, when its use causes, or may cause, in the opinion of the Engineer, damage to the grade. The Contractor shall conduct his/her operation(s), and provide all necessary equipment, to insure the satisfactory completion of the work without damaging the grade. This includes the transporting, stockpiling, rehandling, and movement of materials over additional distances, in lieu of driving on an unprotected, or partially unprotected, grade.

The Contractor is solely responsible for the maintenance and protection of the grade. Further, any damage to the grade which, in the opinion of the Engineer, is caused as a result of the Contractor's operation(s), or his/her subcontractors' or suppliers' operation(s), shall be repaired by the Contractor at the Contractor's expense. This includes any additional earthwork and/or maintenance materials as directed by the Engineer, for the purposes of the Contractor's maintenance and protection of the grade.

The Contractor shall shape the base, subbase and subgrade to the elevations, crowns, and grades as specified on the Plans and as directed by the Engineer. This may include regrading the subbase to provide different crown grades than those existing prior to the construction.

The Contractor shall remove, add to, re-shape, re-grade, and re-compact the existing roadbed materials, and shall construct the roadway to the cross-section(s) as indicated on the Plans, as detailed in the Specifications, and as directed by the Engineer. The Contractor shall use blade graders, maintainers, vibratory rollers, and/or other equipment as necessary, and as directed by the Engineer, for this work. Use of each specific piece of equipment is subject to the approval of the Engineer.

The Contractor shall maintain the base, subbase and subgrade in a smooth, well drained condition at all times.

Sand and aggregate courses shall be placed in uniform layers such that when compacted, they have the thicknesses shown on the Plans, or as directed by the Engineer. The loose measure of any layer shall not be more than 9-inches nor less than 4-inches.

Sand subbase and aggregate base courses shall be compacted to not less than 98% of their respective maximum unit weights, as determined by the AASHTO T-180 test.

All granular materials shall be deposited from trucks or through a spreader in a manner that will minimize segregation of material.

Manholes, valve boxes, inlet structures and curbs shall be protected from damage. Manholes & inlet structures shall be continuously cleaned of construction debris and properly covered at all times during the construction. Upon completion of each day's work, manholes, water valve boxes, inlets and catch basins shall be thoroughly cleaned of all extraneous material.

At various times throughout the work, the Engineer may direct the Contractor to use smaller and/or lighter equipment, and to defer certain work tasks, in order to protect the grade and/or adjacent areas. The Contractor shall not be entitled to any additional compensation for the use of smaller equipment, lighter equipment, or work task deferral.

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

<u>Pay Item</u>	<u>Pay Unit</u>
228 - Aggregate Base, 21AA, C.I.P.....	Cubic Yard
229 - Sand Subbase, CI II, C.I.P.....	Cubic Yard

The unit prices for these items of work shall include all labor, material, and equipment costs to perform all the work specified in the Standard Specifications and as modified by this Detailed Specification.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
MAINTAINING TRAFFIC

230

1 of 4

12/01/16

a. Description. Traffic shall be maintained by the Contractor throughout the project duration in accordance with the City of Ann Arbor Standard Specifications, subsection 104.11 and section 812 of the Michigan Department of Transportation (MDOT) 2012 Standard Specifications for Construction, the Michigan Manual of Uniform Traffic Control Devices (MMUTCD), applicable supplemental specifications, as directed by the Engineer, and as herein specified.

The following, and herein included, Michigan Department of Transportation (MDOT) Maintaining Traffic Typical and Work Zone Device Details apply to the project: m0020a, m0040a (excluding R5-18a and R5-18b signs), m0250a, m0370a, m0380a, m500a, WZD-100-A, and WZD-125-E.

These maintaining traffic provisions are subject to change in the event of special community activities.

The permanent pavement marking items are included in the contract and shall be placed per the MDOT 2012 Standard Specifications for Construction prior to the removal of any devices required to temporarily maintain traffic during construction, and also prior to opening the project to traffic.

b. Materials. Materials for all devices used to temporarily control and maintain traffic shall meet the requirements of section 812 of the MDOT 2012 Standard Specifications for Construction, the MMUTCD, and the applicable MDOT typicals and details included herein.

All signs shall be 48 inches by 48 inches, unless otherwise noted. Temporary signs, which are to remain in the same place for 14 days or more, shall be installed on driven posts. All other temporary signs may be installed on portable supports. All signs shall have a minimum bottom height of 7.0 feet.

Channelizing devices required for all lane closures shall be plastic drums.

c. Construction. Construction methods shall meet the requirements of section 812 of the MDOT 2012 Standard Specifications for Construction.

The Contractor shall provide Witness, Log, and Layout service per the MDOT frequently used special provision for logging the existing permanent pavement markings as part of this project prior to removals.

The Contractor shall furnish and place all necessary temporary traffic control devices to maintain traffic during construction. All work, construction equipment, and material storage shall be kept behind the curb, or behind barricades or channelizing devices, all in combination with protective fencing, if required to protect open excavations, and shall not in any way hamper vehicle movement or impair traffic vision. The contractor shall also provide protection to all uncured concrete sidewalk, driveways, and curb and gutter as may be needed until all traffic, either foot or otherwise, can cross without damage. Additional barricades and protective fencing shall be installed at the end of each day to insure no disturbance to the work area.

Distances between warning, regulatory, and guide signs as shown on the typical and details are approximate, and may require field adjustment, as directed by the Engineer.

The Contractor shall maintain two-way traffic on major streets, access for local traffic on local streets, and keep all intersections open to traffic at all times, unless specifically authorized in writing by the Engineer.

The Contractor shall maintain traffic such that no vehicle shall be required to drive into active work areas.

All temporary traffic/pedestrian control devices furnished by the Contractor shall remain the property of the Contractor. The City shall not be responsible for stolen or damaged signs, barricades, plastic drums and other traffic maintenance items. The Contractor shall replace missing and/or damaged traffic control devices immediately, at no additional cost to the City.

1. Construction Influence Area (CIA). The CIA shall consist of the width of the project right-of-way and easements, and to the furthest placed maintaining traffic device in either direction of Green Road and Plymouth Road.

The Contractor shall furnish, erect, maintain, and upon completion of the work, remove all traffic control devices within and around the CIA for the safety and protection of traffic. This includes, but is not limited to, regulatory and warning signs, barricades, channeling devices and other minor devices where required by the Engineer.

The Contractor shall coordinate its operations with all subcontractors, utilities, and/or other contractors performing work on this and other projects within, or adjacent to, the Construction Influence Area (CIA). The contractor shall avoid conflicts in maintaining traffic operations, signing, and orderly progress of other contract work.

2. Permits. Prior to the start of construction, the Contractor shall obtain a "Right-of-Way" Permit from City of Ann Arbor Customer Services Unit. The Contractor shall notify the Project Engineer and obtain a "Traffic Detour or Lane Closure" Permit from City of Ann Arbor Project Management Services Unit a minimum of 72 business hours prior to the implementation of any traffic shifts, lane closures and street closures. The fees for these permits will be waived.

3. Work Times and Restrictions. All work shall be conducted Monday through Saturday between 7:00am and 8:00pm; unless an alternate plan identifying the days and hours of work has been authorized by the City prior to commencement of construction. Night work for top course paving will be allowed subject to approval of the City. Should night work be required for any reason, the Project Engineer must be notified three (3) working days (72 hours) in advance of such work, and the work must have the approval of the City prior to commencement.

Only work of an emergency nature or work required to insure traffic safety shall be performed on Sunday and only with prior approval by the City.

No road work shall be performed nor traffic interruptions be permitted, including lane closures (other than staging already in place), on Sundays, and during the Memorial Day, July 4th, and Labor Day holiday periods. No work is allowed during the Ann Arbor

Art Fair. All streets and sidewalks that can be opened shall be opened. Trucking on or off site will not be permitted.

During non-working periods, any area with uncompleted work shall have plastic drums at specific locations and protective fencing, as directed by the Engineer, and at no additional cost to the project.

4. Traffic Restrictions. The Contractor shall, at all times, conduct its work to insure the least possible obstruction to traffic and inconvenience to the general public, businesses, and residents in the vicinity of the work.

Traffic on major streets, including Plymouth Road and Green Road, should not be impacted (except for lane closures in place for traffic staging) between the hours of 7:00 a.m. to 9:00 a.m. and from 3:30 p.m. to 6:00 p.m. unless otherwise approved by the Engineer or as specified on the Lane Closure Permit. All major changes in traffic control shall be made either between 9:00 a.m. and 3:30 p.m. or between 7:00 p.m. and 6:30 a.m. in order to minimize interference with rush hour traffic. Temporary obstruction of traffic for loading and unloading of trucks will not be permitted.

Access to businesses, residences, and side street(s) within the CIA shall be maintained for the duration of the project. The Contractor shall make every effort to coordinate its operations to minimize interruptions impacting this access. The Contractor shall notify the Project Engineer forty-eight (48) hours in advance of any work to be performed on or near business or residential driveways, and stage work so that it is part-width when it is necessary to work in these areas. Prohibiting access to businesses and residences will not be allowed during any phase of construction, and flagging will be required at the discretion of the Engineer.

A minimum of one lane of traffic in each direction must be maintained on Plymouth Road and Green Road at all times by use of signage and other traffic control devices unless otherwise authorized by the Engineer.

Lane width shall be a minimum of 10 feet wide. Contractor shall schedule work so that under no circumstances traffic is stopped. The work within the CIA shall be suspended, during peak traffic hours and/or when traffic is being unduly hampered or delayed by all construction activity, at the discretion of the Engineer.

Signal head adjustments will be needed at the Plymouth Road and Green Road intersection to facilitate stage construction. Coordinate with the City for temporary signal placements and adjustments.

Left turns at the Plymouth and Green Road intersection will be detoured during stage construction. Coordinate with the City for temporary signal placement at the Commonwealth Blvd intersections at Plymouth Road and Green Road.

5. Emergency Services. The Contractor shall notify local police, fire departments and emergency response units a minimum of three business days (72 hours) prior to the closure of any lanes, or traffic shifts causing restricted movements of traffic or restricted access. Fire hydrants in or adjacent to the work shall be kept "live" and fire fighting forces made aware of their availability at all times during construction.

d. Measurement and Payment. The completed work for maintaining traffic, as described, will be paid for at the contract unit prices for the following items in accordance with subsection 812.04 of the Standard Specifications for Construction.

<u>Pay Item</u>	<u>Pay Unit</u>
230 - Rem Special Mrkg.....	Sft
231 - Pavt Mrkg, Longit, 6 inch or Less Width, Rem.....	Ft
232 - Pavt Mrkg, Longit, Greater Than 6 inch Width, Rem	Ft
233 - Pavt Mrkg, Wet Reflective, Type R, Tape, 4 inch, White Temp.....	Ft
234 - Pavt Mrkg, Wet Reflective, Type R, Tape, 4 inch, Yellow Temp.....	Ft
235 - Sign Cover	Each
236 - Barricade, Type III, High Intensity, Double Sided, Furn.....	Each
237 - Barricade, Type III, High Intensity, Double Sided, Oper	Each
238 - Lighted Arrow, Type C, Furn.....	Each
239 - Lighted Arrow, Type C, Oper	Each
240 - Plastic Drum, High Intensity, Furn	Each
241 - Plastic Drum, High Intensity, Oper.....	Each
242 - Sign, Portable, Changeable Message, Furn.....	Each
243 - Sign, Portable, Changeable Message, Oper	Each
244 - Sign, Type B, Temp, Prismatic, Furn.....	Square Foot
245 - Sign, Type B, Temp, Prismatic, Oper	Square Foot
246 - Sign, Type B, Temp, Prismatic, Special, Furn	Square Foot
247 - Sign, Type B, Temp, Prismatic, Special, Oper.....	Square Foot
248 - Witness, Log, Layout, \$1,000	Dlr
249 - Traf Regulator Control	Lump Sum
250 - Minor Traffic Control, Max \$_.....	Lump Sum

The estimated quantities for maintaining traffic are based on the signing and related traffic control devices deemed necessary for this project as shown on the applicable MDOT Maintaining Traffic Typical, and include traffic regulators, lighted arrows and minor traffic devices.

Payment for traffic control devices shall be based on the maximum quantity in place at any one time during the project, as determined by the Engineer. Non-standard specially fabricated signs, other than those used to determine the maximum square feet of signage, will be paid for separately by the unit square foot for each sign furnished and operated during construction.

Any additional signing or maintaining traffic devices required to expedite the construction shall be at the Contractor's expense.

Temporary traffic control devices will be paid for only once irrespective of the number of times moved. Traffic control devices not paid for separately shall be included in the payment for the pay item "Minor Traffic Control, Max \$_".

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
TEMPORARY PEDESTRIAN TYPE II BARRICADE

251

1 of 2

12/01/16

a. Description. This work consists of furnishing, installing, maintaining, relocating, and removing a temporary pedestrian Type II barricade section as identified in the proposal or on the plans. Use temporary pedestrian Type II barricades to close non-motorized facilities including sidewalks, bicycle paths, pedestrian paths, and shared use paths that are not part of the roadway. One pedestrian Type II barricade is defined as a barricade section at least 4 feet wide, including all supports, ballast, and hardware.

b. Materials. Provide a temporary pedestrian Type II barricade that meets the requirements of *National Cooperative Highway Research Program Report 350 (NCHRP 350)* or *Manual for Assessing Safety Hardware (MASH)*, in addition to meeting the following requirements:

1. Provide barricade sections at least 4 feet wide, designed to interconnect to ensure a continuous *Americans with Disabilities Act (ADA)* compliant tactile barrier. Ensure the connection includes provisions to accommodate non-linear alignment as well as variations in elevation at the installation area.

2. Ensure the top surface of the barricade is designed to function as a hand-trailing edge, and has a height between 32 and 38 inches. Ensure the lower edge of the barricade is no more than 2 inches above the surface of the non-motorized facility. Ensure the top edge of the bottom rail of the barricade is a minimum of 8 inches above the surface of the non-motorized facility. The barricade may have a solid continuous face. Finally, all features on the front face of the barricade (the face in contact with pedestrians) must share a common vertical plane.

3. Equip both sides of the barricade with bands of alternating 6-inch wide orange and white vertical stripes of reflective sheeting. Two bands of sheeting 6 inches tall and a minimum of 36 inches long containing at least two orange and two white stripes each are required. One band placed near the top and one near the bottom if the barricade section has a solid face. If the barricade consists of two rails, affix one band of sheeting to each rail. Ensure the stripes of reflective sheeting are aligned vertically. Ensure this sheeting meets or exceeds the requirements of *ASTM D 4956* Type IV sheeting.

c. Construction. Construct the temporary pedestrian Type II barricade in accordance with the manufacturer's recommendations, Michigan Manual on Uniform Traffic Control Devices (MMUTCD), the plans, and the following requirements:

1. Install the barricade as shown on the plans and as directed by the Engineer. Interconnect all barricade sections using hinge components if necessary to ensure a continuous detectable edge for the entire installation. Ensure the barricade is ballasted according to the manufacturer's recommendations to ensure stability during wind events and contact with pedestrians.

2. When the barricade is installed near motor vehicle traffic, ensure reflective sheeting is visible to motorists.

3. When pedestrian Type II barricades are used to close a non-motorized facility, ensure a sufficient number of barricade sections are used to block the entire width of the facility. The barricade may extend outside the edge of the non-motorized facility but must not be less than the full width of the facility.

4. If sections of multiple colored barriers are used (i.e. safety orange and white) install the sections such that the colors alternate to increase conspicuity.

5. Ensure pedestrian Type II barricades are not used to close a motor vehicle facility. Ensure these barricades are not used to guide pedestrian traffic on a motor vehicle facility in the presence of active traffic. This prohibition includes bicycle/shared use lanes or shoulders in the presence of active traffic.

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

Pay Item	Pay Unit
251 - Pedestrian Type II Barricade, Temp, Furn & Oper.....	Each

Pedestrian Type II Barricade, Temp, Furn & Oper includes all labor, equipment, and materials to furnish, install, maintain, relocate, and remove one barricade section that is at least 4 feet wide. Additional payment will not be made if wider sections are provided. This includes all rails, supports, ballast, hinge points, reflective sheeting, and miscellaneous hardware needed to install and maintain a barricade section.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
TEMPORARY PEDESTRIAN TYPE II CHANNELIZER

252

1 of 2

12/01/16

a. Description. This work consists of furnishing, installing, maintaining, relocating, and removing temporary pedestrian channelizers as identified in the proposal or on the plans. Use temporary pedestrian channelizers to guide pedestrians along a temporary non-motorized facility, and to create separation of pedestrians from construction areas near existing facilities. Replace damaged temporary pedestrian Type II channelizers as directed by the Engineer.

b. Materials. Provide a temporary pedestrian channelizer that is crashworthy according to the *National Cooperative Highway Research Program Report 350* (NCHRP 350) or *Manual for Assessing Safety Hardware* (MASH), in addition to meeting the following requirements:

1. Ensure the channelizer is designed to interconnect to maintain continuous delineation along the entire installation. This includes provisions to accommodate non-linear alignment as well as variations in elevation.

2. Ensure the top surface of the channelizer is designed to function as a hand-trailing edge, and have a height between 32 and 38 inches. Ensure this top surface is designed to have a 2 inch horizontal gap between the top edge and the support (if so equipped), to allow for continuous hand-trailing without obstructions. Ensure the lower edge of the channelizer is no more than 2 inches above the surface of the non-motorized facility. Ensure the top edge of the bottom rail of the channelizer is a minimum of 8 inches above the surface of the non-motorized facility or the channelizer may have a solid continuous face. Finally, all features on the front face of the channelizers (the face in contact with pedestrians) must share a common vertical plane.

3. Equip both sides of the channelizer with bands of alternating 6-inch wide orange and white vertical stripes of reflective sheeting. Two bands of sheeting 6 inches tall and a minimum of 36 inches long containing at least two orange and two white stripes each are required. One band placed near the top and one near the bottom if the channelizer section has a solid face. If the channelizer consists of two rails, affix one band of sheeting to each rail. Ensure the stripes of reflective sheeting are aligned vertically. Ensure this sheeting meets or exceeds the requirements of *ASTM D 4956* Type IV sheeting.

c. Construction. Deploy the temporary pedestrian Type II channelizer in accordance with the manufacturer's recommendations, the Michigan Manual on Uniform Traffic Control Devices (MMUTCD), the plans, and the following requirements:

1. Install the channelizer as shown on the plans and as directed by the Engineer. Interconnect all channelizers using hinge components if necessary to ensure a continuous detectable edge for the entire installation. Ensure the channelizers are ballasted according to the manufacturer's recommendations to ensure stability during wind events and contact with pedestrians.

2. When the channelizers are installed near motor vehicle traffic, ensure reflective sheeting is visible to motorists providing appropriate delineation for the pedestrian path.

3. If sections of multiple colored barriers are used (i.e safety orange and white), install the sections such that the colors alternate to increase conspicuity.

4. Ensure temporary pedestrian Type II channelizers are not used to guide pedestrian traffic on a motor vehicle facility in the presence of active traffic. This prohibition includes bicycle/shared use lanes or shoulders in the presence of active traffic. Ensure temporary pedestrian channelizers are not used to channelize motor vehicle traffic, or separate motor vehicle and pedestrian traffic.

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

Pay Item	Pay Unit
252 - Pedestrian Type II Channelizer, Temp	Foot

Pedestrian Type II Channelizer, Temp includes all labor, equipment, and materials to furnish, install, maintain, relocate and remove rails or wall sections, supports, ballast, and hinge points at the locations shown on the plans. This includes all rails or wall sections, supports, ballast, hinge points, and miscellaneous hardware needed to construct the channelizer or system of channelizers.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
TEMPORARY PEDESTRIAN PATH

253

1 of 2

12/01/16

a. Description. This work consists of furnishing, installing, maintaining, relocating, and removing a temporary pedestrian path as identified in the proposal or on the plans. Temporary pedestrian paths, or segments thereof, will be repaired or replaced as directed by the Engineer.

b. Materials. Provide materials to construct a temporary pedestrian path in accordance with the contract, the *Public Right of Way Accessibility Guidelines (PROWAG)*, the *Michigan Manual on Uniform Traffic Control Devices (MMUTCD)*, as directed by the Engineer, and the following requirements:

1. Ensure the materials used to construct the temporary pedestrian path yields a continuous hard surface that is firm, stable and skid resistant. Ensure the path does not warp, buckle or otherwise become uneven, and materials support the weight of pedestrians as well as motorized scooters and wheelchairs. Suitable materials to construct the path include asphalt materials, Oriented Strand Board (OSB), plywood, dimensional lumber, reclaimed, or other as approved by the Engineer. Compacted soils, aggregate and sand are prohibited.

2. If asphalt materials are not used to construct the path, provide an antiskid coating, or surface treatment as directed by the Engineer.

c. Construction. Construct the temporary pedestrian path in accordance with *PROWAG*, the *MMUTCD*, the contract, the direction of the Engineer, and the following:

1. The useable surface of the path must be a minimum of 48 inches wide, additional width may be provided to preclude the use of Temporary Pedestrian Passing Spaces (paid for separately). A minimum width of 60 inches is required if Temporary Pedestrian Passing Spaces are not provided as part of the temporary facility. The maximum cross slope for the path is 2 percent. The path, including transitions to the adjacent surface at both ends, must be free of vertical discontinuities greater than 1/4 inch. Eliminate any vertical discontinuities greater than 1/4 inch up to 1/2 inch or bevel with a slope not steeper than 1:2. If a vertical discontinuity greater than 1/2 inch or a running slope greater than 1:20 occurs on the project, a Temporary Pedestrian Ramp (paid for separately) is required.

A. Ensure an anti-skid surface treatment is applied to the surface of the path, if not constructed with asphalt materials, as directed by the Engineer.

B. If the surface of the path is constructed from OSB, plywood, or dimensional lumber securely connect all sections with appropriate fasteners to ensure a continuous, uniform and flat surface.

2. Ensure all debris and construction materials is cleared from the path throughout its use. Ensure snow and ice is removed; the use of an approved de-icing agent may be required.

3. Repair or replace the path, or segments thereof, if it becomes uneven, unstable, or displaces due to weather events, construction activities, or other causes as directed by the Engineer.

4. Following the use or relocation of the temporary path, the Contractor must remove all materials used to construct the path, and restore the area as directed by the Engineer.

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

Pay Item	Pay Unit
253 - Pedestrian Path, Temp	Foot

Pedestrian Path, Temp will be measured along the centerline of the path. **Pedestrian Path, Temp** includes all costs related to installation, maintenance, relocation, restoration, and removal of the path and all associated materials throughout the life of the contract.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
TEMPORARY PEDESTRIAN RAMP

254

1 of 2

12/01/16

a. Description. This work consists of furnishing, installing, maintaining, relocating, and removing a temporary pedestrian ramp as identified in the proposal or on the plans. Use temporary pedestrian ramps to facilitate pedestrian travel on accessible facilities over curbs or other uneven terrain features with a vertical difference of 1/2 inch or greater. Damaged pedestrian ramps will be replaced as directed by the Engineer.

b. Materials. Provide materials to construct a temporary pedestrian ramp in accordance with the *Americans with Disabilities Act (ADA)*, the standard specifications, and the following:

1. Ensure the material used to construct the temporary pedestrian ramp is firm, stable, skid resistant, and forms a continuous hard surface. Ensure the surface does not warp, buckle or otherwise become uneven, and materials support the weight of pedestrians as well as motorized scooters and wheelchairs. Suitable materials to construct the surface of the ramp include asphalt materials, Oriented Strand Board (OSB) or plywood, dimensional lumber, certain reclaimed or other materials as approved by the Engineer. Compacted soils, aggregate and sand are prohibited.

2. Provide a handrail on both sides of the ramp if the ramp is not exposed to vehicle traffic and has a total rise greater than 6 inches, and a length greater than 72 inches. Ensure the handrail is between 1.25 and 1.5 inches wide and configured to be a “graspable” cross-section. See construction subsection 2.A for additional details. When the ramp is exposed to traffic, in lieu of handrails, use a protective edge 2.5 inches minimum height above the ramp surface or 1:10 flare on both sides of the ramp.

3. Ensure the surface of the ramp is free draining; in addition provide features that allow drainage to move past the ramp installation (i.e. along the gutter pan underneath the ramp if the ramp is installed on a curb).

4. Provide materials to construct detectable edging along open sides of the ramp if required.

5. If asphalt materials are not used to construct the surface of the ramp, provide an antiskid coating or surface treatment approved by the Engineer.

c. Construction. Construct the temporary pedestrian ramp in accordance with the manufacturer’s recommendations (if applicable), *ADA*, the plans, and the following:

1. Ensure the useable surface of the ramp is 48 inches wide and does not deflect due to pedestrian traffic. Ensure an anti-skid surface treatment is applied to the useable area of the ramp if it is not made from asphalt materials. The maximum cross slope of the ramp is 2 percent. Ensure both ends of the ramp smoothly transitions to the adjacent surface, with 1/4 inch or less vertical difference.

Construct the ramp to maintain a longitudinal slope from 1:10 to 1:12 where possible. Otherwise, a longitudinal slope from 1:8 to 1:10 may be used for a maximum rise of 3 inches. Temporary pedestrian ramps with longitudinal slopes greater than 1:8 are prohibited.

A. Provide a handrail on both sides of the ramp if required as stated herein. Ensure the top of the handrail is between 34 and 38 inches above the surface of the ramp. Ensure a minimum width of 36 inches is maintained between the handrails, with a minimum clearance of 1.5 inches behind and 18 inches above.

Construct the handrail such that the bending stress applied by a bending moment created by a 250 pound force is less than the allowable stress for the materials and the construction of the handrail. Construct the handrail to withstand the shear stress induced by a 250 pound force. Ensure all fasteners, mounting devices and support structures are also able to withstand shear stress induced by a 250 pound force.

2. Construct a detectable edging anytime a handrail is required, and anytime the path changes direction. This includes a turn onto the ramp from the path. Detectable edging must begin a maximum of 2.5 inches above the ramp surface, and extend at least 6 inches above the ramp surface.

3. Ensure a clear space (minimum 48 inches by 48 inches) is provided above and below the ramp.

4. Avoid locating ramps in areas of drainage collection, ponding or running water, which can produce slippery or unsafe conditions. If the ramp is located over a gutter pan or other drainage structure, provide features to facilitate water movement around or under the ramp as approved by the Engineer.

5. Ensure all debris and construction material is cleared from the surface of the ramp throughout its use. Ensure snow and ice is removed; the use of an approved de-icing agent may be required. Repair or replace the ramp if it becomes uneven, unstable, or displaces due to weather events, construction activities, or other causes as directed by the Engineer.

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

Pay Item	Pay Unit
254 - Pedestrian Ramp, Temp	Each

Pedestrian Ramp, Temp includes all labor, equipment, and materials to furnish, install and remove a temporary pedestrian ramp at the locations shown on the plans, as well as all costs for maintaining, clearing debris, deicing, reconfiguring, and relocating the temporary pedestrian ramp throughout the life of the contract.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
PAVEMENT MARKINGS

255

1 of 2

12/01/16

a. **Description.** This work consists of providing and placing permanent pavement markings in accordance with the Michigan Manual on Uniform Traffic Control Devices. Provide markings, legends, symbols, spacing, and dimensions that conform to the plans, the City of Ann Arbor Standard Specifications, 2012 Michigan Department of Transportation Standard Specifications for Construction, and as specified herein.

Materials Provide materials in accordance with Sections 811 and 920 of the 2012 Michigan Department of Transportation Standard Specifications for Construction. Provide the Material Safety Data Sheets to the Engineer for required materials and supplies. Dispose of unused material and containers in accordance with the Federal Resource Conservation Recovery Act (RCRA) of 1976 as amended, and 1994 PA 451, Part 111 Hazardous Waste Management. Provide samples of permanent pavement marking materials upon request.

Thermoplastic materials provided shall be in accordance with Section 920 Sprayable Thermoplastic Pavement Marking Material

b. **Construction.** The preparation and placement of permanent pavement markings shall conform to Section 811 of the 2012 MDOT Standard Specifications for Construction, the City of Ann Arbor Standard Specifications, the plans, and as specified herein.

All permanent markings are to be recessed in accordance with Detailed Specifications included in the contract documents.

c. **Measurement and Payment.** The measurement and payment for thermoplastic pavement markings shall be in accordance with Section 811.04 of the 2012 MDOT Standard Specifications for Construction, the City of Ann Arbor Standard Specifications, the plans, and as specified herein.

The unit prices for these items of work shall include all labor, material, and equipment costs to perform all the work specified in the Sections 811 and 920 of the 2012 MDOT Standard Specifications and as modified by this Detailed Specification.

The completed work as measured for these items of work will be paid for at the Contract Unit Price for the following Contract (Pay) Items:

<u>PAY ITEM</u>	<u>PAY UNIT</u>
255 - Pavt Mrkg Hot-Applied Thermoplastic 4 inch White	Each
256 - Pavt Mrkg Hot-Applied Thermoplastic 4 inch Yellow	Each
257 - Pavt Mrkg Hot-Applied Thermoplastic 6 inch White	Each
258 - Pavt Mrkg Hot-Applied Thermoplastic 8 inch White	Each
259 - Pavt Mrkg Overlay Cold Plastic White Bike Arrow.....	Each
260 - Pavt Mrkg Overlay Cold Plastic White Bike Symbol.....	Each
261 - Pavt Mrkg Overlay Cold Plastic White L Arrow.....	Each
262 - Pavt Mrkg Overlay Cold Plastic White R Arrow	Each
263 - Pavt Mrkg Overlay Cold Plastic White Thru Arrow	Each
264 - Pavt Mrkg Overlay Cold Plastic, 4 inch, White.....	Feet
265 - Pavt Mrkg Overlay Cold Plastic, 12 inch, Yellow	Feet
266 - Pavt Mrkg Overlay Cold Plastic, 12 inch, Crosswalk.....	Feet
267 - Pavt Mrkg Overlay Cold Plastic White 24 inch, Stop Bar	Feet

All work indicated herein shall be included in the unit prices for the above pay items and shall include all labor, materials and equipment required to complete the work.

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
RECESSED PAVEMENT MARKINGS

268

1 of 2

01-01-17

a. Description. This work consists of providing all equipment and labor required to prepare (grooving) the pavement surface for recessed longitudinal, transverse, and turning guide line pavement markings in accordance with section 811 of the Standard Specifications for Construction, the plans, and this special provision.

b. Materials. None specified.

c. Construction. Install a recess (groove) in accordance with the pavement marking material manufacturer's installation instructions. Ensure all recessing configurations are in accordance with the *Michigan Manual of Uniform Traffic Control Devices* and the Department Pavement Marking Standards.

1. Grooving Concrete and Hot Mix Asphalt Pavement. If there are no markings on the pavement, paint a temporary tracer line (with no beads) exactly where the permanent markings will be placed. Use these lines as a template for the grooving operation.

Use equipment and methods approved by the manufacturer of the pavement marking material to be recessed for forming grooves in pavement surfaces. Dry-cut the grooves in a single pass using stacked diamond cutting heads on self-vacuuming equipment capable of producing a finished groove ready for pavement marking material installation.

Ensure that the bottom of the groove has a fine corduroy finish. If a coarse tooth pattern results, increase the number of blades and decrease the spaces on the cutting head until the required finish is achieved.

2. Groove Dimensions. Ensure grooves for recessed pavement markings are in accordance with the following:

Longitudinal Markings

Groove Width:	Material width +1 inch, ($\pm 1/8$ inch)
Groove Depth:	As recommended by the manufacturer, (± 5 mils)
Groove Position:	Center/Lane Lines: 2 inches from joint line, ($\pm 1/8$ inch) Edge Lines: On lane, 2-4 inches in from the joint line, ($\pm 1/8$ inch) Edge Lines for 14 foot paved lanes: as directed by the Engineer

Transverse Markings - Stop Bars, Crosswalks, and Cross Hatching

Groove Width:	Material width +1 inch, ($\pm 1/8$ inch)
Groove Depth:	As recommended by the manufacturer, (± 5 mils)

Groove Position: In the exact location where the transverse marking will be placed

Transverse Markings - Symbols and Legends

Groove Width: Size of the complete symbol or legend plus the width to smoothly zero out the groove depth

Groove Depth: As recommended by the manufacturer, (±5 mils)

Groove Position: In the exact location where the transverse marking will be placed

Turning Guide Line Markings

Groove Width: Material width +1 inch, (±1/8 inch)

Groove Depth: As recommended by the manufacturer, (±5 mils)

Groove Position: In the exact location where the turning guide line markings will be placed

3. Placing Recessed Pavement Markings. Place the pavement marking material in the grooves within 24 hours of the grooves being made. Ensure the grooves are clean and dry prior to placing pavement marking material. Locate the groove so the entire marking can be placed within the groove.

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

Pay Item	Pay Unit
268 - Recessing Pavt Mrkg, Transv.....	Square Foot
269 - Recessing Pavt Mrkg, Turning Guide Line.....	Square Foot

Recessing Pavt Mrkg, Longit; Recessing Pavt Mrkg, Transv; and Recessing Pavt Mrkg, Turning Guide Line includes placing the temporary tracer line (with no beads), when required, and all work as described in this special provision.

Permanent pavement marking materials and temporary retroreflective pavement markings required for traffic control will be paid for separately using the appropriate pay items.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
HANDHOLE

270

1 of 2

12/01/16

a. Description. This work shall consist of furnishing and installing traffic signal handholes and communication handhole assemblies at the locations shown in the Plans, or as directed by the Engineer. All work shall be completed in accordance with the current National Electric Code (NEC), Section 819 of the Michigan Department of Transportation 2012 Standard Specifications for Construction, except as specified herein.

b. Materials. All materials shall be new and meet the requirements of the current IEEE, NEMA, ANSI Standards as applicable, and as specified herein.

The Contractor shall submit product data sheets for all handholes, covers and other parts for Engineer approval prior to ordering materials. The manufacturer "Quazite Composolite," referenced below, is located in Lenoir City, Tennessee.

12 inch x 18 inch handhole assemblies shall consist of "Quazite Composolite" box. The box shall be #PG1118BA12. The cover shall be, #PG1118HA41, a locking heavy-duty bolt-down type with a logo that reads "Street Lighting." The total depth of the handhole shall be 12 inches.

17 inch x 30 inch handhole assemblies shall consist of two, stacked "Quazite Composolite" boxes. The lower box shall be #PG1730BB18. The upper box shall be #PG1730BA18. The cover shall be, #PG1730HA46, a locking heavy-duty bolt-down type with a logo that reads "Traffic Signal." The total depth of the handhole shall be 36 inches.

24 inch x 36 inch handhole assemblies shall consist of "Quazite Composolite" box. The box shall be #PG2436BA24. The cover shall be, # PG2436HA12, a locking heavy-duty bolt-down type with a logo that reads "Street Lighting." The total depth of the handhole shall be 24 inches.

Provide Granular Material, Class II as detailed elsewhere in these contract documents.

c. Construction. Handholes shall be placed at all junctions of traffic signal or electrical conduit, and as shown on the plans. Maximum distance between any two handholes shall be as shown on the Plans, but in no case shall exceed 500 feet.

Place foundation material consisting of 4 inches of MDOT Class II sand compacted to 95% of its maximum unit weight.

Set the handhole or stacked units to the proper depth and elevation.

Connect handholes to new and existing conduits, whether shown on the plans or not. All conduits shall be connected to the handholes in accordance with the latest revision of Article 346 of the National Electrical Code (NEC).

Backfill around the perimeter of the handhole with MDOT Class II material compacted to 95% of its maximum unit weight.

d. Measurement and Payment. The completed work shall be paid for at the contract unit price for the following contract items (pay items):

<u>Pay Item</u>	<u>Pay Unit</u>
270 – Handhole Assembly, 17 inch x 30 inch	Each
271 – Handhole Assembly, 24 inch x 36 inch	Each

Handhole Assembly, __inch x ___inch shall be paid for at their contract unit prices and shall include all labor, equipment, and materials to complete the work as specified herein.

The pay item shall also include the excavation and disposal of materials, furnishing, installing and compacting MDOT Class II sand, and all work related to connecting handholes to new and existing conduits, whether shown on the plans or not.

CITY OF ANN ARBOR
 DETAILED SPECIFICATION
 FOR
STRUCTURE COVERS

272

1 of 2

12/01/16

a. **Description.** This work shall consist of replacing and furnishing structure covers and castings for structures, gate wells and inlet structures as shown on the Plans and as directed by the Engineer, in accordance with Section 403 of the 2012 edition of the MDOT Standard Specifications for Construction, and the City Standard Specifications, except as specified herein.

b. **Materials.** Materials shall meet the requirements of sections 701, 702, and 908 of the 2012 MDOT Standard Specifications, except that concrete shall be MDOT HE, 8.4-sack per Section 601.

All covers and/or castings shall conform to the model(s) specified, as follows:

<u>Type of Casting</u>	<u>MDOT Designation</u>	<u>NEENAH No. (Weight, Lbs)</u>	<u>EJIW No. (Weight, Lbs)</u>
Flat Inlet Structure Cover	D		5000/Type M2 Sinusoidal Grate (275 lbs.)
Manhole Flange and Cover	B	R-1642 w/ Type C cover Type D cover (380 lbs.)	1040 w/ Type A cover Type M1 (300 lbs.)
Curb Inlet or Catch Basin	K	R-3249F (410 lbs.)	7045 (500 lbs.)

All storm sewer covers shall have the lettering "DUMP NO WASTE!" and a fish image. All other covers shall have "SEWER" or "W" cast in the surface, whichever is applicable.

Frames and covers shall have machined bearing surfaces. Covers shall have two, 1-inch vent holes located opposite each other and 6-inches from the edge.

Castings and covers for monument and water-valve boxes will be provided by the City. The Contractor shall transport these new castings and covers to the site from the City Utilities Department yard at 4251 Stone School Road (Wheeler Center).

c. **Construction.** Hand Materials shall be stored by the Contractor at locations arranged by the Contractor, subject to the approval of the Engineer. The Contractor shall not store materials or equipment, including metal castings and steel plates, on any lawn area.

The Contractor shall deliver all salvaged covers and castings to the Wheeler Center within two days of their removal.

d. **Measurement and Payment.** The completed work shall be paid for at the contract unit price for the following contract items (pay items):

Pay Item

Pay Unit

272 – Structure Cover Lbs

The unit prices for these items of work shall include all labor, material, and equipment costs to perform all the work specified in the Standard Specifications and as modified by this Detailed Specification.

Payment for transporting new and salvaged castings and covers to and from the Wheeler Center is included in the appropriate items of work.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
NON-STRUCTURAL FLOWABLE FILL

273

1 of 1

12/01/16

a. Description. This work consists of furnishing and placing non-structural flowable fill for abandoning pipes and miscellaneous structures; constructing miscellaneous bulkheads or forms; and backfilling. This specification is not intended to address flowable fill used as structural backfill.

b. Materials. Supply non-structural flowable fill consisting of a mixture of Portland cement, fly ash, sand (2NS) and water. Use materials conforming to the standard specifications except as modified by this special provision. All non-structural flowable fill is intended to be removable using conventional mechanical excavation methods.

Use either Type I or IA Portland cement conforming to section 901 of the Standard Specifications for Construction and Class F or C fly ash as specified by ASTM C 618 except that there is no limit on loss on ignition.

Produce a mix of cement, fly ash, sand and water in the following proportions.

Portland Cement	50 lb/cyd
Fly Ash	500 lb/cyd
Sand	2850 lb/cyd
Water	approx. 376 lb/cyd (sufficient to produce desired flowability)

c. Construction. Produce and deliver the non-structural flowable fill at a minimum temperature of 50 degrees F. Transport mixture to the point of placement in a revolving drum mixer or agitator.

Secure all pipes and conduits within the backfill area to counteract the buoyant effect of non-structural flowable fill. Place the material evenly around manholes and in utility trenches to avoid dislocating pipes and conduits.

d. Measurement and Payment. The completed work, as described, will not be paid for separately, but as part of the pay item Water Main, Abandon.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
WATER MAIN AND APPURTENANCES

401

1 of 18

12/01/16

a. Description. The Contractor shall furnish all labor, equipment, pipe, valves, fittings, restrained-joint pipe, restrained-joint gaskets, special gaskets as detailed on the plans and in the specification, polyethylene wrap, blow-off assemblies, fire hydrant, fire hydrant extensions, supplemental lighting towers, and all other materials necessary to complete the work as shown on the Plans, as detailed in this Detailed Specification, and as directed by the Engineer.

All water main installation and testing procedures shall be performed in accordance with the project plans, the requirements of this Detailed Specification, and as directed by the Engineer.

The work for all items shall include, but not be limited to; pavement saw-cutting; excavation and disposal of excavated material; connections to new and existing water mains; the furnishing and installation of solid sleeves and push-on-joint plugs where needed; the furnishing, installation, and removal of sheeting and/or shoring where needed; polyethylene wrap; push boring of water service leads; the furnishing, placement and compaction of approved bedding and backfill materials; thrust blocks; additional labor and equipment costs associated with any required nighttime water main work; cleaning, swabbing, disinfecting, flushing, bacteriological and hydrostatic testing; and any other required items to complete the work as shown on the plans, as detailed in this Detailed Specification, and as directed by the Engineer.

The work of installing a gate valve-in-well shall include installation and backfill of the specified valve, furnishing and installing pre-cast concrete gate wells including the concrete base, straight pre-cast concrete sections, transition sections, and the adjustment of the structure cover. No separate payment will be made for adjusting the structure covers on new gate wells. The gate well cover shall be paid as "Structure Cover, Type B." Upon completion of the work, the Contractor shall clean the Gate Well to the approval of the Engineer.

The gate valve box and its final adjustment to finish grade shall be included in the unit price for "Gate Valve-in-Box, ___ inch" and will not be paid for separately.

The fire hydrant assembly work shall include the hydrant, the 6 inch gate valve-in-box, 3 feet of 6 inch pipe, the thrust block, and any required extensions to install the fire hydrant to the finish grade as shown on the plans.

The work of installing 2 inch copper water service lead by boring shall include furnishing copper water piping, excavation of bore pits, push boring as shown on the plans, backfilling with MDOT Class II sand and compacting in place and all necessary coordination with the City of Ann Arbor to complete the work.

b. Materials.

1. Submittals. Prior to beginning construction, the Contractor shall submit the following:
 - A. Product data on all ductile iron pipe, copper tubing valves, fittings, and hydrants.
 - B. Manufacturer's certifications on all pipe, fittings, and precast concrete units indicating that all materials meet the minimum requirements of these specifications.
 - C. Information on equipment and methods to be used for flushing, chlorination, pressure and bacteriological testing.
2. General Specifications.
 - A. Cast Ductile Iron Pipe and Fittings:

Cast ductile iron pipe shall be Iron Grade 60-42-10 and meet the requirements of ANSI/AWWA C151/A21.51 in all respects; with standard thickness cement mortar lining and asphaltic seal coat in accordance with ANSI/AWWA C104/A21.4; and, coated outside with an asphaltic coating in accordance with ANSI/AWWA C151/A21.51. 100% of the ferrous metals used in the manufacture of cast ductile iron pipe shall be recycled from scrap and other sources. All pipe shall be Pressure Class 350 (Table 50.5 ANSI/AWWA C150/A21.50), or Thickness Class 50 (Table 50.15, ANSI/AWWA C150/A21.50).

Restrained joint pipe, where called for on the Plans, shall be factory manufactured by the installation of retainer weldment and ductile iron locking segments or rings. Restrained joint pipe shall be TR-Flex restrained joint pipe manufactured by U.S. Pipe, Lok-Ring joint pipe manufactured by American Ductile Iron Pipe, or equal as approved by the Engineer.

Cast ductile iron fittings shall be push-on joint, unless otherwise specified (with the exception of solid sleeves and fire hydrants which shall be mechanical joint), meeting the requirements of ANSI/AWWA C110/A21.10 for short body cast iron fittings. Fittings shall have a cement mortar lining and asphaltic seal coat in accordance with ANSI/AWWA C104/A21.4 and ANSI/AWWA C110/A21.10. The outside of all fittings shall have an asphaltic coating in accordance with ANSI/AWWA C110/A21.10.

The coatings shall meet the requirements of ANSI/NSF Standard 61, Drinking Water System Components - Health Effects, and be approved for contact with drinking water.

Solid sleeves shall be long-pattern sleeves.

B. Gate Valves and Gate Valve Boxes:

All gate valves shall be resilient seated meeting the requirements of AWWA C509. All valves shall be of the push-on joint type, unless used on tapping sleeve assemblies, or noted otherwise on the plans. The valves supplied shall be:

- (1) Metroseal 250 Resilient Seated Gate Valve as manufactured by U.S. Pipe & Foundry Company
- (2) U. S. Pipe and Foundry Tyton Joint, Resilient Wedge Seated Gate Valve, meeting the requirements of AWWA C 509, AWWA C550, and ASTM D 2794
- (3) American Flow Control, Series 2500, Single Resilient Wedge
- (4) East Jordan Iron Works FlowMaster Resilient Wedge Valve
- (5) Mueller Series, 4" through 12", A-2360-38, Resilient Wedge – SL x SL
- (6) Tyler Series DRS 250-22 Double Resilient Wedge

All valves shall come equipped with a two-inch square operating nut, opening right.

Valve Boxes shall be Tyler 6860 Buffalo type, Size D, screw-type, 3 piece, 5-1/4 inch shaft and a No. 6 Base for a valve 8 inches or less and a No. 8 base for 10 and 12 inch valves.

C. Gate Valve Wells:

Pre-cast reinforced concrete bases, bottom sections, manhole risers, grade adjustment rings, concentric cones, eccentric cones, and flat-slab tops shall conform to the requirements of ASTM C-478. Joints on precast gate wells shall meet the requirements of ASTM C-443, rubber O-ring gasket.

Flat-slab top, pre-cast, gate wells shall be designed to accommodate HL-93 Modified Live Load requirements as determined by a Professional Engineer licensed by the State of Michigan, regardless of where they are to be installed. For the purposes of design, a HL-93 Modified Live Load shall consist of 1.2 times the design truck or 1.2 times a single 60 kip load, whichever produces the greater stresses.

D. Fire Hydrants:

Fire hydrants shall be East Jordan Iron Works Model 5-BR Water Master BR 250 with traffic flange; American Flow Control 5-1/4" Pacer, WB 67-250; or, Waterous Model TCV-5 with traffic flange. All fire hydrants shall have the following features: a 6 inch mechanical joint pipe connection, ANSI/AWWA C111/A21.11; two 2-1/2 inch National Standard hose connections; one 4 inch Stortz pumper connection; 1-3/8 inch pentagon operating and cap nuts (1-3/8 in. point-to-flat at top; 1-7/16 in. point-to-flat at base); open left; breakable flange construction; no barrel drain; and a painted red finish. Depth of bury (bottom of pipe to ground surface) is generally 6 feet but may vary depending on specific site conditions. The Stortz pumper connection must be 21 in. ± 3 in. above finish grade, and the breakable traffic flange must be between finished grade and 8 in. above finished grade.

Fire hydrant extensions shall be fully compatible with the manufacturer of the fire hydrant assembly provided and be approved by the Engineer. East Jordan Iron Works hydrants shall be provided with a model 5-BR extension kit; and, Waterous Fire Hydrants shall be provided with a F1-K562-6 extension kit.

All fire hydrants must be certified by Underwriters Laboratory (UL) or the National Sanitation Foundation (NSF) for use in a potable water system.

E. Joints:

Push-on joints shall be single gasket joint meeting the requirements of ANSI/AWWA C111/A21.11.

Mechanical joints for fire hydrants and solid sleeves shall be in accordance with ANSI/AWWA C111/A21.11 and shall be the Mega Lug Series 1100 joint restraint system manufactured by EBAA Iron Sales, Inc. or the Ford Meter Box Co. Uni-flange Retainer (UFR 1400-D-x style.).

Bolts for mechanical joints shall be high strength, low alloy steel bolts, only, meeting the requirements of ANSI/AWWA C111/A21.11. All bolts, nuts, and washers if required, shall be coated with a factory-applied flouropolymer coating meeting the following requirements:

- Use Temperature: -100°F to 500°F
- Salt Spray – ASTM B117 up to 4000 hours (nuts must not become frozen)
- Pencil Hardness – 5H to 6H – ASTM D3363-92A
- Kinetic Coefficient of Friction – 0.06 to 0.08
- Thickness – nominal 0.001" (1 mil)
- Impact – 160 in-lbs as measured by ASTM D2794-93
- Adhesion – 5B – ASTM D3359-95
- Di-electric Strength – 500V per mil
- Elongation – 35% to 50%
- Tensile Strength – 4,000 psi
- Operating Pressure – up to 100,000 psi
- Kesternich Test – Nuts not frozen up to 30+ cycles (DIN 50018)
- Corrosion Resistance: as measured by;

ASTM D 1308	Muriatic Acid 31% HCL	24 hours	No Effect
	Sulfuric Acid 93% H ₂ SO ₄	24 hours	No Effect
	Caustic Soda 100% NaOH	24 hours	No Effect
	Methy Ethyl Keytone MEK	24 hours	No Effect
ASTM B117	Salt Fog	1,000 hours	No Effect

The flouropolymer coating shall strongly adhere to surface being coated and shall not flake off or be easily removed by rubbing or brushing.

Cast ductile iron river crossing pipe joints shall be a push-on type ball and socket joint utilizing a first grade rubber gasket. The joint shall be capable of 15-degree full turning deflection without separation, leakage, or restriction of the pipe waterway. Joint restraint shall be provided by a boltless means which is locked against accidental

disengagement of the restraining component. Pipe shall be furnished with the necessary gaskets, lubricant, and retainer locking accessories. Joints for restrained joint pipe shall be in accordance with ANSI/AWWA C111/A21.11. Bolts and nuts for the retainer assembly shall be stainless steel.

Restrained, push-on joint, pipe shall be American Pipe's "Fast-Grip" gasket system, U.S. Pipe's "Field-Lok 350" gasket system, or Griffin Pipe "Field Lok 350" gasket system.

The use of retainer glands and set screws shall not be acceptable.

Lubricants used in making up joints shall be supplied by the pipe manufacturer and the joints shall be coupled in accordance with the manufacturer's requirements.

F. Pipe Wrapping:

All Cast Ductile Iron Pipe, Fittings, and Valves (except river, railroad and highway crossing pipe) shall be fully wrapped with polyethylene per ANSI/AWWA C105/A21.5 and the details as contained on the plans.

G. Copper Water Service Lead Piping

Water service lead piping shall be type K copper tubing suitable for installation by boring.

H. Water Main Pipe Marking:

The following information shall be clearly marked and/or cast on each length of pipe:

- (1) The pipe designation and class (e.g., D.I., Class 50).
- (2) The name or trademark of the manufacturer.
- (3) Country where cast.
- (4) The year in which the pipe was produced.
- (5) Identification of the manufacturing plant.

The following shall be distinctly cast on each fitting:

- (1) The pressure rating of the fitting.
- (2) Nominal diameters of openings.
- (3) The name or trademark of the manufacturer.
- (4) Country where cast.
- (5) The number of degrees or fraction of the circle on all bends.
- (6) Ductile iron fittings shall have the letters "DI" or "Ductile" cast on them.

I. Manufacturer's Certification:

All pipe furnished shall be accompanied by the manufacturer's certificate of test showing conformity with the Specifications. Each certificate shall identify a specific lot number,

quantity of pipe, and show actual test results for the lot furnished. These certificates shall be submitted to the Inspector at the time of unloading.

All materials that will potentially be in contact with the City of Ann Arbor water supply must be certified by Underwriters Laboratory (UL) or the National Sanitation Foundation (NSF) for use in a potable water system. These materials shall include pipe coatings, pipe metals, cement linings, and joint lubricants and gaskets.

J. Inspection:

All pipe furnished shall be subject to inspection on arrival at the job site by the Engineer. The purpose of the inspection shall be to cull and reject pipe or fittings that, independent of physical tests specified under the standard specifications designated herein, fail to conform to the requirements of these Specifications.

The Contractor shall notify the Engineer sufficiently in advance so that an Inspector may be on the job during the unloading of materials. A minimum notice of 24 hours is required for such unloading and inspection. The Contractor shall also notify the Engineer when the material has arrived at the site.

All ductile iron water main pipe shall be stacked on pallets off of the existing grade, with each end plugged or bagged so as to keep the pipe interior clean until final installation.

Cast ductile iron pipe and fittings shall be subject to rejection on account of any of the following:

- (1) Variation in any dimension exceeding the permissible variations given in the material specifications.
- (2) Any crack or defect in the cement mortar lining which, in the opinion of the Engineer, is non-repairable, including, but not limited to, loose or "hollow" lining.
- (3) Any signs of physical damage or poor manufacturing which might render the material unsuitable for its intended use.
- (4) Variation of more than 1/16 inch per lineal foot in alignment of pipe intended to be straight.
- (5) Damaged ends, where in the judgment of the Engineer such damage would prevent making a satisfactory joint.
- (6) Improper handling during delivery, unloading, or installation.

Rejected pipe shall be plainly marked by the Inspector and immediately removed from the site of the work by the Contractor, without cost to the City.

K. Water Main Bedding and Backfill Materials:

The pipe bedding and trench backfill material requirements shall be in accordance with the detailed specifications, or the details shown on the plans.

c. Construction. Water Main Installation, Bacteriologic and Hydrostatic Testing, and Acceptance Requirements shall be as described below. Installation of proposed water mains will require work in close proximity to existing utilities. This must be taken into consideration when the contractor determines the required trench safety requirements. All excavation shall conform to all

relevant MIOSHA Standards; the Contractor is solely responsible for determining all excavation and trench safety requirements.

1. Dry Tap:

When a connection to an existing water main is to be made in the dry, 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 that the connection may be made in the dry. All pipe materials and appurtenances which will come into contact with potable City water after the restoration of water service following the connections shall be disinfected with a strong chlorine solution prior to installation.

The Contractor may not operate City water main valves. For valve operation, contact City of Ann Arbor Public Services Area personnel; the City of Ann Arbor personnel will direct the operation of all valves by Contractor personnel. It is recommended that the Contractor request that the existing valves, which will need to be operated in order to perform the water main work, are checked in advance of the work to ensure that they operate properly. If the Contractor elects not to request the operation of the valves in advance of any required water main operation, then a request for extension of contract time will not be allowed.

It is possible that the valves which need to be operated to facilitate a shutdown will not close entirely, thereby allowing water to leak past the valve into the area of the shut down. The Contractor shall provide the necessary labor, material, and equipment to enable work to be completed with a poor shut down. If a valve cannot be operated at all to facilitate the shutdown without impacting too many customers the shutdown shall be completed by installing a temporary line stop as shown on the drawings and as detailed in the specification for that work. Under no circumstances shall the Contractor be compensated for "downtime" associated with water main valve or appurtenance failure or its inability to properly operate or close fully. An extension of contract time may be allowed, if the Contractor has requested that the water main valves have been exercised in advance of the intended water main shutdown.

Due to the size and length of pipe being shut down, and the quality of shut-down attained, large amounts of water may need to be removed from the excavation. Where possible, the water shall be run directly into nearby storm sewer inlets via pumps and hose.

The Contractor shall have all pipe, fittings and appurtenances required to complete the water main connection prior to the excavation for the connection, or the work will not be allowed to commence.

The Contractor shall complete the water main work in a manner which minimizes the disruption of water service to the greatest extent possible.

The City must notify all businesses 48 hours in advance of a water main shut-down; residences must be notified 24 hours in advance. To give the City an opportunity to provide such notification, the Contractor shall schedule the water main shut-downs at least 72 hours in advance, and preferably a full four or five days in advance, of the water main shut-down.

No water main shutdown shall take place after 12:00 p.m. (noon), unless written permission

has been granted by the Engineer and that the Contractor has sufficient lighting equipment to provide a safe and efficient work area for working after dark. No water main will be shut down until the main has been exposed and cleaned, and is ready to be cut.

There shall be no gap larger than 1/4 inch left in the existing water main as a result of the tie-in. If needed, a closure piece ("thrust ring") of such size so as to meet this requirement shall be installed.

2. Oversized Water Mains:

Portions of the proposed water mains or fittings may connect with existing water mains or fittings. The possibility exists that some of the existing water mains may have been constructed using oversized, cast iron, pipe. Where tie-ins or interconnections are specified and the existing main is found to be oversized, the Contractor shall furnish and install Clow 3501B Sleeves, Tyler Dual Sleeve 5-146L, or Rockwell 441 Sleeves. These sleeves are to be present on the jobsite prior to the excavation for the water main connection, or the work will not be allowed to commence.

3. Permissible Deflection at Joints:

Wherever it is necessary to deflect ductile iron pipe from a straight line, either in the vertical or horizontal plane, to avoid obstructions, to plumb valve stems, or where long-radius curves are permitted, the amount of deflection allowed shall not exceed that required for satisfactory making of the joint, and shall be approved by the Engineer. The deflection shall not exceed the following amounts:

Size of Pipe (Inches)	Joint Angle (Degrees)	Deflection in 18 ft. (Inches)	Approx. Radius of Curve Produced by Succession of 18 ft. Lengths (Feet)
4	5	19	205
6	5	19	205
8	5	19	205
10	5	19	205
12	5	19	205
16	3	11	340
20	3	11	340
24	3	11	340

The above joint deflection angles apply to fittings as well as pipe joints.

4. Trench Opening:

The width of the trench shall be ample to permit the pipe to be laid and jointed properly, and the backfill to be placed and compacted as specified. Trenches shall be of such extra width, when required, to permit the convenient placing of timber supports, sheeting and bracing, and handling of special fittings. For each size of pipe, the minimum trench width shall provide clearance of four inches on each side of the bell of the pipe or fitting or six inches on each side of the pipe barrel, whichever is greater. The maximum trench width shall be in keeping with good construction practice, such that existing structures are not undermined.

In excavating for water mains, the excavation shall at all times be finished to the required grade in advance of the pipe line, but unless otherwise permitted in writing by the Engineer, not more than 50 feet of trench shall be open at one time in advance of the pipe. At no time shall more than 200 feet of trench be opened and incompletely backfilled. At the end of each day, no more than 25 feet of trench may be left open, and access to all drives shall be restored. This opening shall be surrounded by fencing and barricades, or plated. The remainder of the trenching operation shall be available for safe vehicular and pedestrian traffic at all times.

The trench shall be so braced and drained that the workers may work therein safely and efficiently. It is essential that the discharge of the trench de-watering pumps be conducted to natural drainage channels, drains, or storm sewers. If trench water is pumped to natural drainage channels or drains, approved soil erosion and sedimentation controls shall be installed and maintained at the point of discharge. If trench water is pumped into storm sewers, filters shall be provided to prevent the flow of rocks, mud and other debris into the storm sewer line.

The length of street which may be occupied by the construction work at any one time shall be subject to the approval of the Engineer and will be based on the requirements of use of the street by the public.

The Contractor shall fully comply with all laws and regulations governing construction methods and the furnishing and use of all safeguards, safety devices, protective equipment, and pollution controls. Particular care shall be taken to conform to all applicable rules of the Michigan Department of Labor, Construction Safety Standards Commission, "Safety Standards". Part 9 of the above document should be particularly noted.

Where required to support the surfaces of adjacent throughfares, structures, or excavations, or to protect the construction work, adjacent work, or workmen; sheeting, bracing, and shoring shall be provided. The placing of such supports shall not release the Contractor of the responsibility for the sufficiency and integrity of the trench opening. In the removing of sheeting and bracing after the construction has been completed, special care shall be taken to prevent any caving of the sides of the excavation and injury to the completed work or to adjacent property.

Sheeting, bracing, and shoring shall not be left in place after completion of the work except as required by the Engineer. Where the Engineer requires the sheeting, bracing, or shoring to be left in place it shall be cut off below the established surface grade as required by the Engineer.

5. Laying Pipe:

Each pipe shall be inspected for defects prior to being lowered into the trench. Inside of pipe and outside of spigot shall be cleaned of any earth or foreign matter.

Proper implements, tools, and facilities satisfactory to the Engineer shall be provided and used by the Contractor for the safe and convenient prosecution of the work. All pipe, fittings, valves, and hydrants shall be carefully lowered into the trench piece by piece by means of an excavator using chains, slings, or other suitable tools or equipment as

recommended by the manufacturer, in such a manner as to prevent damage to them and their protective coatings and linings. Under no circumstances shall materials be dropped or dumped into the trench.

New water main construction shall not be connected into the existing system until it has been tested and accepted by the Engineer. Pipe shall be laid on the prepared trench bottom with the bell ends facing the direction of laying, unless otherwise directed by the Engineer.

The Contractor shall take every precaution to prevent foreign material from entering the pipe while it is being placed in the line. During laying operations, no debris, tools, clothing or other materials shall be placed in the pipe. At times when pipe laying is not in progress, the open ends of pipe shall be closed by a watertight plug. This provision shall apply during the noon hours as well as overnight. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.

Pipe shall be jointed as specified elsewhere herein. The pipe shall be secured in place with approved backfill material tamped under it except at the bells. Pipe and fittings which do not allow a sufficient and uniform space for joints shall be removed and replaced with pipe and fittings of proper dimensions to insure such uniform space. Precautions shall be taken to prevent dirt from entering the joint space.

All pipe shall be laid at the correct line and grade as indicated by the grade stakes and offset line. Each pipe, as laid, shall be checked by the Contractor to insure that this result is obtained. The staking shall be provided by the Engineer. No pipe shall be laid until a cut sheet for that pipe has been approved by the Engineer. The grade as shown on the Plans is that of the top-of-pipe for water main; and the work must conform to this profile. For water main construction, a variation from the profile grade of two inches with ductile iron pipe, and three inches with reinforced concrete pipe, will be deemed sufficient reason to cause the work to be rejected and re-laid. Water main pipe alignment shall be maintained so as not to vary more than three inches from the correct line. Any pipe found out of line shall be re-laid properly by the Contractor.

Due to conditions in the field, changes to the proposed vertical and horizontal alignment of the proposed water main may become necessary. The Contractor shall, where directed by the Engineer, excavate up to 60 feet in advance of the pipe laying operation to expose existing underground facilities thereby enabling the Engineer to make alignment decisions. The Contractor is required to realign (re-lay) the water main up to 2 feet vertically and/or horizontally as directed by the Engineer at no extra cost to the project. The excavation in advance of the pipe laying is intended to help eliminate the need for re-laying pipe.

6. Crossing Existing Structures and Facilities:

During the construction it may be necessary to cross under or over certain sewers, drains, culverts, water lines, gas lines, electric lines, fiber optic communication, telecommunication, and other types of underground structures or facilities, known or unknown. The Contractor shall make every effort to prevent damage to such underground structures and facilities. The Contractor shall not intentionally damage or break existing structures or facilities and repair them in order to expedite the water main installation process. Wherever such structures or facilities may inadvertently be disturbed or broken, they shall be restored to a

condition that is equal to, or better than, that was encountered prior to the damage. All damaged structures and/or facilities shall be made fully acceptable to the owner and the City, at the Contractor's expense. All crossings shall be made with a minimum of twelve inches of vertical clearance between or alongside existing structures or facilities.

7. Cutting Pipe:

Cutting cast iron or ductile iron pipe for inserting valves, fittings, or closure pieces shall be performed in a neat and workmanlike manner without damage to the pipe or cement lining and so as to leave a smooth end at right angles to the longitudinal axis. Where the type of pipe joint in use is such that it employs push-on assembly to effect the joint seal, the outside of the cut end shall be tapered back 1/8 inch with a coarse file or a portable grinder at an angle of about 30 degrees. The tapering must remove all sharp and/or rough edges which might injure the gasket.

The flame cutting of pipe will not be allowed.

9. Setting Water Main Fittings and Accessories:

Valves, fittings, plugs, hydrants, etc. shall be set and joined to pipe in the manner specified in the Section entitled "Making Joints."

Hydrants shall be located as shown on the Plans or as directed by the Engineer in such a manner as to provide complete accessibility and minimize the possibility of damage from vehicles or injury to pedestrians.

10. Making Joints:

Mechanical means shall be used for pulling home all rubber-gasket pipes regardless of trench condition where manual means will not result in pushing and holding the pipe home. When a trench box or liner is used, a cable shall be used to pull the joints home and hold them in position.

Where work is performed in wet trenches or trenches with running sand, the Contractor shall provide and use mechanical means for pulling the pipe home in making up the joint and for holding the pipe joints tight until completion of the line. Mechanical means shall consist of a cable placed inside or outside of the pipe with a suitable winch, jack, or come-along for pulling the pipe home and holding the pipe in position.

Where not required by these Specifications, manual means will be acceptable only if the joints can be pushed home and held.

Hydrants shall be set to stand plumb with their nozzles parallel to the street and the pumper nozzle facing the street. Hydrants shall be set with pumper nozzles between 18 and 24 inches above finished grade, or as directed in writing by the Engineer.

11. Anchorage for Water Main Fittings and Accessories:

All plugs, caps, tees, hydrants, and bends shall be provided with MDOT Grade S2 concrete meeting the requirements of Section 701 of the 2012 MDOT Standard Specifications for Construction reaction backing (thrust block) as shown on the Plans or specified herein. Valves shall be restrained from movement at adjacent sleeves by the use of a closure piece, or thrust ring (full size pipe section cut to fill the gap inside the sleeve to within 1/4") as specified herein.

Reaction backing shall be placed between unexcavated solid ground and the fitting to be anchored. The area of bearing on the pipe and on the ground in each instance shall be that shown on the details or directed by the Engineer. The reaction backing shall, unless otherwise shown or directed, be so placed that the pipe and fitting joints will be accessible for repairs. This shall include adequate protection of any bolts from direct contact with the concrete.

Metal harnesses of tie rods or clamps may not be used instead of concrete reaction backing. Mega-Lug joint restraint systems and restrained, push-on joint, pipe shall be used where connections to existing lines require immediate pressurization, as specified herein.

In the event that the Engineer determines a change in the anchorage or design is required due to unsuitable earth conditions, changes may be ordered by the Engineer.

The use of friction clamps or set-screw type retainer glands for thrust restraint will not be allowed.

12. Abandonment or Removal of Water Main and Fire Hydrants:

The Contractor shall abandon or remove water main(s) where shown on the Plans. All work shall be performed in accordance with the Detailed Specification entitled "Water Main and Appurtenances, Remove or Abandon".

staff, who will complete the work of tapping the existing water main, furnishing and installing a curb stop and box and making all final service lead piping connections, and shall be paid for as "Excavate and Backfill for Water Services and Leads". Work for this pay item shall be in accordance with City Standards.

13. Water Main Testing:

The water main shall be disinfected and tested by the Contractor in the presence of the Engineer in accordance with the requirements below. The Contractor shall furnish all piping, pumps, hoses, gauges, and other materials and equipment required to carry out the tests using water from the City's water mains. All chlorinated water shall be discharged directly to the sanitary sewer and will not be allowed to be discharged to the ground or any surrounding water course. Any hoses which are needed to direct water from blow-offs and/or hydrants during water main testing and flushing shall be supplied by the Contractor. The City shall furnish and install one inch corporation stops at all necessary locations, at the expense of the Contractor. The tapping of water mains, the installation of all corporation stops, and the operation of valves and hydrants is reserved for City personnel. The Contractor is required to assist in valve and hydrant operation, however. The Contractor shall give the City forty-eight hours prior written notice of intent and desire to test water mains.

A. Bacteriological Testing Sequences:

In the case of all water mains connected to existing facilities, flushing, chlorination and bacteriological testing must precede pressure testing. Where mains can be totally isolated from existing facilities with air gaps or double valves, pressure testing may precede chlorination and bacteriological testing. The normal sequence and time requirements for testing are:

Isolated (Gapped) Water Main	Connected Water Main
1. Fill Main	1. Flush and Swab*
2. Pressure Test	2. Chlorinate
3. Connect One End of Main	3. Wait; 24 hours
4. Flush and Swab*	4. Flush**
5. Chlorinate	5. Wait; 24 hours
6. Wait; 24 hours	6. Bacteriological Samples
7. Flush**	7. Wait; 24 hours
8. Wait; 24 hours	8. Bacteriological Samples
9. Bacteriological Samples	9. Wait; 48 hours
10. Wait; 24 hours	10. Pressure Test (If both sets of Bacteriological samples pass)
11. Bacteriological Samples	11. Flush
12. Wait; 48 hours	12. Wait; 24 hours
13. Make Final Connection(s) – Place in Service (If both sets of bacteriological samples pass)	13. Bacteriological Samples
	14. Wait; 24 hours
	15. Bacteriological Samples
	16. Wait; 48 hours
	17. Place in Service (If both sets of bacteriological samples pass)

*Collect flush water in operable storm water retention/detention facility.

**Discharge flush water into approved sanitary sewer.

The Contractor shall not connect any end of a newly constructed water main to an existing, in-service, water main, until the newly constructed water main passes the hydrostatic test, unless approved in writing by the Engineer.

B. Hydrostatic (Pressure Test):

Insofar as is practical, mains shall be pressure tested between valves. The maximum length of water main to be tested in any one test shall be 1500 feet. The section of main to be tested shall be slowly filled with potable water and the entrained air within the pipe removed or absorbed and pumped up to a pressure of 150 psi (or other pressure if specified) and the test period shall start immediately thereafter. The lines shall then be maintained under a test pressure of 145-155 psi for a continuous period of three hours by pumping chlorinated (25 ppm) water into the line at frequent intervals. The volume of

water so added shall be measured and considered to represent the leakage from the line under test during the interval. Visible leaks shall be repaired regardless of test results. The leakage under the conditions of the test shall not exceed the values shown in the table below. If one side of a double disc gate valve is under test pressure, that seat shall count as four joints.

Maximum Allowable Leakage per 100 Joints at 150 psi Avg. Test Pressure

Pipe Diameter (Inches)	4	6	8	10	12	16	20	24	30	36
Leakage (gallons/hr)	0.66	0.99	1.32	1.66	1.99	2.65	3.30	3.97	4.97	5.96

In the event that the leakage exceeds the maximum allowable leakage as specified above, the joints in the line shall be carefully inspected for leaks and repaired where necessary. Any pipes or fittings found to be leaking shall be removed and replaced with new pieces by the Contractor. After this work has been performed, all tests shall be repeated.

C. Flushing and Swabbing:

The Contractor shall flush the water main after making a connection to the existing City water main where a valve separates the new water main from the existing main. As a result, flushing will be accomplished using flow through the full size of the new water main. If a storm water retention/detention facility is to be constructed as part of the project, this facility is to be completed, stabilized, operable, and utilized for the collection of the flushing water. All pipe, materials, and appurtenances which will come into contact with potable City water after the restoration of water service following the connection shall be disinfected with a strong chlorine solution prior to installation.

Water main shall be cleaned using a high density poly-pig, Girard Aqua Swab (2 lbs/ft³ density) swab, or Engineer approved equal and flushed. The diameter of the blow-off pipes shall be at least 50% of the diameter of the pipe being flushed. Hydrants, with internal components removed, may serve as blow-offs for mains 12 inches and less. The Contractor shall provide details, for the review and approval of the Engineer, for the various required blow-offs. Blow-off pipes, discharge hoses, where needed, and associated costs shall be included in the cost of the permanent water main being installed and will not be paid for separately. If there are no branch connections to be swabbed, the poly-pig shall be inserted in the new water main at the time of connection described above. The poly-pig shall be located on the "downstream" or new side of the separation valve. The poly-pig shall then be forced through the new water main during the first flush and discharged through a construction blow-off of sufficient size to allow passage of the poly-pig. For water mains with branch connections, a launching tee or wye shall be installed as shown in the details, for launching multiple poly-pigs. The main line and each branch main shall be flushed and swabbed individually. Following the successful final bacteriological testing of the water main, the launching tee/wye shall be permanently capped at its branch.

During the flushing and swabbing of a water main, the discharge point for the main shall

be left open, with all other discharge points closed, to direct the poly-pig completely through the main being swabbed to its point of termination. Following the initial swabbing of water main, the separation valve shall be closed, and then the discharge point closed. If a branch water main is to be swabbed, the poly-pig is then to be placed in the launcher; the discharge point for the branch water main is to be opened; the poly-pig is to be inserted into the water main; the separation valve partially opened and the branch water main flushed and swabbed.

Following the swabbing of the water main(s), the water main(s) are to be flushed as required. If approved or directed by the Engineer, the water main(s) may be flushed overnight, provided that proper controls (i.e. hoses directed into storm structures, etc.) are installed to direct and control the flushing water.

D. Chlorination:

After the water mains to be tested have been acceptably flushed, they shall be disinfected in accordance with AWWA C651 "Disinfecting Water Mains" and these Specifications. All new mains and fittings, and any existing mains contaminated by the Contractor, shall be chlorinated to a minimum residual of fifty (50) parts per million (ppm) with commercial liquid chlorine solution (sodium hypochlorite - pool type). Other forms of chlorination and disinfection methods of water mains may be presented by the Contractor and shall receive prior approval in writing by the Engineer before being used. The minimum recommended dosage of sodium hypochlorite is as follows (based on 10% available chlorine):

Recommended Minimum Chlorine Dosage to Disinfect 100 L.F. of Pipe

Pipe Diameter (inches)	10% Chlorine Solution (gallon)
6	0.153
8	0.272
10	0.426
12	0.613
16	1.090
20	1.703
24	2.452

The chlorinated water shall remain in the mains for a minimum of 24 hours, at the end of which period the chlorinated water at all parts of the main must show free available chlorine residual of at least twenty-five (25) ppm. If less than 25 ppm residual is shown at the end of the first 24 hour period, additional chlorine shall be added until a residual of not less than 25 ppm 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 disposed of into an existing, approved City sanitary sewer main, or other location approved in writing by the Engineer. All chlorinated water shall be discharged directly to the sanitary sewer and will not be allowed to be discharged to the ground or any surrounding water course.

The mains shall then be left full of water ready for bacteriological testing.

E. Bacteriological Testing:

The City will obtain bacteriological samples of the water in the mains for analysis from testing blow-offs, corporations, or other sampling points as determined acceptable by the City. Samples will be taken after the mains have been satisfactorily chlorinated in accordance with these Specifications, the chlorinated water flushed out and removed, and the mains filled with potable water. If the newly constructed water main is connected at one end to an in-service section of the City water main, and the chlorination precedes pressure testing, the City will also take samples after satisfactory pressure testing. In each case, two sets of samples shall be taken; a period of 24 hours must elapse between flushing of the main and drawing of the first samples, with the second samples being drawn 24 hours after the first samples were drawn. For each sample, a minimum of 48 hours is required to obtain test results. All samples must pass the bacteriological test.

The Contractor shall plan for these testing sequences and durations in his construction schedule. Contract time will continue during all water main testing phases, regardless of duration.

d. Construction. The Contractor shall be responsible for coordination with the City of Ann Arbor Field Operations Unit for the installation of 1-inch corporations in the gate wells to be used for water main testing and/or filling of new main.

The Contractor must have all materials, fittings, pumps and other miscellaneous equipment, and personnel on-site before the City of Ann Arbor Public Services personnel will prepare and shutdown and existing main.

Pipe bedding and trench backfill material requirements shall be in accordance with the detailed specifications, or the details shown on the plans. Construct water main pipe bedding using granular material Class II, placed in layers no greater than 10 inches thick. Compact each layer to at least 95 percent of maximum unit weight for the entire length of the pipe. Where rock or hardpan is encountered, excavate the trench to at least 6 inches below the proposed bottom of the pipe; backfill with granular material Class II, and compact.

Where unstable soil conditions, or obstructions other than rock, require excavation of the trench below the elevation detailed on the plans; undercut, backfill, and compact the trench as directed by the Engineer. Use 6A, 17A, or 34R aggregate as backfill material for undercutting due to unstable soil conditions. This work will be paid for as trench undercut and backfill according to subsection 402.04.E of the Michigan Department of Transportation 2012 Standard Specifications for Construction.

The Contractor shall backfill water mains within the limits of the roadbed with granular material Class II. Place backfill in layers no greater than 10 inches thick and compact each layer to at least 95 percent of the maximum unit weight. Backfill water main outside the limits of the roadbed with Engineer approved granular or suitable material, compacted to 90% of the maximum unit weight, in lifts of 12 inches or less, unless otherwise noted on the plans.

The Contractor shall excavate and expose all utility crossings prior to laying any water main pipe. This will allow the Engineer to adjust the grade of the water main, if possible, to avoid the existing

utilities. The costs of this work, and all related costs, shall be included in the respective pay items associated with this Detailed Specification.

Should the water main, or other pay items associated with this Detailed Specification, conflict with abandoned sewers or water mains, the conflicting section of the abandoned sewer or water main shall be removed and the remaining sections shall be (re)abandoned in accordance the Detailed Specification for “Water Main and Appurtenances, Abandon” and the Detailed Specification for “Sewer, Any Size or Depth, Abandon,” except that flow filling the sewer will not be required. All the work shall be included in the cost of the water main, or other pay items in this Detailed Specification.

All water main construction shall be completed in accordance with the Detailed Specification entitled “Maintaining Traffic” and as detailed on the plans. The Contractor shall schedule and coordinate all water main shutdowns with the Engineer. The Contractor shall submit for the Engineer’s review and approval the sequence of all water main “shut downs” and tie-ins such that disruption in service to existing properties is minimized to the greatest extent possible. Should the Engineer not accept the Contractor’s proposed construction sequence, it shall not be a basis of claim for extension of contract time or additional compensation.

All water main and appurtenances shall be pressure tested, cleaned, disinfected and bacteriological tested in accordance with the specifications outlined within this Detailed Specification.

The Contractor shall install water service leads by the specific means shown on the drawings and only in the locations as labeled. Contractor shall provide all labor, equipment and materials to furnish and install the water service piping where shown.

Upon acceptance of each section of new main the Contractor shall begin coordination with the City of Ann Arbor Public Services Area for the installation of water services, curb stops and boxes in accordance with the City Standard Detailed Specification for “Excavate and Backfill for Water Services and Leads.”

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

<u>Pay Item</u>	<u>Pay Unit</u>
401 to 404 - Water Main, DI w/Polyethylene Wrap, ___ inch, Tr Det _____	Foot
405 to 407 - Water Main, DI, ___ deg Bend, ___ inch _____	Each
408 to 409 - Water Main, DI, Reducer, ___ inch by ___ inch _____	Each
410 to 414 - Water Main, DI, Tee, ___ inch by ___ inch _____	Each
415 - Water Main, DI, Cross, ___ inch by ___ inch _____	Each
416 - Fire Hydrant Assembly _____	Each
417 - Gate Valve-in-Box, ___ inch _____	Each
418 - Gate Valve-in-Well, ___ inch _____	Each
419 - Water Main, Tie-in _____	Each
420 – 2 inch Copper Water Service, Bored _____	Foot

All work shall be paid in full at the contract unit prices which shall include all the labor, materials and equipment required including all required costs associated with night time work, supplemental lighting, and all other required elements of the work.

Fittings other than those specifically listed as separate contract items, blow-off assemblies, hoses, and restrained joint pipe and gaskets, special gaskets, and the like, shall not be paid for separately, but shall be considered included in the payment for **Water Main, DI w/Polyethylene Wrap, ____ inch, Tr Det ____**

Tees, Crosses, Bends, and Reducers and other fittings specifically listed as separate contract items (pay items), shall be paid for at the contract unit price for each unit installed.

Valve Box Extensions will only be paid for if they are required by the plans and they are not required due to the Contractor's operations.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
WATER MAIN CIPP LINING

421

1 of 7

1/20/17

a. Description. The Contractor shall provide for the rehabilitation of water mains by the installation of cured-in-place pipe (CIPP). The finished product is a joint-less, class IV fully structural pipe, not relying on the remaining strength of the host pipe to withstand long-term external loading and internal pressure.

All water main CIPP Lining and post construction testing procedures shall be performed in accordance with the project plans, the requirements of this Detailed Specification, and as directed by the Engineer.

This specification references the American Society for Testing and Materials (ASTM) designation F1216, Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube; and ASTM designation F1743, Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe. These documents are herein made part of this specification and shall be the latest edition and revision thereof. However, this specification shall govern if there is a conflict between the references and this specification.

The work for all items shall include, but not be limited to; pavement saw-cutting; excavation and disposal of excavated material; sawcutting existing water mains; reconnection to existing water mains; the furnishing and installation of CIPP liners and resins, solid sleeves and push-on-joint plugs where needed; the furnishing, installation, and removal of sheeting and/or shoring where needed; polyethylene wrap; the furnishing, placement and compaction of approved bedding and backfill materials; thrust blocks; additional labor and equipment costs associated with any required nighttime water main work; cleaning, disinfecting, flushing, bacteriological and hydrostatic testing; and any other required items to complete the work as shown on the plans, as detailed in this Detailed Specification, and as directed by the Engineer.

b. Materials.

1. Submittals. Prior to beginning construction, the Contractor shall submit the following:

A. Product data on CIPP tube and resins.

B. Design Considerations. The CIPP shall be designed using the formulas in ASTM F1216, Appendix X1 .3.2 for the Fully Deteriorated Pressure Pipe condition and the parameters listed below. Any layers of the tube that are not saturated with resin prior to insertion into the existing pipe shall not be included in the structural CIPP wall thickness.

Existing Pipe Condition	Fully Deteriorated
Diameter	8 inch and 12 inch
Internal Design Pressure	150 psi
Groundwater Elevation	8 feet below grade
Unit Weight of Soil	120 pcf
Depth to Invert	6.5 feet
Initial Flexural Modulus of Elasticity (ASTM)	300,000 psi
Initial Flexural Strength (ASTM D790)	5,000 psi
Initial Tensile Strength (ASTM 0638*)	6,500 psi
Live Load (under roadways)	AASHTO HS20-44
Live Load (under railroads)	AASHTO E-80
Minimum Design Safety Factor	2
Soil Modulus (under streets and railroad tracks)	1000 psi
Soil Modulus (under natural surfaces)	700 psi
Internal Design Pressure	65 psi (system working
Ovality of Existing Pipe	2% minimum
Creep Retention Factor	50% maximum

C. Information on equipment and methods to be used for flushing, chlorination, pressure and bacteriological testing.

D. After the Work is completed, the Contractor shall provide the Engineer with three (3) copies of video inspection showing both the before and after conditions including the restored connections. The video inspection shall be in DVD or hard drive format and shall become property of the Owner.

E. Submit a detailed temporary water main plan to the Engineer for review prior to beginning work.

2. General Specifications.

A. CIPP Liner Tube

- i. All materials forming the components of the CIPP lining system shall meet the applicable requirements of ASTM F1743 and ASTM F1216, and must have NSF 61 approval.
- ii. The CIPP tube product shall consist of one or more layers of absorbent woven and/or non-woven synthetic fiber, with or without glass fiber reinforcement, which is fabricated in the USA or Canada.
- iii. Fabricate tube to dimensions such that, when installed, will fit tightly to the internal circumference of the host pipe being lined, making allowance for stretching during installation.

- iv. Fabricate tube from materials which, when cured, will be chemically resistant to internal exposure to drinking water treated with common chemical additives.
 - v. The tube shall be homogenous across the entire wall thickness containing no intermediate or encapsulated elastomeric layers. The tube shall contain reinforcement (glass fiber, woven fiber, or equal) in order to withstand the internal pressure design requirements.
 - vi. No internal end seals shall be used to seal the extremities of the liner.
 - vii. The color of the interior pipe surface of the CIPP after installation shall be a light reflective color so that a clear examination may be made of the final product.
 - viii. CONTRACTOR shall transport, handle, and store liner, resin, and all other materials as recommended by the manufacturer. Materials that are defective, damaged, or otherwise deemed unacceptable for use prior to installation shall be rejected and replaced at CONTRACTOR's expense. Liner materials damaged during installation shall be repaired or replaced as recommended by CONTRACTOR and approved by the CITY.
 - ix. Service plugs shall be sized for the respective water service tap and shall be NSF Standard 61 approved. Plugs shall be able to withstand temperatures of up to 300 degrees Fahrenheit.
- B. Temporary Water System: The CONTRACTOR shall install a temporary water system to maintain water supply to customers during water main preparation and rehabilitation. The temporary water system shall comply with the following requirements.
- i. CONTRACTOR shall submit a plan for providing temporary water service for the CITY's approval prior to the preconstruction meeting. The plan shall describe size, material, and location of temporary mains to be laid. It shall also indicate the source of water supply for each temporary main and the technique used to provide water service to each water customer. The plan shall include documentation confirming that materials selected for temporary water service comply with ANSI/NSF Standard 61.
 - ii. The CITY will operate all water main valves, curb stops, and fire hydrants necessary to isolate the existing water main and/or supply the temporary water system. CONTRACTOR will provide to the CITY a specific time and date when the individual water services will be transferred from the existing water main to the temporary water system.

- iii. Temporary water mains shall be sized to meet customer demand but in no case less than 2-inch diameter. All service lines shall be a minimum of 3/4-inch diameter. CONTRACTOR shall perform visual checks for leakage and repair as necessary.
- iv. Temporary water system shall be disinfected and tested in accordance with IEPA requirements before being placed into service. CITY will collect water samples and perform bacteriological analysis. Upon obtaining acceptable samples, CONTRACTOR shall be allowed to make final connections to individual customers.
- v. CONTRACTOR is responsible for removing existing vacuum breakers from hose bibs as necessary to connect the temporary water supply, and for reinstalling the vacuum breakers upon removal of the temporary water system. CONTRACTOR should anticipate that plumbing work within the scope of this Bid will require some work in basements and/or crawl spaces and shall utilize the services of an Illinois licensed plumber for any plumbing modifications required to make the connection. CONTRACTOR shall obtain permission from each affected property owner before connecting the temporary water supply to their property. The route of water service lines installed between the temporary mains and the buildings shall be acceptable to the property owners.
- vi. Where temporary water mains cross a street, trenching and protective cover shall be utilized such that the temporary water main is completely below grade.
- vii. Ramps shall be provided at all other driveway crossings and at public sidewalk crossings using asphalt grindings or other acceptable material. Protective felt or asphalt paper shall be placed at driveway and public sidewalk crossings prior to placing ramping materials. Ramps shall be sufficiently durable and stable to prevent damage to vehicles, turf, paved surfaces, and piping, and shall be sufficiently secured, monitored, and controlled so as to prevent injury to residents and pedestrians.
- viii. CONTRACTOR is responsible for all maintenance or repairs required to maintain temporary water service on a 24-hour continuous basis, and shall provide emergency service with a response time of no more than two hours after notification of a failure or breach of the temporary water service.

c. Construction. Water Main CIPP Liner Installation, Bacteriologic and Hydrostatic Testing, and Acceptance Requirements shall be as described below. All excavation shall conform to all relevant MIOSHA Standards; the Contractor is solely responsible for determining all excavation and trench safety requirements.

1. Water Main Preparation:

- i. Access. CONTRACTOR shall confirm the number and location of water main access points required, and the length of water main sections to be cleaned and lined. CONTRACTOR shall provide the excavation, pipe work, water

main reconnection, and restoration at access points, except as otherwise indicated in the Drawings. The existing water main shall be cut using an approved cutting machine, leaving no split or fractured ends. Immediately upon opening the host main at the access points and prior to installation of the GIPP liner, the ends of the adjacent existing water main that are not to be lined shall be plugged and covered by CONTRACTOR so that no debris shall enter into them during the Work. All cut faces of the existing water main shall be chamfered on the inside surface to a suitable profile to prevent damage to the liner pipe during or after insertion.

- ii. **Cleaning.** Contractor shall remove all deposits, debris, and other foreign materials from the internal surface of the water main that may interfere with the GIPP liner installation. Pipes shall be cleaned with high velocity jet cleaners, mechanically powered equipment, cable-attached devices, or fluid-propelled devices (e.g., pipe pigs). Flush the host pipe with clean water after cleaning operations and remove all standing water with foam swabs.

Settling tanks of a suitable size and capacity shall be used to remove a minimum of 85% of the suspended iron oxide solids from the discharge water before it is disposed of. Discharge of water must be to a sanitary sewer, and Contractor must obtain approval from the Owner prior to disposing of any water or debris generated from the cleaning process. Solids shall be disposed of at an approved waste disposal location.

Owner will furnish water for cleaning operations at agreed locations.

- iii. **Inspection.** The water main shall be inspected using closed circuit television equipment (CCTV) to verify readiness for lining. The CONTRACTOR shall verify the locations of any potential obstructions that may prevent proper installation of the resin-impregnated tube. The CONTRACTOR shall use a rotating camera to verify water service locations. Provide the CITY with a complete set of videos on DVD. Videos shall identify the water main section, direction of filming, and the date and time of inspection; and include voice description of the location of any identified defects, service connections, fittings, etc.
- iv. **Line Obstructions.** The CONTRACTOR shall clear the water main of obstructions that may prevent proper installation of the resin-impregnated tube. All obstructions which reduce the cross-section of the host pipe by more than 10 percent, or that would otherwise prevent the insertion of the CIPP shall be removed. The CONTRACTOR shall notify the CITY of any obstruction that cannot be removed by conventional pipeline cleaning equipment. The CITY will approve alternative means proposed by the CONTRACTOR to remove these obstructions.
- v. **Plugging Service Connections.** CONTRACTOR shall plug the water service connections as recommended by the liner manufacturer, to prevent any accumulation of resin inside the service line and to prevent water infiltration during lining. All plugs shall be sized for the respective water taps.

- vi. Valves. CONTRACTOR shall follow drawings for what work is to be done on water valves. All existing in-line isolation valves along the segment of water main to be rehabilitated will fully opened so that they can be lined through during installation with no obstruction.

2. CIPP Liner Installation

- i. Resin Impregnation. The tube shall be impregnated with resin in strict accordance with the appropriate ASTM standard and manufacturer's recommendations.
- ii. Installation. The installation of the CIPP shall be accomplished in strict accordance with the appropriate ASTM standard and manufacturer's recommendations in regards to the pulling tube into position and/or inversion, pressure, lubricant, curing, cool- down and workmanship. Lubricant shall be a non-toxic, NSF/ANSI 61 certified product. Inversion shall be accomplished by using a hydrostatic head or air pressure. Curing shall be accomplished by circulating heated water throughout the pipeline to uniformly raise the temperature above the temperature required to affect a cure of the resin. The tube shall have a uniform thickness that, when compressed at installation pressures, will meet or exceed the minimum required thickness specified in the Bid submittals. External water shall be kept out of the existing pipeline so as not to interfere with proper installation and cure of the CIPP liner.
- iii. Inspection. After cool-down and before pressure testing, perform a CCTV inspection of the newly installed liner to determine if the liner has been properly installed. The finished lining shall be continuous over the entire length and be free from visual defects such as foreign inclusions, lifts, pinholes, and delaminations. The liner shall be impervious and free of any leakage from the pipe to the surrounding ground or from the ground to the inside of the lined pipe. If these conditions are present, the CONTRACTOR shall repair the defect at their own cost in a manner acceptable to the CITY.
- iv. Finishing. After visual inspection, all plugs shall be removed from the service connections and the lined main shall be flushed, and tested per City standards for new water main installation, including hydrostatic and bacteriologic testing. Upon completion of the testing of all parts of rehabilitated water main, the contractor shall connect the segments of lined main via the use of solid sleeves and other materials specified in section. Cut in and install new isolation valves prior to bringing main back into service and removing all temporary water service connections.

d. Construction. The Contractor shall be responsible for coordination with the City of Ann Arbor Field Operations Unit for the installation of 1-inch corporations in the gate wells to be used for water main testing and/or filling of rehabilitated water main.

The Contractor must have all materials, fittings, pumps and other miscellaneous equipment, and personnel on-site before the City of Ann Arbor Public Services personnel will prepare and shutdown and existing main.

The Contractor shall backfill water main lining pits within the limits of the roadbed with granular material Class II. Place backfill in layers no greater than 10 inches thick and compact each layer to at least 95 percent of the maximum unit weight.

All water main rehabilitation related work shall be coordinated in the project in accordance with the Detailed Specification entitled "Project Sequencing" and as detailed on the plans. The Contractor shall schedule and coordinate all water main shutdowns with the Engineer. The Contractor shall submit for the Engineer's review and approval the sequence of all water main "shut downs" and tie-ins such that disruption in service to existing properties is minimized to the greatest extent possible.

Should the Engineer not accept the Contractor's proposed construction sequence, it shall not be a basis of claim for extension of contract time or additional compensation.

All rehabilitated water main and appurtenances shall be pressure tested, cleaned, disinfected and bacteriological tested in accordance with the specifications outlined within this Detailed Specification.

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

<u>Pay Item</u>	<u>Pay Unit</u>
421 to 422 - Water Main, CIPP Lining, ___ inch	Foot
423 - Temporary Water Main, ___ inch.....	Foot

All work shall be paid in full at the contract unit prices which shall include all the labor, materials and equipment required including all required costs associated with night time work, supplemental lighting, and all other required elements of the work.

Fittings other than those specifically listed as separate contract items, blow-off assemblies, hoses, and restrained joint pipe and gaskets, special gaskets, and the like, shall not be paid for separately, but shall be considered included in the payment for **Water Main, CIPP lining, ___ inch**

DETAILED SPECIFICATION
FOR
WATER MAIN TESTING

425

1 of 2

12/01/16

- a. **Description.** This Detailed Specification is intended to supplement the current City of Ann Arbor Standard Specifications for Construction with regard to water main installation and hydrologic and bacteriologic testing. It is also intended to establish minimum requirements for the work that the Contractor is responsible to follow.

CONSTRUCTION METHODS

During the delivery, handling, installation, and testing of the water main, the Contractor shall comply with the following requirements:

1. Keep all pipe clean and neatly stacked a minimum of six-inches off of the ground at all times. Ends of pipe shall be covered to prevent entry of dust, dirt, small animals, and any other objectionable matter at all times. During installation of the water main and all appurtenances no dirt, soil, or non-potable water shall be allowed to enter the pipe. If dirt, soil, or non-potable water does enter the pipe, the Contractor shall completely remove it prior to installing the next segment of pipe. Segments of pipe that have visible signs of contamination including, but not limited to; soil, dirt, mud, oil, grease, solvents, animal droppings, etc. shall have all visible traces of the offending substance completely removed by the Contractor in a manner acceptable to the Engineer. Sections of pipe or fittings that have been marked by the Engineer for cleaning shall not be approved for installation until such time as the Engineer has again approved them for use on the project. Acceptable methods of cleaning include flushing and/or power washing, compressed air, or other methods that the Engineer may approve. Approval by the Engineer of a cleaning method shall not be construed by the Contractor to include acceptance of the water main for the purposes of placing it into service. Water main pipe and fittings that have been placed shall remain covered on the advancing end until the next segment of pipe is connected. The Contractor may uncover no more than three segments of pipe in advance of placement. Water main pipe and fittings that have been laid out further in advance of the installation operation must remain covered.
2. Gasket lubricant shall only be applied immediately before connection to the next segment of pipe. Pipe with lubricant applied shall not come in contact with the ground. If the lubricated portion of the pipe end contacts the ground, it shall be thoroughly cleaned to the satisfaction of the Engineer, prior to its installation.
3. All water main shall be swabbed in accordance with the requirements of Section 3H, Flushing and Swabbing, of the current edition of the City of Ann Arbor Public Services Department Standards. During swabbing of the water main, the swab shall be flushed through the pipe in accordance with the manufacturer's recommendations and in a manner that is acceptable to the Engineer. The Contractor shall submit the product data of the swab from the manufacturer, for review and approval by the Engineer, at or before the pre-construction meeting.
4. Swabbing of the water main shall be followed immediately by flushing of the pipe so that any disturbed particles are washed out before they can resettle. The pipe shall be flushed in accordance with Section 3H, Flushing and Swabbing, of the current edition of the City of Ann Arbor Public Services Department Standard Specifications. The pipe shall be flushed until the water runs clear for a minimum of fifteen minutes or until two full pipe volumes have been flushed (whichever is longer.) Flushing from the existing water main that is to be replaced shall not be allowed.

5. During the chlorination process, the proper level of chlorination must be achieved throughout the entire length pipe. Chlorine levels shall be checked at intermediate locations as directed by the Engineer and the Contractor shall add chlorine until such time as the required levels are achieved at all points. The “plug method” of chlorinating the pipe shall not be allowed. The Contractor shall chlorinate the proposed water main to a minimum residual concentration of 100 parts per million with commercial liquid chlorine solution. The chlorine concentrate shall be a minimum of 10% chlorine (sodium hypochlorite) by volume. Solid chlorine “pellets” or powder shall not be allowed. Any chlorine containing compound used on the project shall be approved by the Engineer. The minimum recommended dosage of chlorine (sodium hypochlorite) is as follows (based on 10% available chlorine):

Recommended Minimum Chlorine Dosage to Disinfect 100 L.F. of Pipe

<u>Pipe Diameter</u>	<u>10% Chlorine Solution (gallons)</u>
6	0.306
8	0.544
10	0.852
12	1.226
16	2.180
20	3.406
24	4.904

6. Bacteriological testing shall be performed by the City with the Contractor present. The Engineer shall determine the number, location, and type of testing points for each section of water main being tested. Bacteriological samples shall only be drawn from copper or brass sampling points. The use of galvanized steel blow-offs or sampling points are strictly prohibited. Obtaining bacteriological samples from fire hydrants will not be allowed.
7. If a new water main fails two consecutive sets of bacteriological tests, the Engineer may require the Contractor to re-swab the water main in accordance with Section 3H, Flushing and Swabbing, as described above. Additional flushing, prior to subsequent bacteriological sampling will also be required. The required additional swabbing and flushing of the water main by the Contractor shall be performed at no additional cost to the City of Ann Arbor.

MEASUREMENT AND PAYMENT

Payment for all labor, materials, and equipment that is required to comply with this Detailed Specification shall be considered as part of the unit price as bid for each respective water main pipe and fitting and will not be paid for separately.

Payment for all water main pipe shall be as follows:

The Contractor shall be paid for 50% of the water main pipe installed upon satisfactory completion of the installation and backfilling of the water main pipe. The remaining 50% shall be paid upon successful completion of all required bacteriological testing, the water main has been placed into service, and all water service leads have been connected and are in service.

APPENDIX A

Geotechnical Subsurface Investigation Report

**Tetra Tech
Ann Arbor, Michigan**

**Geotechnical Subsurface Investigation
Proposed Water Main Upgrade
Plymouth Road and Green Road
Ann Arbor, Michigan**

December 2016





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December 14, 2016

TTL Project No. 14636.01

Mr. Joseph C. Siwek, P.E., LEED AP
Tetra Tech
710 Avis Drive
Ann Arbor, Michigan 48108

**Geotechnical Subsurface Investigation
Proposed Water Main Upgrade
Plymouth Road and Green Road
Ann Arbor, Michigan**

Dear Mr. Siwek:

Following is the report of the geotechnical subsurface investigation performed by TTL Associates, Inc. (TTL) for the referenced project. This study was performed in general accordance with TTL Proposal No. 14636.01, dated August 29, 2016 and authorized via a Subconsultant Services Agreement, dated September 16, 2016.

This final report contains the results of our study, our engineering interpretation of the results with respect to the project characteristics, and our recommendations for support and installation of the proposed water main using directional drilling techniques.

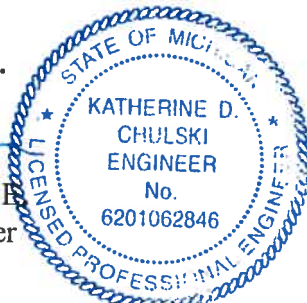
Soil samples collected during this investigation will be stored at our laboratory for 90 days from the date of this report. The samples will be discarded after this time unless you request that they be saved or delivered to you.

Should you have any questions regarding this report or require additional information, please contact our office.

Sincerely,

TTL Associates, Inc.

Katherine Chulski, P.E.
Geotechnical Engineer



Curtis E. Roupe, P.E.
Vice President

**GEOTECHNICAL SUBSURFACE INVESTIGATION
PROPOSED WATER MAIN UPGRADE
PLYMOUTH ROAD AND GREEN ROAD
ANN ARBOR, MICHIGAN**

FOR

**TETRA TECH
710 AVIS DRIVE
ANN ARBOR, MICHIGAN 48108**

SUBMITTED

**DECEMBER 14, 2016
TTL PROJECT NO. 14636.01**

**TTL ASSOCIATES, INC.
44265 PLYMOUTH OAKS BOULEVARD
PLYMOUTH, MICHIGAN 48170-2585
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TABLE OF CONTENTS

	<u>Page No.</u>
1.0 Introduction	1
2.0 Investigative Procedures	2
3.0 Proposed Construction	4
4.0 General Site and Subsurface Conditions	5
4.1 General Site Conditions	5
4.2 General Soil Conditions.....	5
4.3 Groundwater Conditions.....	6
5.0 Design Recommendations	7
5.1 Water Main Installation	7
5.2 Groundwater Control	8
5.3 Excavations and Slopes.....	8
5.4 General.....	9
6.0 Qualification of Recommendations	10

PLATES

- Plate 1.0 Site Location Map
- Plate 2.0 Test Boring Location Plan

FIGURES

- Logs of Test Borings B-1 through B-3
- Legend Key
- Tabulation of Test Data
- Grain Size Distribution
- Pavement Core Logs

1.0 INTRODUCTION

This geotechnical subsurface investigation report has been prepared for the proposed replacement of the water main at the intersection of Plymouth Road with Green Road in Ann Arbor, Michigan. The general project area is presented on the attached Site Location Map (Plate 1.0).

This report summarizes our understanding of the proposed construction, describes the investigative and testing procedures, presents the findings, discusses our evaluations and conclusions, and provides our support and installation recommendations for the proposed water main.

This study was performed in accordance with TTL Proposal No. 14636.01, dated August 29, 2016, and was authorized via a Subconsultant Services Agreement, dated September 16, 2016.

The purpose of this investigation was to evaluate the subsurface conditions at this site to provide soils-related installation recommendations for the proposed project. To accomplish this, three soil test borings, field and laboratory soil testing, and a geotechnical engineering evaluation of the test results were performed.

This report includes:

- A description of the subsurface soil and groundwater conditions evaluated from the test boring and laboratory test results.
- Recommendations concerning soil- and groundwater-related construction procedures such as site preparation, excavation requirements, backfilling, groundwater conditions and control, and related field testing.

The scope of this study did not include an environmental assessment of the surface or subsurface materials.

2.0 INVESTIGATIVE PROCEDURES

This investigation included three test borings, designated as Borings B-1 through B-3, drilled by TTL on October 13, 2016. The borings were performed within the roadway along the alignment of the proposed water main. The approximate locations of the borings are shown on the Test Boring Location Plan (Plate 2.0).

The test borings were located in the field by TTL with guidance from Tetra Tech. The borings were performed to the planned completion depth of 15 feet.

The test borings were performed in general accordance with geotechnical investigative procedures outlined in ASTM Standards D 1452 and D 5434. The test borings performed during this investigation were completed with a truck-mounted drilling rig utilizing 3¼-inch inside diameter hollow-stem augers.

During auger advancement, soil samples were collected at 2½-foot intervals. Split-spoon (SS) samples were obtained by the Standard Penetration Test (SPT) Method (ASTM D 1586), which consists of driving a 2-inch outside diameter split-barrel sampler into the soil with a 140-pound weight falling freely through a distance of 30 inches. The sampler was driven in three successive 6-inch increments with the number of blows per increment being recorded. The sum of the number of blows required to advance the sampler the second and third 6-inch increments is termed the Standard Penetration Resistance (N-value) and is presented on the Logs of Test Borings attached to this report. The samples were sealed in jars and transported to our laboratory for further classification and testing.

Soil conditions encountered in the test borings are presented in the Logs of Test Borings, along with information related to sample data, SPT results, water conditions observed in the borings, and laboratory test data. It should be noted that these logs have been prepared on the basis of laboratory classification and testing as well as field logs of the encountered soils.

All samples of the subsoils were visually or manually classified using the Unified Soil Classification System (ASTM D 2487 and D 2488). Selected samples were tested in the laboratory for moisture content (ASTM D 2216). Unconfined compressive strength estimates were performed for the intact cohesive samples using a calibrated hand penetrometer. Atterberg limits tests (ASTM D 4318) and particle size analyses (ASTM D 422) were performed on a representative sample from Boring B-1 (SS-4) to determine soil classification and index

properties. These test results are presented on the Logs of Test Borings, Tabulation of Test Data sheets, and Grain Size Distribution sheet attached to this report.

Experience indicates that the actual subsoil conditions at a site could vary from those generalized on the basis of test borings made at specific locations, especially at previously developed sites such as this site. Therefore, it is essential that a geotechnical engineer be retained to provide soil engineering services during the site preparation and excavation phases of the proposed project. This is to observe compliance with the design concepts, specifications, and recommendations, and to allow design changes in the event subsurface conditions differ from those anticipated prior to the start of construction.

3.0 PROPOSED CONSTRUCTION

We understand the project consists of replacement of the water main at the intersection of Plymouth Road with Green Road in Ann Arbor, Michigan. The minimum depth of cover along the route is indicated to be 5½ feet below existing grades. We understand that the water main generally will be installed using cut and cover or directional drill methods.

4.0 GENERAL SITE AND SUBSURFACE CONDITIONS

4.1 General Site Conditions

At the time of this investigation, the roadways within the project area contained asphalt pavement. The surface materials encountered the borings consisted of asphalt varying in thickness from 3¼ to 6½ inches, underlain by crushed stone varying in thickness from 5½ to 8¾ inches.

4.2 General Soil Conditions

Based on the results of the field and laboratory tests, the subsurface conditions underlying the surface materials consisted of predominantly cohesive soils with areas of granular soils.

Underlying the pavement materials in Borings B-1 and B-2, medium dense granular soils were encountered to a depth of approximately 2 feet below existing grades. These granular soils generally consisted of poorly graded sand (SP) with trace silt. Moisture contents ranged from 6 percent and 4 percent were determined for the recovered samples from Borings B-1 (SS-1a) and B-2 (SS-1a), respectively.

Underlying the pavement materials in Boring B-3, as well as the granular soils in Borings B-1 and B-2, predominantly very stiff to hard cohesive soils were encountered to a depth of 13 feet in Boring B-3, and to boring termination at a depth of 15 feet in Borings B-1 and B-2. The cohesive soils consisted of lean clay (CL) with varying amounts of sand and gravel, as well as sandy silt (ML). SPT N-values typically ranged from 16 to 32 bpf and unconfined compressive strengths typically ranged from 3,940 pounds per square foot (psf) to greater than 9,000 psf (the highest reading obtainable using a calibrated hand penetrometer), with one sample tested using the constant rate of strain method for a strength as high as 11,890 psf. Moisture contents generally ranged from 10 to 16 percent. A Liquid limit of 28 percent and a plasticity index of 14 percent were determined for a sample from this stratum in Boring B-1 (SS-4). These values, along with gradation results, are indicative of lean clay (CL) as classified in accordance with USCS.

Underlying the cohesive soils in Boring B-3, medium dense granular soils were encountered to boring termination at a depth of 15 feet. An SPT N-value of 13 bpf and a moisture content of 19 percent were determined for the recovered sample.

The detailed stratigraphy encountered in the borings is presented on the Logs of Test Borings attached to this report.

4.3 Groundwater Conditions

Groundwater was initially encountered during drilling in Borings B-2 and B-3 at depths of 8 feet and 13 feet below existing grade, respectively. Groundwater was observed upon completion of the drilling operations in the same two borings at depths of 14 feet and 12 feet, respectively. Groundwater was not encountered in Boring B-1 during drilling or upon completion of drilling operations. It should be noted that each test boring was drilled and backfilled within the same day. As such, stabilized water levels may not have occurred over this limited time period. Instrumentation was not installed to observe long-term groundwater levels.

Based on the soil characteristics and groundwater conditions encountered in the borings, it is our opinion that “normal” groundwater levels at the site will generally be encountered at depths of 8 feet and lower below existing grade. It should be noted that groundwater elevations can fluctuate with seasonal and climatic influences. In particular, “perched” water may be encountered in fill materials or granular soils that are underlain by relatively impermeable native cohesive soils. Therefore, the groundwater conditions may vary at different times of the year from those encountered during this investigation.

5.0 DESIGN RECOMMENDATIONS

The following conclusions and recommendations are based on our understanding of the proposed construction and on the data obtained during the field investigation. If the project information or location as outlined is incorrect or should change significantly, a review of these recommendations should be made by TTL.

5.1 Water Main Installation

We understand that the new water main will generally be installed with a minimum 5½-foot cover using open-cut or directional drill methods. Based on the conditions encountered in the borings, the soils encountered within the alignment of the water main are anticipated to consist of very stiff to hard cohesive soils.

It is anticipated that bedding and haunching material will be utilized below and above the waterline at locations of open-cut installation. Although not anticipated, if unsuitable soils are encountered at pipe invert elevations, undercutting and replacement with additional bedding stone may be required. As a minimum, unsuitable soils should be undercut to a depth of one pipe diameter below invert, or 12 inches, whichever is greater. The undercut zones should be replaced with engineered fill, properly placed and compacted prior to placement of the bedding and haunching material.

Based on the conditions encountered in Boring B-3, if the water main is installed using directional drill methods below a depth of 13 feet, a zone of granular materials was encountered to boring termination at a depth of 15 feet. It should be noted that, depending on the abruptness of change in soil consistency/strength, and the type of drilling advancement being used, maintenance of the vertical alignment through a mixed stratigraphic profile may be problematic where varying soil types are encountered. The contractor will need to exercise care and diligence during directional drilling advancement to avoid alignment drift. Also while not encountered in the borings, there is the potential for cobbles and boulders to be present in the geologic profile.

Care should be exercised during the boring operation to prevent “loss of ground” caused by the movement of excessive amount of soils out of the horizontal borehole. The movement of excessive amounts of soil during the boring operation could result in surface settlements along the boring alignment.

5.2 Groundwater Control

As stated earlier, it is our opinion that the "normal" groundwater table will generally be encountered at depths of 8 feet and lower below existing grade. It is our opinion that significant groundwater seepage is not likely to be encountered in shallow excavations that do not extend more than a couple feet below the ambient groundwater level. Within the anticipated excavation depths, we anticipate that adequate control of seepage should be achievable by minor dewatering systems, such as pumping from prepared sumps. In the event excessive seepage is encountered during construction, TTL should be notified to evaluate whether other dewatering methods are required.

5.3 Excavations and Slopes

The sides of temporary excavations for waterline installation should be adequately sloped to provide stable sides and safe working conditions. Access excavations for the direction drilling equipment operations must be constructed with appropriate slope layback as discussed below. Otherwise, the excavation must be properly braced against lateral movements. In any case, applicable Occupational Safety and Health Administration (OSHA) standards must be followed.

Depending on the depth of excavations, encountered soils are anticipated to both granular and cohesive soils. For these various conditions, the sides of excavations may not stand vertically unsupported for any significant period. In addition, OSHA standards would apply to excavations for all soil types. Thus, provisions should be made for the water main installation to proceed as a sloped bank excavation, or alternately, as a steeper cut with properly designed and installed lateral bracing. The latter system may include the use of a portable trench box or a sliding trench shield. If a portable trench box or a sliding trench shield system is utilized, vertical side slopes may be used up to 18 inches below the top of the shield. The sides should be sloped from that point to the ground surface in accordance with the criteria described below.

Based on the borings drilled for this investigation, soils encountered in excavations may include one or more of the following:

- Type A soils (cohesive soils with unconfined compressive strengths of 3,000 psf or greater), and
- Type C soils (granular soils).

For temporary excavations in Type A and C soils, side slopes must be no steeper than $\frac{3}{4}$ horizontal to 1 vertical ($\frac{3}{4}$ H:1V), and $1\frac{1}{2}$ H:1V, respectively. Where lower strength soils are encountered underlying higher strength soils, the entire excavation is governed by the lower strength criteria. In all cases, flatter slopes may be required if lower strength soils or adverse seepage conditions are encountered during construction.

5.4 General

Construction traffic and excavated material stockpiles should be kept away from the edge of excavations at a minimum distance equal to the full depth of the excavation. In all cases, pertinent Occupational Safety and Health Administration (OSHA) requirements (Part 1926, Subpart M, Amended 1989) must be followed and adequate protection for workers must be provided. **Where existing structures, roadways, or underground utilities are located within a distance from the excavation equal to approximately twice the depth of the excavation, an adequate system of trench boxes, sheet piling, lateral bracing, or similar alternate construction procedures may be required to prevent lateral movements that could cause settlement of structures, pavements, and utilities if not properly supported.**

The construction excavations should not be left open any longer than necessary. Fill required for backfill operations may consist of any non-organic soils having a maximum dry density as determined by the Modified Proctor (ASTM D 1557) of 90 pounds per cubic foot (pcf) or greater. The on-site soils that are free of organic matter, excessive moisture, debris, and rock or stone fragments larger than 3 inches in diameter may be used as engineered fill materials. Although not anticipated for this project, if there will be areas where the backfill will be placed in proposed pavement locations, the backfill should consist of dense-graded aggregate, such as MDOT 21A or 21AA.

In general, backfill material placed should be compacted sufficiently to achieve stability and to avoid undesirable settlements. Although not anticipated for this project, if excavations extend into pavement areas, the backfill material must be placed in uniform layers of not more than three inches (loose measure) and compacted to a density of not less than 95 percent of the maximum dry density as determined by ASTM D 1557 (Modified Proctor). All fill materials should be placed within 3 percent of the optimum moisture content to facilitate satisfactory compaction.

It is recommended that all earthwork and site preparation activities be conducted under adequate specifications and properly monitored in the field by a TTL geotechnical engineer or a qualified representative.

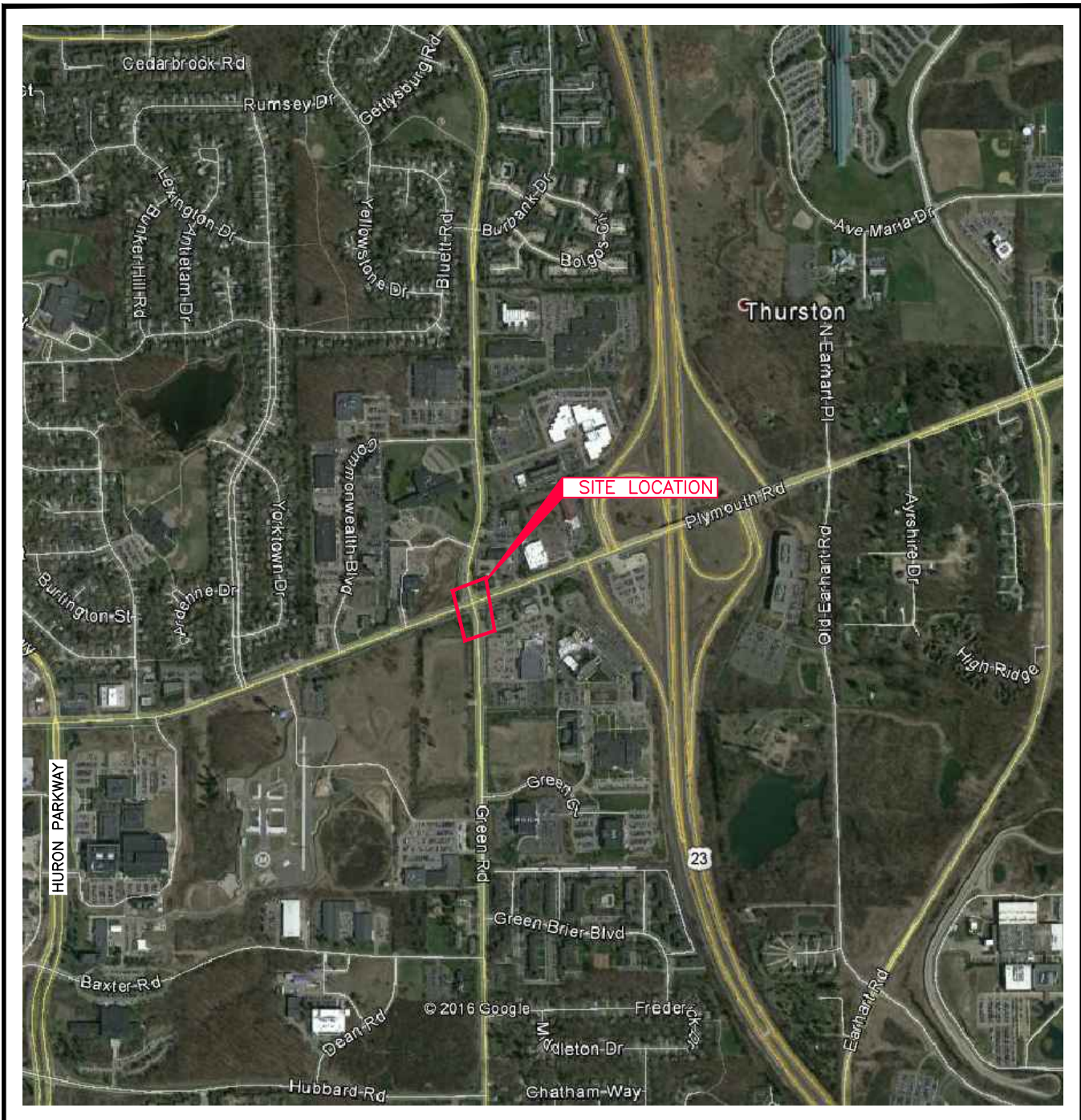
6.0 QUALIFICATION OF RECOMMENDATIONS

Our evaluation of water main installation as related to soil conditions has been based on our understanding of the site and project information and the data obtained during our field investigation. The general subsurface conditions were based on interpretation of the subsurface data obtained at specific boring locations. Regardless of the thoroughness of a subsurface investigation, there is the possibility that conditions between borings will differ from those at the boring locations, that conditions are not as anticipated by the designers, or that the construction process has altered the soil conditions. Therefore, experienced geotechnical engineers should observe water main installation to confirm that the conditions anticipated in design are noted. Otherwise, we assume no responsibility for construction compliance with the design concepts, specifications, or recommendations.

The recommendations in this report have been developed based on the previously described project characteristics and subsurface conditions. If project criteria or locations change, TTL should be permitted to determine if the recommendations must be modified. The findings of such a review will be presented in a supplemental report.

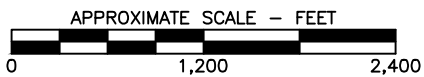
The nature and extent of variations between the borings may not become evident until the course of construction. If such variations are encountered, it will be necessary to reevaluate the recommendations of this report after on-site observations of the conditions.

Our professional services have been performed, our findings derived, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all other warranties either expressed or implied. TTL is not responsible for the conclusions, opinions, or recommendations of others based on this data.



LEGEND

— APPROXIMATE SITE LOCATION



**PLATE 1.0
SITE LOCATION MAP**
PROPOSED WATER MAIN UPGRADE
PLYMOUTH ROAD AND GREEN ROAD
ANN ARBOR, MICHIGAN

PREPARED FOR
TETRA TECH
ANN ARBOR, MICHIGAN

DRAWN TRR/10-19-16 CHECKED KDC/10-20-16

REVISED APPROVED

JOB NO. 14636.01

DRAWING NUMBER

1463601-01G





LEGEND

B-1 APPROXIMATE BORING LOCATION

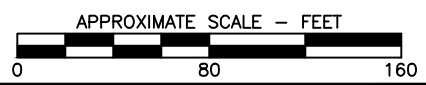


PLATE 2.0
TEST BORING LOCATION PLAN
 PROPOSED WATER MAIN UPGRADE
 PLYMOUTH ROAD AND GREEN ROAD
 ANN ARBOR, MICHIGAN

PREPARED FOR
TETRA TECH
 ANN ARBOR, MICHIGAN

DRAWN	TRR/10-19-16	CHECKED	KDC/10-20-16
REVISED		APPROVED	

JOB NO. 14636.01
 DRAWING NUMBER
1463601-02G



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TTL Associates, Inc.
 1915 N 12th Street
 Toledo, Ohio 43624
 Telephone: 419-324-2222
 Fax: 419-241-1808

BORING NUMBER B-1

PAGE 1 OF 1

CLIENT Tetra Tech	PROJECT NAME Proposed Water Main Upgrade
PROJECT NUMBER 14636.01	PROJECT LOCATION Ann Arbor, MI
DRILLING CONTRACTOR TTL Associates NW CM	RIG NO. 111 GROUND ELEVATION
DRILLING METHOD 3-1/4 in. HSA	GROUND WATER LEVELS:
DATE STARTED 10/13/16 COMPLETED 10/13/16	AT TIME OF DRILLING None
LOGGED BY KKC CHECKED BY KDC	AT END OF DRILLING None
NOTES	0hrs AFTER DRILLING Backfilled w/Cuttings, Chips, and Patch

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	PL MC LL			
									20	40	60	80
	0.0		ASPHALT - 3.25 Inches									
			CRUSHED STONE - 8.75 Inches									
			Moist Medium Dense Brown POORLY GRADED SAND w/Trace Silt (SP)	SS 1a	100	9-6	NP					
	2.5		Moist Stiff Brown LEAN CLAY w/Sand and Trace Gravel (CL)	SS 1b	100	7	3.75					
			@3.5': Very Stiff									
	5.0			SS 2	100	6-8-10 (18)	>4.5					
	7.5			SS 3	100	12-15-15 (30)	>4.5					
			Moist Very Stiff Brown SANDY LEAN CLAY w/Trace Gravel (CL)	SS 4	100	10-11-10 (21)	5.94	121				
	12.5		Moist Hard Brown LEAN CLAY w/Sand and Trace Gravel (CL)	SS 5	100	12-15-17 (32)	4.00					
			Moist Very Stiff Gray LEAN CLAY w/Sand and Trace Gravel (CL)	SS 6	100	11-11-13 (24)	NI					
	15.0		Bottom of hole at 15.0 feet.									

TTL_GEOTECH_STANDARD 14636.01.GPJ GINT US LAB.GDT 10/24/16



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BORING NUMBER B-2

PAGE 1 OF 1

CLIENT Tetra Tech	PROJECT NAME Proposed Water Main Upgrade
PROJECT NUMBER 14636.01	PROJECT LOCATION Ann Arbor, MI
DRILLING CONTRACTOR TTL Associates NW CM	RIG NO. 111 GROUND ELEVATION
DRILLING METHOD 3-1/4 in. HSA	GROUND WATER LEVELS:
DATE STARTED 10/13/16 COMPLETED 10/13/16	▽ AT TIME OF DRILLING 8.0 ft
LOGGED BY KKC CHECKED BY KDC	▽ AT END OF DRILLING 14.0 ft
NOTES	0hrs AFTER DRILLING Backfilled w/Cuttings, Chips, and Patch

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	SPT N VALUE			
									PL	MC	LL	
0.0			ASPHALT - 6.5 Inches									
			CRUSHED STONE - 5.5 Inches									
			Moist Medium Dense Brown POORLY GRADED SAND w/Trace Silt (SP)	SS 1a	100	13-14	NP					
			Moist Very Stiff Brown LEAN CLAY w/Sand and Trace Gravel (CL)	SS 1b	100	9	4.00					
2.5												
				SS 2	100	10-10-12 (22)	>4.5					
5.0												
			Moist Hard Brown LEAN CLAY w/Sand and Trace Gravel (CL)	SS 3	100	11-14-17 (31)	>4.5					
7.5												
			Moist Very Stiff Brown SANDY SILT (ML)	SS 4	100	8-8-9 (17)	NI					
10.0												
				SS 5	78	10-12-15 (27)	NI					
12.5			Moist Very Stiff Gray LEAN CLAY w/Sand and Trace Gravel (CL)									
				SS 6	94	7-7-4 (11)	NI	113				
15.0			Moist Stiff Gray SANDY LEAN CLAY w/Trace Gravel (CL)									
			Bottom of hole at 15.0 feet.									

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BORING NUMBER B-3

PAGE 1 OF 1





















CLIENT Tetra Tech	PROJECT NAME Proposed Water Main Upgrade
PROJECT NUMBER 14636.01	PROJECT LOCATION Ann Arbor, MI
DRILLING CONTRACTOR TTL Associates NW CM	RIG NO. 111 GROUND ELEVATION
DRILLING METHOD 3-1/4 in. HSA	GROUND WATER LEVELS:
DATE STARTED 10/13/16 COMPLETED 10/13/16	▽ AT TIME OF DRILLING 13.0 ft
LOGGED BY KKC CHECKED BY KDC	▽ AT END OF DRILLING 12.0 ft
NOTES	0hrs AFTER DRILLING Backfilled w/Cuttings, Chips, and Patch

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	PL MC LL						
									20	40	60	80			
	0.0		ASPHALT - 5 Inches												
			CRUSHED STONE - 7 Inches												
	1.0		Moist Very Stiff Brown SANDY SILT (ML)	SS 1	78	8-9-9 (18)	NI							15	
	2.5		Moist Very Stiff Brown SANDY LEAN CLAY w/Trace Gravel (CL)	SS 2	100	7-9-7 (16)	1.50								17
	3.0		Moist Very Stiff Brown LEAN CLAY w/Sand and Trace Gravel (CL)	SS 3	100	10-10-10 (20)	1.97	112							13
	5.0			SS 4	100	11-13-10 (23)	4.00								16
	6.0			SS 5	100	13-13-16 (29)	3.75								16
	7.5			SS 6	100	6-7-6 (13)	NP								19
	10.0														
	12.5														
	13.0														
	15.0														
			Bottom of hole at 15.0 feet.												







TTL_GEOTECH_STANDARD 14636.01.GPJ GINT US LAB.GDT 10/24/16

LEGEND KEY

Unified Soil Classification System Soil Symbols

 GW - WELL GRADED GRAVEL Includes Gravel-Sand mixtures, little or no fines.	 GP - POORLY GRADED GRAVEL Includes Gravel-Sand mixtures, little or no fines.	 GM - SILTY GRAVEL Includes Gravel-Sand-Silt mixtures.	 GC - CLAYEY GRAVEL Includes Gravel-Sand-Clay mixtures.
 SW - WELL GRADED SAND Includes Gravelly Sands, little or no fines.	 SP - POORLY GRADED SAND Includes Gravelly Sands, little or no fines.	 SM - SILTY SAND Includes Sand-Silt mixtures.	 SC - CLAYEY SAND Includes Sand-Clay mixtures.
 ML - SILT Includes Silt with Sand and Sandy Silt.	 CL - LEAN CLAY Includes Sandy Lean Clay and Lean Clay with Sand and Gravel.	 MH - ELASTIC SILT Includes Sandy Elastic Silt and Elastic Silt with Sand.	 CH - FAT CLAY Includes Sandy Fat Clay and Fat Clay with Sand.
 CL-ML - SILTY CLAY Includes Clayey Silt of low plasticity.	 OL - ORGANIC SILT and ORGANIC CLAY of low plasticity.	 OH - ORGANIC SILT and ORGANIC CLAY of medium to high plasticity.	 Pt - PEAT Includes humus, swamp and other soils with high organic content.
 FILL MATERIAL - Includes controlled and non-controlled soil and non-soil materials.	 TOPSOIL	 ASPHALT - Bituminous Asphalt	 CONCRETE - Includes broken concrete rubble.

Sample Symbols

 SS - Split Spoon	 ST - Shelby Tube	 RC - Rock Core	 GS - Geoprobe Sleeve
	 AU - Auger Cuttings	 GB - Grab	

Notes:

1. Exploratory borings were drilled on October 13, 2016 using 3/4-inch inside diameter hollow-stem augers.
2. These logs are subject to the limitations, conclusions, and recommendations in the report and should not be interpreted separate from the report.
3. Boring locations were established in the field by TTL Associates, Inc. with guidance from Tetra Tech.
4. Unconfined Compressive Strength (tsf):
NP – Non-plastic
NI – Not Intact

TABULATION OF TEST DATA

Boring Number	Sample Number	Sample Interval Depth (Feet)	Standard Penetration (Blows per Foot)	Natural Moisture Content (% of Dry Weight)	In-Place Dry Density (Pounds per Cubic Foot)	Unconfined Compressive Strength (Pounds per Square Foot)	Particle Size Distribution (%)						Atterberg Limits (%)			Unified Soil Classification			
							Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	Liquid Limit	Plastic Limit	Plasticity Index				
B-1	SS-1a	1.0-2.0	13	6.2															
	SS-1b	2.0-2.5		14.7		*7,500													
	SS-2	3.5-5.0	18	15.6		*9,000+													
	SS-3	6.0-7.5	30	11.5		*9,000+													
	SS-4	8.5-10.0	21	13.4	121.2	11,890	1	4	6	21	25	43	28	14	14			CL	
	SS-5	11.0-12.5	32	14.7		*8,000													
	SS-6	13.5-15.0	24	14.1															
B-2	SS-1a	1.0-2.0	23	4.3															
	SS-1b	2.0-2.5		14.0		*8,000													
	SS-2	3.5-5.0	22	13.0		*9,000+													
	SS-3	6.0-7.5	31	13.8		*9,000+													
	SS-4	8.5-10.0	17	14.8															
	SS-5	11.0-12.5	27	13.1															
	SS-6	13.5-15.0	11	10.1	112.9														

*Unconfined compressive strength derived from a calibrated hand penetrometer

TABULATION OF TEST DATA

Boring Number	Sample Number	Sample Interval Depth (Feet)	Standard Penetration (Blows per Foot)	Natural Moisture Content (% of Dry Weight)	In-Place Dry Density (Pounds per Cubic Foot)	Unconfined Compressive Strength (Pounds per Square Foot)	Particle Size Distribution (%)						Atterberg Limits (%)			Unified Soil Classification		
							Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	Liquid Limit	Plastic Limit	Plasticity Index			
B-3	SS-1	1.0-2.5	18	14.5														
	SS-2	3.5-5.0	16	17.1		*3,000												
	SS-3	6.0-7.5	20	13.4	112.5	3,940												
	SS-4	8.5-10.0	23	15.7		*8,000												
	SS-5	11.0-12.5	29	15.7		*7,500												
	SS-6	13.5-15.0	13	18.5														

*Unconfined compressive strength derived from a calibrated hand penetrometer



TTL Associates, Inc.
 1915 N 12th Street
 Toledo, Ohio 43624
 Telephone: 419-324-2222
 Fax: 419-241-1808

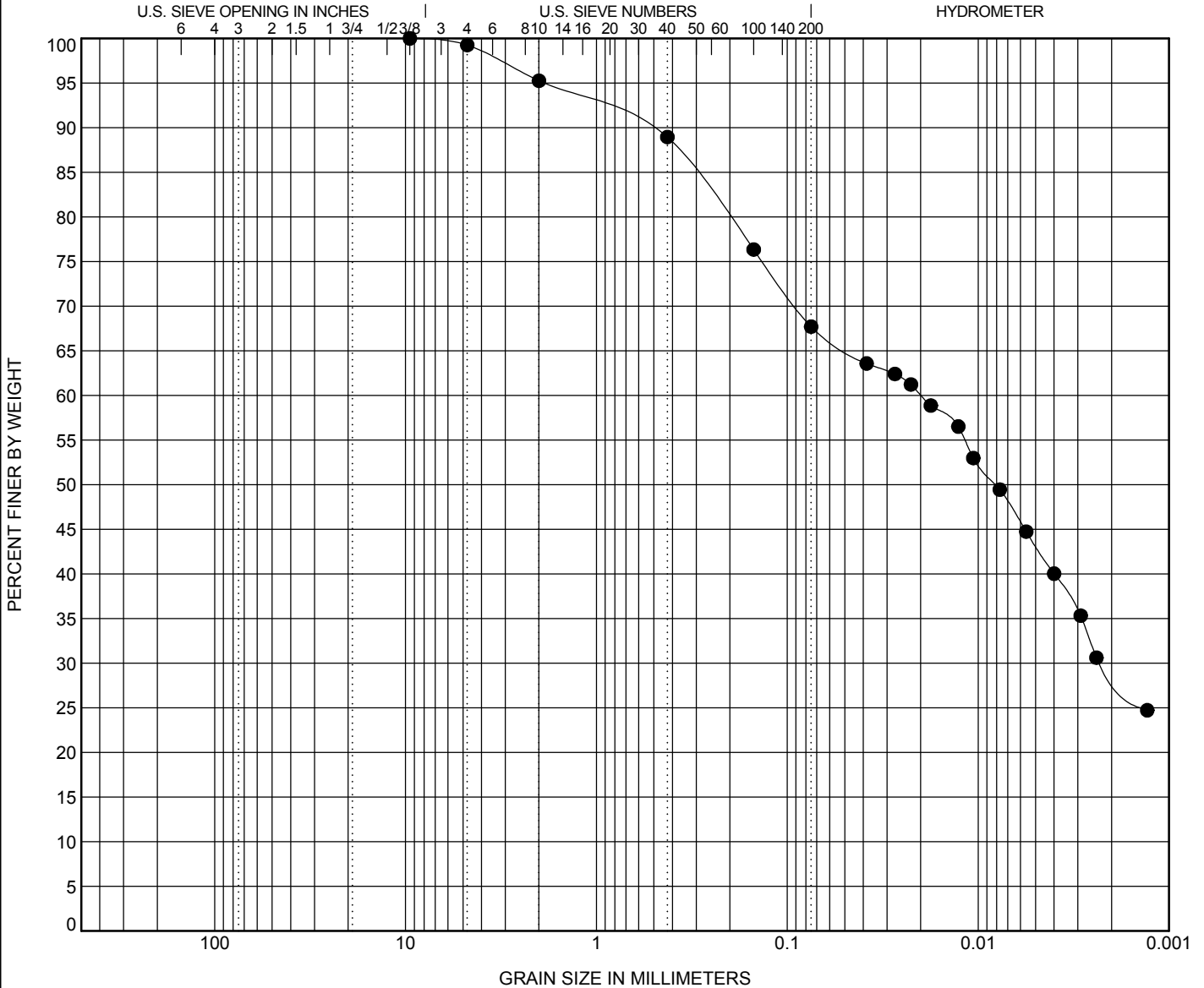
GRAIN SIZE DISTRIBUTION

CLIENT Tetra Tech

PROJECT NAME Proposed Water Main Upgrade

PROJECT NUMBER 14636.01

PROJECT LOCATION Ann Arbor, MI



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

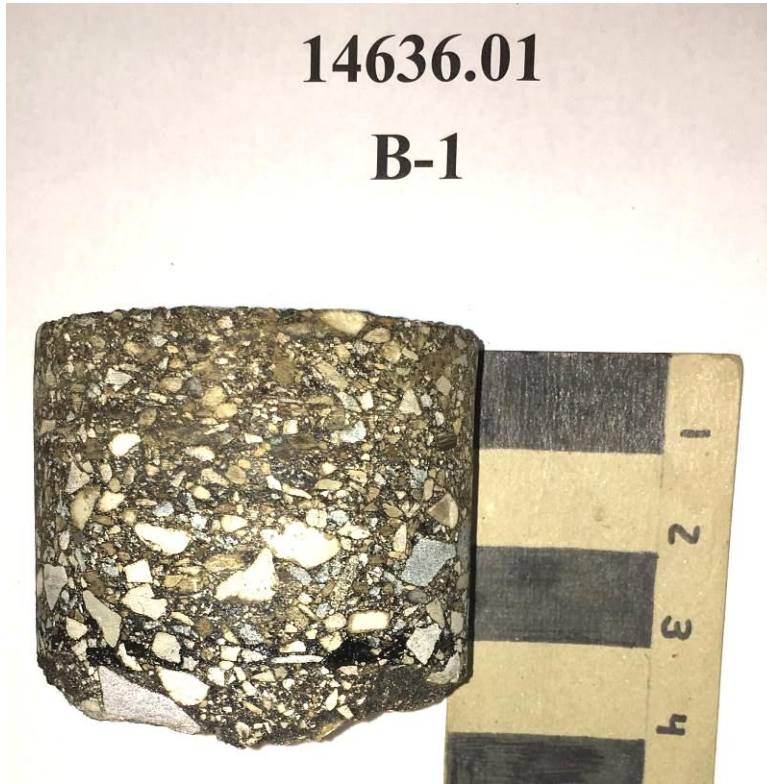
Specimen Identification	USCS Classification	LL	PL	PI	Cc	Cu
● B-1 8.5	SANDY LEAN CLAY (CL)	28	14	14		

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-1 8.5	9.5	0.02	0.002		0.7	31.6	24.5	43.2

GRAIN SIZE 14636.01.GPJ GINT US LAB.GDT 10/24/16

CORE LOG for B-1

Project: Proposed Water Main Upgrade
 Project Location: Ann Arbor, Michigan
 TTL Project No. 14636.01
 Core Date: October 13, 2016



ASPHALT THICKNESS (in)	=	3.25
CORE BARREL DIAMETER (in)	=	4.0

VISUAL DESCRIPTION:

Surface Course – 1” thick

Intermediate Course(s) – 1¼” and 1” thick

CORE LOG for B-2

Project: Proposed Water Main Upgrade
 Project Location: Ann Arbor, Michigan
 TTL Project No. 14636.01
 Core Date: October 13, 2016



ASPHALT THICKNESS (in)	=	6.5
CORE BARREL DIAMETER (in)	=	4.0

VISUAL DESCRIPTION:

Surface Course – 3½” thick

Intermediate Course – 3” thick

CORE LOG for B-3

Project: Proposed Water Main Upgrade
 Project Location: Ann Arbor, Michigan
 TTL Project No. 14636.01
 Core Date: October 13, 2016



ASPHALT THICKNESS (in)	=	5.0
CORE BARREL DIAMETER (in)	=	4.0

VISUAL DESCRIPTION:

Surface Course – 1" thick

Intermediate Course(s) – 2¼" and 1¾" thick

ATTACHMENTS

**CITY OF ANN ARBOR
LIVING WAGE ORDINANCE**

RATE EFFECTIVE APRIL 30, 2016 - ENDING APRIL 29, 2017

\$12.93 per hour

If the employer provides health care benefits*

\$14.43 per hour

If the employer does **NOT** provide health care benefits*

Employers providing services to or for the City of Ann Arbor or recipients of grants or financial assistance from the City of Ann Arbor for a value of more than \$10,000 in a twelve-month period of time must pay those employees performing work on a City of Ann Arbor contract or grant, the above living wage.

ENFORCEMENT

The City of Ann Arbor may recover back wages either administratively or through court action for the employees that have been underpaid in violation of the law. Persons denied payment of the living wage have the right to bring a civil action for damages in addition to any action taken by the City.

Violation of this Ordinance is punishable by fines of not more than \$500/violation plus costs, with each day being considered a separate violation. Additionally, the City of Ann Arbor has the right to modify, terminate, cancel or suspend a contract in the event of a violation of the Ordinance.

* Health Care benefits include those paid for by the employer or making an employer contribution toward the purchase of health care. The employee contribution must not exceed \$.50 an hour for an average work week; and the employer cost or contribution must equal no less than \$1/hr for the average work week.

The Law Requires Employers to Display This Poster Where Employees Can Readily See It.

**For Additional Information or to File a Complaint Contact:
Colin Spencer at 734/794-6500 or cspencer@a2gov.org**



Vendor Conflict of Interest Disclosure Form

All vendors interested in conducting business with the City of Ann Arbor must complete and return the Vendor Conflict of Interest Disclosure Form in order to be eligible to be awarded a contract. Please note that all vendors are subject to comply with the City of Ann Arbor's conflict of interest policies as stated within the certification section below.

If a vendor has a relationship with a City of Ann Arbor official or employee, an immediate family member of a City of Ann Arbor official or employee, the vendor shall disclose the information required below.

1. No City official or employee or City employee's immediate family member has an ownership interest in vendor's company or is deriving personal financial gain from this contract.
2. No retired or separated City official or employee who has been retired or separated from the City for less than one (1) year has an ownership interest in vendor's Company.
3. No City employee is contemporaneously employed or prospectively to be employed with the vendor.
4. Vendor hereby declares it has not and will not provide gifts or hospitality of any dollar value or any other gratuities to any City employee or elected official to obtain or maintain a contract.
5. Please note any exceptions below:

Conflict of Interest Disclosure*	
Name of City of Ann Arbor employees, elected officials or immediate family members with whom there may be a potential conflict of interest.	<input type="checkbox"/> Relationship to employee <hr style="border: 0; border-top: 1px solid black;"/> <input type="checkbox"/> Interest in vendor's company <input type="checkbox"/> Other (please describe in box below)

*Disclosing a potential conflict of interest does not disqualify vendors. In the event vendors do not disclose potential conflicts of interest and they are detected by the City, vendor will be exempt from doing business with the City.

I certify that this Conflict of Interest Disclosure has been examined by me and that its contents are true and correct to my knowledge and belief and I have the authority to so certify on behalf of the Vendor by my signature below:		
Vendor Name	Vendor Phone Number	
Signature of Vendor Authorized Representative	Date	Printed Name of Vendor Authorized Representative

Questions about this form? Contact Procurement Office City of Ann Arbor Phone: 734/794-6500, procurement@a2gov.org

**CITY OF ANN ARBOR
DECLARATION OF COMPLIANCE**

Non-Discrimination Ordinance

The “non discrimination by city contractors” provision of the City of Ann Arbor Non-Discrimination Ordinance (Ann Arbor City Code Chapter 112, Section 9:158) requires all contractors proposing to do business with the City to treat employees in a manner which provides equal employment opportunity and does not discriminate against any of their employees, any City employee working with them, or any applicant for employment on the basis of actual or perceived age, arrest record, color, disability, educational association, familial status, family responsibilities, gender expression, gender identity, genetic information, height, HIV status, marital status, national origin, political beliefs, race, religion, sex, sexual orientation, source of income, veteran status, victim of domestic violence or stalking, or weight. It also requires that the contractors include a similar provision in all subcontracts that they execute for City work or programs.

In addition the City Non-Discrimination Ordinance requires that all contractors proposing to do business with the City of Ann Arbor must satisfy the contract compliance administrative policy adopted by the City Administrator. A copy of that policy may be obtained from the Purchasing Manager

The Contractor agrees:

- (a) To comply with the terms of the City of Ann Arbor’s Non-Discrimination Ordinance and contract compliance administrative policy.
- (b) To post the City of Ann Arbor’s Non-Discrimination Ordinance Notice in every work place or other location in which employees or other persons are contracted to provide services under a contract with the City.
- (c) To provide documentation within the specified time frame in connection with any workforce verification, compliance review or complaint investigation.
- (d) To permit access to employees and work sites to City representatives for the purposes of monitoring compliance, or investigating complaints of non-compliance.

The undersigned states that he/she has the requisite authority to act on behalf of his/her employer in these matters and has offered to provide the services in accordance with the terms of the Ann Arbor Non-Discrimination Ordinance. The undersigned certifies that he/she has read and is familiar with the terms of the Non-Discrimination Ordinance, obligates the Contractor to those terms and acknowledges that if his/her employer is found to be in violation of Ordinance it may be subject to civil penalties and termination of the awarded contract.

Company Name

Signature of Authorized Representative

Date

Print Name and Title

Address, City, State, Zip

Phone/Email address

Questions about the Notice or the City Administrative Policy, Please contact:
Procurement Office of the City of Ann Arbor
(734) 794-6500

CITY OF ANN ARBOR NON-DISCRIMINATION ORDINANCE

Relevant provisions of Chapter 112, Nondiscrimination, of the Ann Arbor City Code are included below. You can review the entire ordinance at www.a2gov.org/departments/city-clerk

Intent: It is the intent of the city that no individual be denied equal protection of the laws; nor shall any individual be denied the enjoyment of his or her civil or political rights or be discriminated against because of actual or perceived age, arrest record, color, disability, educational association, familial status, family responsibilities, gender expression, gender identity, genetic information, height, HIV status, marital status, national origin, political beliefs, race, religion, sex, sexual orientation, source of income, veteran status, victim of domestic violence or stalking, or weight.

Discriminatory Employment Practices: No person shall discriminate in the hire, employment, compensation, work classifications, conditions or terms, promotion or demotion, or termination of employment of any individual. No person shall discriminate in limiting membership, conditions of membership or termination of membership in any labor union or apprenticeship program.

Discriminatory Effects: No person shall adopt, enforce or employ any policy or requirement which has the effect of creating unequal opportunities according to actual or perceived age, arrest record, color, disability, educational association, familial status, family responsibilities, gender expression, gender identity, genetic information, height, HIV status, marital status, national origin, political beliefs, race, religion, sex, sexual orientation, source of income, veteran status, victim of domestic violence or stalking, or weight for an individual to obtain housing, employment or public accommodation, except for a bona fide business necessity. Such a necessity does not arise due to a mere inconvenience or because of suspected objection to such a person by neighbors, customers or other persons.

Nondiscrimination by City Contractors: All contractors proposing to do business with the City of Ann Arbor shall satisfy the contract compliance administrative policy adopted by the City Administrator in accordance with the guidelines of this section. All city contractors shall ensure that applicants are employed and that employees are treated during employment in a manner which provides equal employment opportunity and tends to eliminate inequality based upon any classification protected by this chapter. All contractors shall agree not to discriminate against an employee or applicant for employment with respect to hire, tenure, terms, conditions, or privileges of employment, or a matter directly or indirectly related to employment, because of any applicable protected classification. All contractors shall be required to post a copy of Ann Arbor's Non-Discrimination Ordinance at all work locations where its employees provide services under a contract with the city.

Complaint Procedure: If any individual has a grievance alleging a violation of this chapter, he/she has 180 calendar days from the date of the individual's knowledge of the allegedly discriminatory action or 180 calendar days from the date when the individual should have known of the alleged discriminatory action to file a complaint with the city's Human Rights Commission. If an individual fails to file a complaint alleging a violation of this chapter within the specified time frame, the complaint will not be considered by the Human Rights Commission. The complaint should be made in writing to the Human Rights Commission. The complaint may be filed in person with the City Clerk, by e-mail (hrc@a2gov.org), by phone (734-794-6141) or by mail (Ann Arbor Human Rights Commission, PO Box 8647, Ann Arbor, MI 48107). The complaint must contain information about the alleged discrimination, such as name, address, phone number of the complainant and location, date and description of the alleged violation of this chapter.

Private Actions For Damages or Injunctive Relief: To the extent allowed by law, an individual who is the victim of discriminatory action in violation of this chapter may bring a civil action for appropriate injunctive relief or damages or both against the person(s) who acted in violation of this chapter.

THIS IS AN OFFICIAL GOVERNMENT NOTICE AND
MUST BE DISPLAYED WHERE EMPLOYEES CAN READILY SEE IT.