

PRUETER DRAIN

BIDDING DOCUMENTS



Prepared For:

SAGINAW COUNTY PUBLIC WORKS COMMISSIONER

Prepared By:



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Public Works Commissioner

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Phone 989-790-5258

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SAGINAW COUNTY PUBLIC WORKS COMMISSIONER

PRUETER DRAIN

**NOTICE OF LETTING, DAY OF REVIEW OF DRAINAGE DISTRICT BOUNDARIES AND
DAY OF REVIEW OF APPORTIONMENTS**

NOTICE OF LETTING

DATE: February 18, 2020

TIME: 10:00 a.m.

LOCATION: Spicer Group, Inc.
230 S. Washington Avenue
Saginaw, MI 48607

QUESTIONS: (989) 529-0256

The Saginaw County Public Works Commissioner will meet on the above date, time and location to receive construction bids for the Prueter Drain. Bids will then be opened and publicly announced.

The Prueter Drain will be let in 1 section as follows, having the length, average depth and width as set forth:

Said Drain is a tiled drain approximately 3,640 feet in length with an average depth of 6 feet. This Notice of Letting, the plans, specifications, and bid proposal shall be considered a part of the contract. The following items will be required, and a contract let for same:

STORM SEWER CONSTRUCTION

3,942	Lin. Ft.	6"-36" Dia. R.C.P. (C-76 III)
40	Each	2'-8' Dia. Drainage Structures
15	Each	Lateral Tile Connection
4	Each	Water Main Lowering, 6-10-Inch
11	Each	Relocate/Lower Existing Water Service
12	Each	Lower Sanitary Sewer Service Lead

PAVEMENT REPAIR

2,825	Sq. Yd.	Pavt, Rem
8.7	Station	Machine Grading, Modified
100	Cu. Yd.	Sub-Grade Undercut
845	Cu. Yd.	12 Inch Class II Granular Base, CIP
3,020	Sq. Yd.	Aggregate Base, 6 Inch, 21AA CIP
1,035	Lin. Ft.	Curb and Gutter, Remove and Replace
1,100	Ton	HMA Paving
1,260	Sq. Yd.	Driveway Restoration
3,300	Sq. Yd.	HMA Base Crushing and Shaping

260	Sq. Yd.	4" MDOT 22A Class I Shoulder
3	Each	Existing Water Box, Adjust to Grade
7	Each	Existing Structure Adjust
7	Each	Conc. Manhole Collar
500	Ton	Maintenance Gravel

SOIL EROSION AND SEDIMENT CONTROL

4	Each	Catch Basin Inlet Protection
1	Lump Sum	Seeding, Fertilizing and Mulching
1	Lump Sum	Cleanup and Site Restoration

TRAFFIC CONTROL

1	Lump Sum	Traffic Control
6	Each	Traffic Signal Adjustment
1,107	Sq. Ft.	Sign Type B, Temp
144	Sq. Ft.	Rem Spec Mrkg
6,072	Lin. Ft.	Pavt Mrkg, Longit, 6-Inch or Less Width, Rem
40	Each	Barricade, Type III, High Intensity, Double Sided
3	Each	Lighted Arrow, Type C
96	Each	Sign Cover
8,812	Lin. Ft.	Pavt Mrkg, Wet reflective, Type R, Tape, 4-Inch, Temp
205	Each	Plastic Drum, Fluorescent
3	Each	Pavt Mrkg, Wet reflective, Type R, Lt Turn Arrow
14	Lin. Ft.	Pavt Mrkg, Wet reflective, Type R, Tape, 24-Inch Stop Bar
3	Each	Pedestrian Type II Barricade, Temp
1	Lump Sum	Minor, Traf, Devices

SIGNALS

957	Lin. Ft.	Recable, TS
3	Each	Wireless Vehicle Sensor Node, Rem, Salv
12	Each	TS Head, Adj
4	Each	TS Face, Bag

PERMANENT PAVEMENT MARKINGS

12,316	Lin. Ft.	Pavement Markings
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MISCELLANEOUS

1	Lump Sum	Allowance-Contaminated Soil Testing and Tipping Fees Allowance
2	Each	Bentonite Clay Trench Barrier (Station 0+15+ and Station 2+15+)
480	Lin. Ft.	Chain Link Fence

This Notice of Letting, the plans, specifications and bid proposal shall be considered a part of the Contract. The Contract will be let in accordance with the Contract Documents now on file at the Saginaw County Public Works Commissioner's Office and available to interested parties. Bidding Documents, including plans and specifications, may be examined, beginning February 3, 2020 at the following:

Online at <http://www.saginawcounty.com/PublicWorks/Current-Projects.aspx>

Hard copies of the Contract Documents may be obtained upon payment of a \$50 non-refundable fee, beginning on February 3, 2020. An additional *non-refundable* charge of \$10.00 will be required for mailing out Bidding Documents. To order hard copies of the Contract Documents, please contact Ms. Angie McCullen at Spicer Group at (989) 921-5538.

A security deposit in the form of a cashier's check, money order, certified check or bidders' bond shall be submitted with any bids. No cash will be permitted. The security deposits of all unsuccessful bidders shall be returned after the Contract is awarded.

A **mandatory pre-bid conference** will be held at **10:00 a.m.** on the **5th day of February 2020**, at the office of Spicer Group, Inc., 230 S. Washington Avenue, Saginaw, Michigan 48607. It is a requirement that any prospective General Contractor bidding attend this meeting. Representatives of the Owner and Professional will be present to discuss the project. Attendance is required for sealed bids to be accepted. The Professional will transmit to all prospective bidders of record an Addendum as the Professional considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be legally effective.

The Contract will be awarded to the lowest responsive and responsible bidder giving adequate security for the performance of the work and meeting all conditions represented in the Instructions to Bidders. The Contract completion date and the terms of payment will be announced at the time and place of letting. If no satisfactory bids are received, we reserve the right to reject any and all bids and to adjourn to a time and location as we shall announce.

DAY OF REVIEW OF DRAINAGE DISTRICT BOUNDARIES

DATE: February 19, 2020
TIME: 9:00 a.m. to 5:00 p.m.
LOCATION: Saginaw County Public Works Commissioner's Office
 111 S. Michigan Avenue
 Saginaw, MI 48602
QUESTIONS: (989) 790-5258

The Saginaw County Public Works Commissioner will hold a Day of Review of Drainage District Boundaries on the above date, time and location. The Day of Review is an opportunity to review the Prueter Drain Drainage District boundaries. A map of the proposed Drainage District boundary revisions can be found at: <http://www.saginawcounty.com/PublicWorks/Current-Projects.aspx>

A general description of the lands by section number proposed to be added or deleted from the Drainage Districts as recommended by a licensed professional engineer or surveyor for each of the Drains is as follows:

Drain Name	Municipalities	Portions of Sections Added	Portions of Sections Removed
Prueter Drain	Buena Vista Charter Township	T.12N.-R5E: 29	

The Public Works Commissioner, engineers and/or other staff members will be available to assist individuals throughout the day and make revisions where necessary. There is no need to schedule an appointment for a specific time on the Day of Review.

Persons with disabilities needing accommodations for effective participation in the Day of Review should contact the Public Works Commissioner's Office at the number noted above (voice) or through the Michigan Relay Center at 7-1-1 (TDD) at least 24 hours in advance of the Day of Review to request mobility, visual, hearing or other assistance.

You may appeal the Public Works Commissioner's decision to revise the district boundary to the Saginaw County Circuit Court within ten (10) days.

DAY OF REVIEW OF APPORTIONMENTS

DATE: March 3, 2020
TIME: 9:00 a.m. to 5:00 p.m.
LOCATION: Saginaw County Public Works Commissioner’s Office
111 S. Michigan Avenue
Saginaw, MI 48602
QUESTIONS: (989) 790-5258

The Saginaw County Public Works Commissioner will hold a Day of Review of Apportionments on the above date, time and location.

The Day of Review is an opportunity to review the tentative apportionment of benefit for each parcel and municipality within the Drainage District.

The Public Works Commissioner, engineers and/or other staff members will be available to assist individuals throughout the day and make revisions where necessary. There is no need to schedule an appointment for a specific time on the Day of Review. The computation of costs for the Drain will also be available at the Day of Review. Drain assessments are collected in the same manner as property taxes and will appear on your winter tax bill. If drain assessments are being collected for more than one (1) year, you may pay the assessment in full with any interest to date at any time and avoid further interest charges.

Persons with disabilities needing accommodations for effective participation in the Day of Review should contact the Public Works Commissioner’s Office at the number noted above (voice) or through the Michigan Relay Center at 7-1-1 (TDD) at least 24 hours in advance of the Day of Review to request mobility, visual, hearing or other assistance.

You may appeal the Public Works Commissioner’s determination of apportionments to the Saginaw County Probate Court within ten (10) days.

The following is a condensed description of the land constituting the Prueter Drain Drainage District. The description of the area that is served by the Prueter Drain consists of lands situated in Section 29, T.12N.-R.3E., Buena Vista Charter Township, Saginaw County, Michigan.

Buena Vista Charter Township T.12N.-R.5E. Saginaw County, Michigan.

In Section 29 - The South ½ of the South ½ of the Southeast ¼ of the Northeast ¼ and the Northeast ¼ of the Southeast ¼ and the East ½ of the East ½ of the Northwest ¼ of the Southeast ¼ and the North ½ of the North ½ of the Southeast ¼ of the Southeast ¼ of the Section.

The following is a list of each county, township, city, or village to be assessed at large:

- Saginaw County
- Buena Vista Charter Township
- Michigan Department of Transportation

Dated: _____

Brian J. Wendling
Saginaw County Public Works Commissioner

INSTRUCTIONS TO BIDDERS

ARTICLE 1 – DEFINED TERMS

- 1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:
- A. *Issuing Office* – The office from which the Bidding Documents are to be issued.

ARTICLE 2 – COPIES OF BIDDING DOCUMENTS

- 2.01 Complete sets of the Bidding Documents may be obtained from the Issuing Office in the number and format stated in the advertisement or invitation to bid.
- 2.02 Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- 2.03 Owner and Engineer, in making copies of Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids for the Work and do not authorize or confer a license for any other use.

ARTICLE 3 – QUALIFICATIONS OF BIDDERS

- 3.01 To demonstrate Bidder's qualifications to perform the Work, after submitting its Bid and within 3 days of Owner's request, Bidder shall submit (a) written evidence establishing its qualifications such as financial data, previous experience, and present commitments, and (b) the following additional information:
- 3.02 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.
- 3.03 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.
- 3.04 Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.

ARTICLE 4 – SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER'S SAFETY PROGRAM; OTHER WORK AT THE SITE

- 4.01 *Site and Other Areas*
- A. The Site is identified in the Bidding Documents. By definition, the Site includes rights-of-way, easements, and other lands furnished by Owner for the use of the Contractor. Any additional lands required for temporary construction facilities, construction equipment, or storage of materials and equipment, and any access needed for such additional lands, are to be obtained and paid for by Contractor.
- 4.02 *Existing Site Conditions*
- A. Subsurface and Physical Conditions; Hazardous Environmental Conditions
1. The Supplementary Conditions identify:

- a. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site.
 - b. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).
 - c. reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site.
 - d. Technical Data contained in such reports and drawings.
2. Owner will make copies of reports and drawings referenced above available to any Bidder on request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Conditions, has been identified and established in the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.
3. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.
- B. Underground Facilities: Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site are set forth in the Contract Documents and are based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others.
- C. Adequacy of Data: Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions, and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in Paragraphs 5.03, 5.04, and 5.05 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work, appear in Paragraph 5.06 of the General Conditions.

4.03 *Site Visit and Testing by Bidders*

- A. Bidder shall conduct the required Site visit during normal working hours, and shall not disturb any ongoing operations at the Site.
- B. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site.
- C. Bidder shall comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.
- D. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

4.04 *Owner's Safety Program*

- A. Site visits and work at the Site may be governed by an Owner safety program. As the General Conditions indicate, if an Owner safety program exists, it will be noted in the Supplementary Conditions.

4.05 *Other Work at the Site*

- A. Reference is made to Article 8 of the Supplementary Conditions for the identification of the general nature of other work of which Owner is aware (if any) that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) and relates to the Work contemplated by these Bidding Documents. If Owner is party to a written contract for such other work, then on request, Owner will provide to each Bidder access to examine such contracts (other than portions thereof related to price and other confidential matters), if any.

ARTICLE 5 – BIDDER'S REPRESENTATIONS

5.01 It is the responsibility of each Bidder before submitting a Bid to:

- A. examine and carefully study the Bidding Documents, and any data and reference items identified in the Bidding Documents;
- B. visit the Site, conduct a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfy itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;
- C. become familiar with and satisfy itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work;
- D. carefully study all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings;
- E. consider the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs;
- F. agree, based on the information and observations referred to in the preceding paragraph, that at the time of submitting its Bid no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;
- G. become aware of the general nature of the work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;
- H. promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder;

- I. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work; and
- J. agree that the submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 6 – PRE-BID CONFERENCE

6.01 A **mandatory pre-bid conference** will be held at the time and location stated in the invitation or advertisement to bid. Representatives of Owner and Engineer will be present to discuss the Project. Bidders are required to attend and participate in the conference. Engineer will transmit to all prospective Bidders of record such Addenda as Engineer considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective.

ARTICLE 7 – INTERPRETATIONS AND ADDENDA

- 7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all parties recorded as having received the Bidding Documents. Questions received less than seven days prior to the date for opening of Bids may not be answered. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.
- 7.02 Addenda may be issued to clarify, correct, supplement, or change the Bidding Documents.

ARTICLE 8 – BID SECURITY

- 8.01 A Bid must be accompanied by Bid security made payable to **“Prueter Drain Drainage District”** in an amount of 5 percent of Bidder’s maximum Bid price (determined by adding the base bid and all alternates) and in the form of a certified check, bank money order, or a Bid bond issued by a surety meeting the requirements of Paragraphs 6.01 and 6.02 of the General Conditions.
- 8.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract Documents, furnished the required contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited. Such forfeiture shall be Owner’s exclusive remedy if Bidder defaults.
- 8.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective Date of the Contract or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.
- 8.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within seven days after the Bid opening.

ARTICLE 9 – CONTRACT TIMES

9.01 The number of days within which, or the dates by which the Work is to be substantially completed and ready for final payment are set forth in the Agreement.

ARTICLE 10 – LIQUIDATED DAMAGES

10.01 Provisions for liquidated damages, if any, for failure to timely attain a Milestone, Substantial Completion, or completion of the Work in readiness for final payment, are set forth in the Agreement.

ARTICLE 11 – SUBSTITUTE AND “OR-EQUAL” ITEMS

11.01 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration during the bidding and Contract award process of possible substitute or “or-equal” items. In cases in which the Contract allows the Contractor to request that Engineer authorize the use of a substitute or “or-equal” item of material or equipment, application for such acceptance may not be made to and will not be considered by Engineer until after the Effective Date of the Contract.

11.02 All prices that Bidder sets forth in its Bid shall be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of “or-equal” or substitution requests are made at Bidder’s sole risk.

ARTICLE 12 – SUBCONTRACTORS, SUPPLIERS, AND OTHERS

12.01 A Bidder shall be prepared to retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of the Work if required by the Bidding Documents (most commonly in the Specifications) to do so. If a prospective Bidder objects to retaining any such Subcontractor, Supplier, or other individual or entity, and the concern is not relieved by an Addendum, then the prospective Bidder should refrain from submitting a Bid.

12.02 Subsequent to the submittal of the Bid, Owner may not require the Successful Bidder or Contractor to retain any Subcontractor, Supplier, or other individual or entity against which Contractor has reasonable objection.

12.03 The apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening, submit to Owner a list of the Subcontractors or Suppliers proposed for the substantial portions of the Work.

If requested by Owner, such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, or other individual or entity. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder shall submit a substitute, Bidder’s Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.

12.04 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, or other individuals or entities. Declining to make requested substitutions will constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Owner or Engineer makes no written objection prior to the giving of the

Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 7.06 of the General Conditions.

ARTICLE 13 – PREPARATION OF BID

- 13.01 The Bid Form is included with the Bidding Documents.
- A. All blanks on the Bid Form shall be completed in ink and the Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.
- B. If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words “No Bid” or “Not Applicable.”
- 13.02 A Bid by a corporation shall be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation shall be shown.
- 13.03 A Bid by a limited liability company shall be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm shall be shown.
- 13.04 A Bid by an individual shall show the Bidder’s name and official address.
- 13.05 A Bid by a joint venture shall be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The official address of the joint venture shall be shown.
- 13.06 All names shall be printed in ink below the signatures.
- 13.07 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.
- 13.08 Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.
- 13.09 The Bid shall contain evidence of Bidder’s authority and qualification to do business in the state where the Project is located, or Bidder shall covenant in writing to obtain such authority and qualification prior to award of the Contract and attach such covenant to the Bid. Bidder’s state contractor license number, if any, shall also be shown on the Bid Form.

ARTICLE 14 – BASIS OF BID

- 14.01 *Lump Sum*
- A. Bidders shall submit a Bid on a lump sum basis as set forth in the Bid Form.
- 14.01 Base Bid with Alternates
- A. Bidders shall submit a Bid on a lump sum basis for the base Bid and include a separate price for each alternate described in the Bidding Documents and as provided for in the Bid Form. The price for each alternate will be the amount added to or deleted from the base Bid if Owner selects the alternate.
- B. In the comparison of Bids, alternates will be applied in the same order of priority as listed in the Bid Form.
- 14.02 *Unit Price*
- A. Bidders shall submit a Bid on a unit price basis for each item of Work listed in the unit price section of the Bid Form.

- B. The “Bid Price” (sometimes referred to as the extended price) for each unit price Bid item will be the product of the “Estimated Quantity” (which Owner or its representative has set forth in the Bid Form) for the item and the corresponding “Bid Unit Price” offered by the Bidder. The total of all unit price Bid items will be the sum of these “Bid Prices”; such total will be used by Owner for Bid comparison purposes. The final quantities and Contract Price will be determined in accordance with Paragraph 13.03 of the General Conditions.
- C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

14.03 *Allowances*

- A. For cash allowances the Bid price shall include such amounts as the Bidder deems proper for Contractor's overhead, costs, profit, and other expenses on account of cash allowances, if any, named in the Contract Documents, in accordance with Paragraph 13.02.B of the General Conditions.

ARTICLE 15 – SUBMITTAL OF BID

- 15.01 With each copy of the Bidding Documents, a Bidder is furnished one Affidavit of Compliance – Iran Economic Sanctions Act (C210) This form must be signed, notarized and included with the submitted bid package.
- 15.02 A Bid shall be received no later than the date and time prescribed and at the place indicated in the advertisement or invitation to bid and shall be enclosed in a plainly marked package with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted), the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with the notation “BID ENCLOSED.”
- 15.03 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

ARTICLE 16 – MODIFICATION AND WITHDRAWAL OF BID

- 16.01 A Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.
- 16.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 16.01 and submit a new Bid prior to the date and time for the opening of Bids.
- 16.03 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, that Bidder will be disqualified from further bidding on the Work.

ARTICLE 17 – OPENING OF BIDS

17.01 Bids will be opened at the time and place indicated in the advertisement or invitation to bid and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

ARTICLE 18 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE

18.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

ARTICLE 19 – EVALUATION OF BIDS AND AWARD OF CONTRACT

19.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible. If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, then the Owner will reject the Bid as nonresponsive; provided that Owner also reserves the right to waive all minor informalities not involving price, time, or changes in the Work.

19.02 If Owner awards the contract for the Work, such award shall be to the responsible Bidder submitting the lowest responsive Bid.

19.03 Evaluation of Bids

- A. In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.
- B. For the determination of the apparent low Bidder when unit price bids are submitted, Bids will be compared on the basis of the total of the products of the estimated quantity of each item and unit price Bid for that item, together with any lump sum items.

19.04 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.

19.05 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors or Suppliers.

ARTICLE 20 – BONDS AND INSURANCE

20.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the Agreement (executed by Successful Bidder) to Owner, it shall be accompanied by required bonds and insurance documentation.

ARTICLE 21 – SIGNING OF AGREEMENT

21.01 When Owner issues a Notice of Award to the Successful Bidder, it shall be accompanied by the unexecuted counterparts of the Agreement along with the other Contract Documents as identified in the Agreement. Within 15 days thereafter, Successful Bidder shall execute and deliver the required number of counterparts of the Agreement (and any bonds and insurance documentation required to be delivered by the Contract Documents) to Owner. Within ten days thereafter, Owner shall deliver one fully executed counterpart of the Agreement to Successful Bidder, together with printed and electronic copies of the Contract Documents as stated in Paragraph 2.02 of the General Conditions.

BID FORM

ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

Saginaw County Public Works Commissioner

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 – BIDDER’S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 90 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 – BIDDER’S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

<u>Addendum No.</u>	<u>Addendum, Date</u>

If no addenda have been issued, insert “N/A”. Bidder shall submit signed copies of the Addendum Acknowledgment receipt form issued with each addendum with the complete bid form.

- B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Bidder is familiar with and has satisfied itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

- E. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs.
- F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.
- G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents and confirms that the written resolution thereof by Engineer is acceptable to Bidder.
- I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.
- J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 4 – BIDDER'S CERTIFICATION

4.01 Bidder certifies that:

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:
 - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process;
 - 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 - 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and
 - 4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

ARTICLE 5 – BASIS OF BID

5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

UNIT PRICE BID – SEE ATTACHED BID FORM

Bidder acknowledges that (1) each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor’s overhead and profit for each separately identified item, and (2) estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all unit price Bid items will be based on actual quantities, determined as provided in the Contract Documents.

ARTICLE 6 – TIME OF COMPLETION

6.01 Bidder agrees that the Work will be substantially complete on or before **September 15, 2020** and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before **October 15, 2020**.

6.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 7 – ATTACHMENTS TO THIS BID

7.01 The following documents are submitted with and made a condition of this Bid:

- A. Required Bid security;
- B. Affidavit of Compliance – Iran Economic Sanctions Act;

ARTICLE 8 – DEFINED TERMS

8.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 9 – INSPECTION DAYS

9.01 In addition, BIDDER accepts:

- A. That the OWNER will provide, through the PROFESSIONAL, reference points for construction and the CONTRACTOR will be responsible for lay out (staking) the work sufficient for construction purposes in accordance with applicable parts of paragraph 4.4 of the General Conditions and the Supplementary Conditions.
- B. All inspection on this project will be performed by the PROFESSIONAL. The Contractor shall state in the proposal the number is inspection days required for the completion of this project.

A required minimum number of Inspection days has been shown in the proposal.

The Contractor is to bid the Additional Inspection if in his opinion the Inspection amount is not adequate, in which case the Contractor should write in the blank the total number additional inspection days he feels it will take to complete this project.

The Total inspection day’s fee bid will be part of the total contract price and will be considered to determine the low bidder on the project.

An inspection day shall be an 8-hour day, Monday thru Friday and not a holiday day when an inspector or resident project representative is required to observe the following type of work:

1. When any pay item is being installed.
2. Laying pipe and appurtenances.
3. Digging bore pits.
4. Boring operations.
5. Installing concrete sidewalk or driveways.
6. Installing bituminous walks or driveways.
7. Backfilling trenches.
8. Exploratory Excavation/Utility location.
9. Cutting a roadway to grade.
10. Undercutting.
11. Installing subbase, base and wearing courses for a roadway.
12. Installing any manholes or catchbasins.
13. Setting of castings on manholes and catchbasins.
14. Installing/Reconnecting water or sewer services.
15. Making a road crossing and repairing a road crossing.

This is not intended to be an all-inclusive list, but rather a mere sample.

The amount bid for inspection days shall not change through the course of the project unless by Change Order to the Contract for additional work and shall be prepared by the PROFESSIONAL.

Each progress payment shall include a section where the Contractor is paid the number of inspection days used up to the bid amount unless additional days have been added. The progress payment shall also have a section where the actual number of inspection days used shall be deducted from the Contractor's progress payment.

If the project is completed at the Inspection (Minimum Estimated by the Engineer) amount or under, the Inspection (Minimum Days Estimated by Engineer) amount shall be deducted from the Contract **and the remainder will be credited to the Contractor.**

If the project is completed at the Additional Inspection (Extra Days Estimated by Contractor) amount or under, the amount actually used, shall be deducted from the contract **and the remainder will be credited to the Contractor.**

The person doing the inspection and observation shall be known as the Resident Project Representative (RPR) whose limitations of authority and responsibilities are generally described in paragraph 9.13 of the General Conditions.

The CONTRACTOR shall be responsible for coordinating with the PROFESSIONAL the starting and stopping times of each workday. Any work performed by the CONTRACTOR without the Resident Project Representative will not be paid or shall be exposed, uncovered and witnessed that it was properly installed before recommendation for payment will be made.

Hours worked in excess of the **8** hour-day, a **40** hour work week; hours on Saturday, Sunday, or hours on a Holiday shall be charged at 1 ½ times **\$105.00** per hour.

Show-up time for the Resident Project Representative will be charge at a minimum of two hours per day.

- 9.02 The inspector's daily report (IDR) shall reflect the exact hours to be charged to the Contractor for that particular day. The contractor shall receive copies of the weeks IDR the following Monday morning.

ARTICLE 10 – BIDDER COMMUNICATIONS

- 10.01 Communications concerning this Bid shall be addressed to:

Dave Vallier, Project Manager, 230 S. Washington Ave., Saginaw, MI 48607-1286, Phone: (989) 233-0136, Email: davev@spicergroup.com

ARTICLE 11 – BID SUBMITTAL

BIDDER: *[Indicate correct name of bidding entity]*

By:
[Signature] _____

[Printed name] _____
(If Bidder is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest:
[Signature] _____

[Printed name] _____

Title: _____

Submittal Date: _____

Address for giving notices:

Telephone Number: _____

Fax Number: _____

Contact Name and e-mail address: _____

Bidder's License No.: _____
(where applicable)

NOTE TO USER: Use in those states or other jurisdictions where applicable or required.

**PRUETER DRAIN
 BID FORM**

Item No.	Estimated Quantity	Unit	Description	Unit Price	Amount
<u>STORM SEWER CONSTRUCTION MDOT M-46 HWY.</u>					
1.	232	Lin. Ft.	36" Dia. R.C.P. (C-76 III) (w/Nitrile Gaskets)	\$ _____	\$ _____
2.	293	Lin. Ft.	36" Dia. R.C.P. (C-76 III) (w/wrapped joints)	\$ _____	\$ _____
3.	291	Lin. Ft.	30" Dia. R.C.P. (C-76 III) (w/wrapped joints)	\$ _____	\$ _____
4.	16	Lin. Ft.	12" Dia. R.C.P. C. B. Lead (C-76 III) (w/wrapped joints)	\$ _____	\$ _____
5.	1	Each	8' Dia. M.H. (Connect to Kohler Drain) (Includes casting, frame, grate and adjustment)	\$ _____	\$ _____
6.	1	Each	8' Dia. M.H. (Includes casting, frame, grate and adjustment)	\$ _____	\$ _____
7.	1	Each	7' Dia. M.H. (Includes casting, frame, grate and adjustment)	\$ _____	\$ _____
8.	3	Each	6' Dia. M.H. (Includes casting, frame, grate and adjustment)	\$ _____	\$ _____
9.	1	Each	5' Dia. M.H. (Includes casting, frame, grate and adjustment)	\$ _____	\$ _____
10.	3	Each	4' Dia. M.H./C.B. (Includes casting, frame, grate and adjustment)	\$ _____	\$ _____
11.	650	Lin. Ft.	6" Perforated Tile w/Sock (Includes connection to proposed structures)	\$ _____	\$ _____
12.	3	Each	Lateral Tile Connection	\$ _____	\$ _____
13.	1	Each	Water Main Lowering, 8-Inch AC	\$ _____	\$ _____
14.	1	Each	Water Main Lowering, 10-Inch AC	\$ _____	\$ _____
15.	2	Each	Relocate/Lower Existing Water Service (1-Inch to 2-Inch Service)	\$ _____	\$ _____
16.	3	Each	Lower Sanitary Sewer Service Lead	\$ _____	\$ _____
<u>PAVEMENT REPAIR - MDOT M-46 HWY.</u>					
17.	2,825	Sq. Yd.	Pavt, Rem	\$ _____	\$ _____
18.	8.7	Station	Machine Grading, Modified (approximately 1,260 cubic yards)	\$ _____	\$ _____
19.	100	Cu. Yd.	Sub-Grade Undercut	\$ _____	\$ _____

20.	845	Cu. Yd.	12 Inch Class II Granular Base, CIP	\$ _____	\$ _____
21.	3,020	Sq. Yd.	Aggregate Base, 6 Inch, 21AA CIP	\$ _____	\$ _____
22.	725	Lin. Ft.	Curb and Gutter, Remove and Replace, Det F2	\$ _____	\$ _____
23.	310	Lin. Ft.	Driveway Opening, Conc, Det M	\$ _____	\$ _____
24.	170	Ton	HMA Approach, LVSP	\$ _____	\$ _____
25.	425	Ton	HMA Base Course 3E3	\$ _____	\$ _____
26.	285	Ton	HMA Leveling Course 4E3HS	\$ _____	\$ _____
27.	215	Ton	HMA Wearing Course 5E3HS	\$ _____	\$ _____
28.	5	Ton	Hand Patching	\$ _____	\$ _____
29.	3	Each	Existing Water Box, Adjust to Grade	\$ _____	\$ _____
30.	1	Each	Existing Structure Adjust	\$ _____	\$ _____
31.	7	Each	Conc. Manhole Collar	\$ _____	\$ _____
32.	500	Ton	Maintenance Gravel	\$ _____	\$ _____

SOIL EROSION AND SEDIMENT CONTROL - MDOT M-46 HWY.

33.	4	Each	Catch Basin Inlet Protection	\$ _____	\$ _____
34.	1	Lump Sum	Seeding, Fertilizing and Mulching	<u>Lump Sum</u>	\$ _____
35.	1	Lump Sum	Cleanup and Site Restoration (Includes 4" of imported screened top soil)	<u>Lump Sum</u>	\$ _____

TRAFFIC CONTROL - MDOT M-46 HWY.

36.	144	Sq. Ft.	Rem Spec Mrkg	\$ _____	\$ _____
37.	6072	Lin. Ft.	Pavt Mrkg, Longit, 6-Inch or Less Width, Rem	\$ _____	\$ _____
38.	40	Each	Barricade, Type III, High Intensity, Double Sided, Lighted, Furn, Oper	\$ _____	\$ _____
39.	3	Each	Lighted Arrow, Type C, Furn, Oper	\$ _____	\$ _____
40.	96	Each	Sign Cover	\$ _____	\$ _____
41.	3414	Lin. Ft.	Pavt Mrkg, Wet reflective, Type R, Tape, 4-Inch, White, Temp	\$ _____	\$ _____
42.	5398	Lin. Ft.	Pavt Mrkg, Wet reflective, Type R, Tape, 4-Inch, Yellow, Temp	\$ _____	\$ _____
43.	205	Each	Plastic Drum, Fluorescent, Furn, Oper	\$ _____	\$ _____

44.	3	Each	Pavt Mrkg, Wet reflective, Type R, Lt Turn Arrow	\$ _____	\$ _____
45.	14	Lin. Ft.	Pavt Mrkg, Wet reflective, Type R, Tape, 24-Inch Stop Bar	\$ _____	\$ _____
46.	887	Sq. Ft.	Sign, Type B, Temp, Prismatic, Furn, Oper	\$ _____	\$ _____
47.	220	Sq. Ft.	Sign, Type B, Temp, Prismatic, Special, Furn, Oper	\$ _____	\$ _____
48.	3	Each	Pedestrian Type II Barricade, Temp	\$ _____	\$ _____
49.	1	Lump Sum	Minor, Traf, Devices	<u>Lump Sum</u>	\$ _____

SIGNALS PHASE I - MDOT M-46 HWY.

50.	957	Lin. Ft.	Recable, TS	\$ _____	\$ _____
51.	3	Each	Wireless Vehicle Sensor Node, Rem, Salv	\$ _____	\$ _____
52.	6	Each	TS Head, Adj	\$ _____	\$ _____
53.	4	Each	TS Face, Bag	\$ _____	\$ _____

SIGNALS PHASE II- MDOT M-46 HWY.

54.	4	Each	TS Face, Bag, Rem	\$ _____	\$ _____
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SIGNALS RESTORATION PHASE - MDOT M-46 HWY.

55.	6	Each	TS Head, Adj	\$ _____	\$ _____
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PERMANENT PAVEMENT MARKINGS - MDOT M-46 HWY

56.	78	Lin. Ft.	Pavt Mrkg, Ovly, Cold Plastic, 6-Inch Crosswalk	\$ _____	\$ _____
57.	38	Lin. Ft.	Pavt Mrkg, Ovly, Cold Plastic, 24-Inch Stop Bar	\$ _____	\$ _____
58.	4	Lin. Ft.	Pavt Mrkg, Ovly, Cold Plastic, Lt Turn Arrow Sym	\$ _____	\$ _____
59.	1733	Lin. Ft.	Pavt Mrkg, Waterborne, 4-Inch, White	\$ _____	\$ _____
60.	4365	Lin. Ft.	Pavt Mrkg, Waterborne, 4-Inch, Yellow	\$ _____	\$ _____
61.	1733	Lin. Ft.	Pavt Mrkg, Waterborne, 2nd Application, 4-Inch, White	\$ _____	\$ _____
62.	4365	Lin. Ft.	Pavt Mrkg, Waterborne, 2nd Application, 4-Inch, Yellow	\$ _____	\$ _____

MISCELLANEOUS - MDOT M-46 HWY.

63.	1	Lump Sum	Allowance-Contaminated Soil Testing and Tipping Fees Allowance	<u>Lump Sum</u>	<u>\$25,000.00</u>
64.	2	Each	Bentonite Clay Trench Barrier (Station 0+15± and Station 2+15±)	\$ _____	\$ _____
65.	30	Day	Inspection (minimum days estimated by Engineer)	<u>\$840.00</u>	<u>\$25,200.00</u>

66. _____ Day Inspection (additional days estimated by Contractor) \$840.00 \$ _____

SUB-TOTAL MDOT M-46 CONSTRUCTION----- \$ _____

STORM SEWER CONSTRUCTION PRUETER DRIVE MAIN BR.

67.	144	Lin. Ft.	30" Dia. R.C.P. (C-76 III) (w/wrapped joints)	\$ _____	\$ _____
68.	612	Lin. Ft.	24" Dia. R.C.P. (C-76 III) (w/wrapped joints)	\$ _____	\$ _____
69.	318	Lin. Ft.	15" Dia. R.C.P. (C-76 III) (w/wrapped joints)	\$ _____	\$ _____
70.	1,441	Lin. Ft.	12" Dia. R.C.P. (C-76 III) (w/wrapped joints)	\$ _____	\$ _____
71.	1	Each	6' Dia. M.H. (Includes casting, frame, grate and adjustment)	\$ _____	\$ _____
72.	1	Each	6' Dia. M.H./C.B. (Includes casting, frame, grate and adjustment)	\$ _____	\$ _____
73.	2	Each	5' Dia. M.H./C.B. (Includes casting, frame, grate and adjustment)	\$ _____	\$ _____
74.	6	Each	4' Dia. M.H./C.B. (Includes casting, frame, grate and adjustment)	\$ _____	\$ _____
75.	6	Each	3' Dia. C.B. (Includes casting, frame, grate and adjustment)	\$ _____	\$ _____
76.	3	Each	2' Dia. C.B. (Includes casting, frame, grate and adjustment)	\$ _____	\$ _____
77.	3	Each	24" x 12" R.C.P. Inlet Tee (Includes casting, frame, grate and adjustment)	\$ _____	\$ _____
78.	10	Each	12" x 12" R.C.P. Inlet Tee (Includes casting, frame, grate and adjustment)	\$ _____	\$ _____
79.	12	Each	Lateral Tile Connection	\$ _____	\$ _____
80.	2	Each	Water Main Lowering, 6- Inch AC	\$ _____	\$ _____
81.	9	Each	Relocate/Lower Existing Water Service (3/4-Inch Service)	\$ _____	\$ _____
82.	9	Each	Lower Sanitary Sewer Service Lead	\$ _____	\$ _____

STORM SEWER CONSTRUCTION PRUETER DRIVE BR. 1

83.	1	Each	4' Dia. M.H./C.B. (Includes casting, frame, grate and adjustment)	\$ _____	\$ _____
84.	240	Lin. Ft.	15" Dia. R.C.P. (C-76 III)	\$ _____	\$ _____

STORM SEWER CONSTRUCTION PRUETER DRIVE BR. 2

85.	605	Lin. Ft.	12" Dia. R.C.P. (C-76 III)	\$ _____	\$ _____
86.	4	Each	3' Dia. C.B. (Includes casting, frame, grate and adjustment)	\$ _____	\$ _____
87.	1	Each	2' Dia. C.B. (Includes casting, frame, grate and adjustment)	\$ _____	\$ _____
88.	100	Lin. Ft.	2" x 4" x 4' Welded Wire Fence (Includes 4 x 4 treated wood posts)	\$ _____	\$ _____
89.	100	Lin. Ft.	Chain Link Fence, Galvanized, 4' High	\$ _____	\$ _____

STORM SEWER CONSTRUCTION PRUETER DRIVE BR. 3

90.	443	Lin. Ft.	12" Dia. R.C.P. (C-76 III)	\$ _____	\$ _____
91.	1	Each	12" x 12" R.C.P. Inlet Tee (Includes grate and adjustment)	\$ _____	\$ _____
92.	3	Each	3' Dia. C.B. (Includes casting, frame, grate and adjustment)	\$ _____	\$ _____
93.	1	Each	2' Dia. C.B. (Includes casting, frame, grate and adjustment)	\$ _____	\$ _____
94.	2	Each	4'x10' Chain Link Fence Gate, Galvanized	\$ _____	\$ _____

PAVEMENT REPAIR - PRUETER DRIVE

95.	300	Sq. Yd.	Driveway, Nonreinf Conc, 6-Inch	\$ _____	\$ _____
96.	660	Sq. Yd.	HMA Approach 13A or LSVP	\$ _____	\$ _____
97.	300	Sq. Yd.	Gravel Driveway Restoration	\$ _____	\$ _____

PAVEMENT CRUSH AND SHAPE -PRUETER DRIVE

98.	3,300	Sq. Yd.	HMA Base Crushing and Shaping	\$ _____	\$ _____
99.	410	Ton	2" Leveling Course - HMA	\$ _____	\$ _____
100.	310	Ton	1.5" Wearing Course - HMA	\$ _____	\$ _____
101.	260	Sq. Yd.	4" MDOT 22A Crushed Limestone Class I Shoulder	\$ _____	\$ _____
102.	3	Each	Existing Water Boxes Adjust to Grade	\$ _____	\$ _____
103.	6	Each	Existing Structure Adjust	\$ _____	\$ _____

SOIL EROSION AND SEDIMENT CONTROL - PRUETER DRIVE & BRANCHES

104.	1	Lump Sum	Seeding, Fertilizing and Mulching	Lump Sum	\$ _____
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105.	1	Lump Sum	Landscape Grading and Cleanup and Restoration (Includes 4" of imported screened top soil)	Lump Sum	\$	_____
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MISCELLANEOUS - PRUETER DRIVE & BRANCHES

106.	1	Lump Sum	Site Clearing and Debris Management	Lump Sum	\$	_____
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107.	1	Lump Sum	Traffic Control	Lump Sum	\$	_____
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108.	30	Day	Inspection (minimum days estimated by Engineer)	\$840.00		\$25,200.00
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109.	_____	Day	Inspection (additional days estimated by Contractor)	\$840.00	\$	_____
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SUB TOTAL PRUETER DRIVE STORM SEWER CONSTRUCTION----- \$ _____

TOTAL BASE BID----- \$ _____

STORM SEWER CONSTRUCTION MDOT M-46 HWY. - ALTERNATE BID ITEMS

1.	525	Lin. Ft.	36" HP Storm Sewer (w/Nitrile Gaskets)	\$	_____	\$	_____
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2.	293	Lin. Ft.	36" HP Storm Sewer (w/watertight joints)	\$	_____	\$	_____
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3.	289	Lin. Ft.	30" HP Storm Sewer (w/watertight joints)	\$	_____	\$	_____
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4.	16	Lin. Ft.	12" HP Storm Sewer (w/watertight joints)	\$	_____	\$	_____
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5.	5	Each	Corporation, Saddle and Reconnect Existing Water Service (Investigation and Install Only)	\$	_____	\$	_____
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**TOTAL STORM SEWER CONSTRUCTION MDOT M-46 HWY.
ALTERNATE BID ITEMS-----** \$ _____

**STORM SEWER CONSTRUCTION PRUETER DRIVE AND BRANCHES
ALTERNATE BID ITEMS**

1.	144	Lin. Ft.	30" HP Storm Sewer	\$	_____	\$	_____
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2.	612	Lin. Ft.	24" N12 - Mega Green Storm Sewer	\$	_____	\$	_____
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3.	558	Lin. Ft.	15" N12 - Mega Green Storm Sewer	\$	_____	\$	_____
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4.	2,415	Lin. Ft.	12" N12 - Mega Green Storm Sewer	\$	_____	\$	_____
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5.	1	Each	36" Dia. Nyloplast Drain Basin (Includes domed grate and adjustment)	\$	_____	\$	_____
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6.	3	Each	30" Dia. Nyloplast Drain Basin (Includes domed grate and adjustment)	\$	_____	\$	_____
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7.	8	Each	24" Dia. Nyloplast Drain Basin (Includes domed grate and adjustment)	\$	_____	\$	_____
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8.	2	Each	18" Dia. Nyloplast Drain Basin (Includes domed grate and adjustment)	\$ _____	\$ _____
9.	7	Each	15" Dia. Nyloplast Drain Basin (Includes domed grate and adjustment)	\$ _____	\$ _____
10.	2	Each	12" Dia. Nyloplast Drain Basin (Includes domed grate and adjustment)	\$ _____	\$ _____
11.	3	Each	24" x 12" N12 - Mega Green Tee	\$ _____	\$ _____
12.	10	Each	12" x 12" N12 - Mega Green Tee	\$ _____	\$ _____
13.	13	Each	12" x 12" N12 - Mega Green Inline Drain (Includes domed grate and adjustment)	\$ _____	\$ _____

TOTAL STORM SEWER PRUETER DRIVE AND BRANCHES
ALTERNATE BID ITEMS-----

\$ _____

NOTICE OF AWARD

Date of Issuance:

Owner: Saginaw County Public Works Commissioner Owner's Contract No.:

Engineer: Spicer Group, Inc. Engineer's Project No.: 126725SG2019

Project: Prueter Drain Contract Name:

Bidder:

Bidder's Address:

TO BIDDER:

You are notified that Owner has accepted your Bid dated [_____] for the above Contract, and that you are the Successful Bidder and are awarded a Contract for:

[describe Work, alternates, or sections of Work awarded]

The Contract Price of the awarded Contract is: \$ _____ *[note if subject to unit prices, or cost-plus]*

unexecuted counterparts of the Agreement accompany this Notice of Award, and one copy of the Contract Documents accompanies this Notice of Award, or has been transmitted or made available to Bidder electronically. *[revise if multiple copies accompany the Notice of Award]*

a set of the Drawings will be delivered separately from the other Contract Documents.

You must comply with the following conditions precedent within 15 days of the date of receipt of this Notice of Award:

1. Deliver to Owner [____] counterparts of the Agreement, fully executed by Bidder.
2. Deliver with the executed Agreement(s) the Contract security *[e.g., performance and payment bonds]* and insurance documentation as specified in the Instructions to Bidders and General Conditions, Articles 2 and 6.
3. Other conditions precedent (if any):

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Award and declare your Bid security forfeited.

Within ten days after you comply with the above conditions, Owner will return to you one fully executed counterpart of the Agreement, together with any additional copies of the Contract Documents as indicated in Paragraph 2.02 of the General Conditions.

Owner:

Authorized Signature

By:

Title:

Copy: Engineer

AGREEMENT

THIS AGREEMENT is by and
between

Saginaw County Public Works Commissioner (“Owner”) and

 (“Contractor”).

Owner and Contractor hereby agree as follows:

ARTICLE 1 – WORK

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

ARTICLE 2 – THE PROJECT

2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows: Prueter Drain.

ARTICLE 3 – ENGINEER

3.01 The Project has been designed by Spicer Group, Inc.

3.02 The Owner has retained Spicer Group, Inc. (“Engineer”) to act as Owner’s representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 – CONTRACT TIMES

4.01 *Time of the Essence*

A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 *Contract Times: Dates*

A. The Work will be substantially completed on or before September 15, 2020, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before October 15, 2020.

4.03 *Liquidated Damages*

A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with the Contract. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):

1. Substantial Completion: Contractor shall pay Owner \$500 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified in Paragraph 4.02.A above for Substantial Completion until the Work is substantially complete.
2. Completion of Remaining Work: After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner \$500 for each day that expires after such time until the Work is completed and ready for final payment.
3. Liquidated damages for failing to timely attain Substantial Completion and final completion are not additive and will not be imposed concurrently.
4. Milestones: Contractor shall pay Owner \$500 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for achievement of Milestone 1, until Milestone 1 is achieved.

4.04 *Special Damages*

- A. In addition to the amount provided for liquidated damages, Contractor shall reimburse Owner (1) for any fines or penalties imposed on Owner as a direct result of the Contractor's failure to attain Substantial Completion according to the Contract Times, and (2) for the actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified in Paragraph 4.02 for Substantial Completion (as duly adjusted pursuant to the Contract), until the Work is substantially complete.
- B. After Contractor achieves Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times, Contractor shall reimburse Owner for the actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified in Paragraph 4.02 for Work to be completed and ready for final payment (as duly adjusted pursuant to the Contract), until the Work is completed and ready for final payment.

ARTICLE 5 – CONTRACT PRICE

- 5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents the amounts that follow, subject to adjustment under the Contract:
- A. For all Work, at the prices stated in Contractor's Bid, attached hereto as an exhibit (see Exhibit A).

ARTICLE 6 – PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

- A. Contractor shall submit Applications for Payment in accordance with Article 15 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

6.02 *Progress Payments; Retainage*

- A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the 28th day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based

on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract

a. 90 percent of Work completed (with the balance being retainage). If the Work has been 50 percent completed as determined by Engineer, and if the character and progress of the Work have been satisfactory to Owner and Engineer, then as long as the character and progress of the Work remain satisfactory to Owner and Engineer, there will be no additional retainage; and

B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 100 percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less 100 percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 *Final Payment*

A. Upon final completion and acceptance of the Work in accordance with Paragraph 15.06 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 15.06.

ARTICLE 7 – INTEREST

7.01 All amounts not paid when due shall bear interest at the rate of 0 percent per annum.

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

8.01 In order to induce Owner to enter into this Contract, Contractor makes the following representations:

A. Contractor has examined and carefully studied the Contract Documents, and any data and reference items identified in the Contract Documents.

B. Contractor has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Contractor is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

E. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the

Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (3) Contractor's safety precautions and programs.

- F. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
- G. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
- H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
- I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
- J. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 *Contents*

- A. The Contract Documents consist of the following:
 - 1. This Agreement (pages 1 to 7, inclusive).
 - 2. Performance bond (pages 1 to 3, inclusive).
 - 3. Payment bond (pages 1 to 4, inclusive).
 - 4. General Conditions (pages 1 to 65, inclusive).
 - 5. Supplementary Conditions (pages 1 to 6, inclusive).
 - 6. Specifications as listed in the table of contents of the Project Manual.
 - 7. The Drawings are listed on the document title page.
 - 8. Addenda (numbers █ to █, inclusive).
 - 9. Exhibits to this Agreement (enumerated as follows):
 - a. Contractor's Bid (pages █ to █, inclusive).
 - 10. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
 - a. Notice to Proceed.
 - b. Work Change Directives.
 - c. Change Orders.
 - d. Field Orders.
- B. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 9.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in the General Conditions.

ARTICLE 10 – MISCELLANEOUS

10.01 *Terms*

- A. Terms used in this Agreement will have the meanings stated in the General Conditions and the Supplementary Conditions.

10.02 *Assignment of Contract*

- A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, money that may become due and money that is due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

10.03 *Successors and Assigns*

- A. Owner and Contractor each binds itself, its successors, assigns, and legal representatives to the other party hereto, its successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

10.04 *Severability*

- A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

10.05 *Contractor's Certifications*

- A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 10.05:
 1. “corrupt practice” means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process or in the Contract execution;
 2. “fraudulent practice” means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 3. “collusive practice” means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and
 4. “coercive practice” means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

10.06 *Other Provisions*

- A. Owner stipulates that if the General Conditions that are made a part of this Contract are based on EJCDC® C-700, Standard General Conditions for the Construction Contract, published by the Engineers Joint Contract Documents Committee®, and if Owner is the

party that has furnished said General Conditions, then Owner has plainly shown all modifications to the standard wording of such published document to the Contractor, through a process such as highlighting or “track changes” (redline/strikeout), or in the Supplementary Conditions.

B. Equal Opportunity

Contractor shall not 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 race, color, religion, national origin, age, sex, height, weight, marital status, or because of a handicap that is unrelated to the person’s ability to perform the duties of a particular job or position.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement.

This Agreement will be effective on _____ (which is the Effective Date of the Contract).

OWNER:

CONTRACTOR:

Saginaw County Public Works Commissioner

By: _____

By: _____

Title: _____

Title: _____

Attest: _____

Attest: _____

Title: _____

Title: _____

Address for giving notices:

Address for giving notices:

111 S. Michigan Avenue

Saginaw, MI 48602

NOTICE TO PROCEED

Owner:	Saginaw County Public Works Commissioner	Owner's Contract No.:	
Contractor:		Contractor's Project No.:	
Engineer:	Spicer Group, Inc.	Engineer's Project No.:	126725SG2019
Project:	Prueter Drain	Contract Name:	
		Effective Date of Contract:	

TO CONTRACTOR:

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on [REDACTED], 20[REDACTED]. *[see Paragraph 4.01 of the General Conditions]*

On that date, Contractor shall start performing its obligations under the Contract Documents. No Work shall be done at the Site prior to such date. In accordance with the Agreement, the date of Substantial Completion is September 15, 2020, and the date of readiness for final payment is October 15, 2020.

Before starting any Work at the Site, Contractor must comply with the following:
[Note any access limitations, security procedures, or other restrictions]

Owner: _____
Authorized Signature

By: _____

Title: _____

Date Issued: _____

Copy: Engineer

PERFORMANCE BOND

CONTRACTOR (name and address):

SURETY (name and address of principal place of business):

OWNER (name and address):

Saginaw County Public Works Commissioner
111 S. Michigan Avenue
Saginaw, MI 48602

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description (name and location): Prueter Drain, Saginaw County, MI

BOND

Bond Number:

Date (not earlier than the Effective Date of the Agreement of the Construction Contract):

Amount:

Modifications to this Bond Form: None See Paragraph 16

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

Contractor's Name and Corporate Seal (seal)

Surety's Name and Corporate Seal (seal)

By: _____
Signature

By: _____
Signature (attach power of attorney)

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after:

3.1 The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

3.2 The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

3.3 The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:

5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:

7.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

7.2 additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and

7.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.

9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.

10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

11. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed

incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

14. Definitions

14.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

14.2 Construction Contract: The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

14.3 Contractor Default: Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

14.4 Owner Default: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

14.5 Contract Documents: All the documents that comprise the agreement between the Owner and Contractor.

15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

16. Modifications to this Bond are as follows:

PAYMENT BOND

CONTRACTOR *(name and address)*:

SURETY *(name and address of principal place of business)*:

OWNER *(name and address)*:
Saginaw County Public Works Commissioner
111 S. Michigan Avenue
Saginaw, MI 48602

CONSTRUCTION CONTRACT

Effective Date of the Agreement:
Amount:
Description *(name and location)*: Prueter Drain, Saginaw County

BOND

Bond Number:
Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:
Amount:
Modifications to this Bond Form: None See Paragraph 18

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

Contractor's Name and Corporate Seal

Surety's Name and Corporate Seal

By: _____
Signature

By: _____
Signature *(attach power of attorney)*

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.
2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.
4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.
5. The Surety's obligations to a Claimant under this Bond shall arise after the following:
 - 5.1 Claimants who do not have a direct contract with the Contractor,
 - 5.1.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
 - 5.1.2 have sent a Claim to the Surety (at the address described in Paragraph 13).
 - 5.2 Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).
6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.
7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:
 - 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
 - 7.2 Pay or arrange for payment of any undisputed amounts.
 - 7.3 The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.
8. The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.
9. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond,

and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.

11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.
14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

16. Definitions

16.1 **Claim:** A written statement by the Claimant including at a minimum:

1. The name of the Claimant;
2. The name of the person for whom the labor was done, or materials or equipment furnished;
3. A copy of the agreement or purchase order pursuant to which labor, materials,

- or equipment was furnished for use in the performance of the Construction Contract;
4. A brief description of the labor, materials, or equipment furnished;
5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
7. The total amount of previous payments received by the Claimant; and
8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

16.2 **Claimant:** An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

16.3 **Construction Contract:** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

16.4 **Owner Default:** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

16.5 **Contract Documents:** All the documents that comprise the agreement between the Owner and Contractor.

17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in

this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

18. Modifications to this Bond are as follows:

CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner: Saginaw County Public Works Commissioner	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer: Spicer Group, Inc.	Engineer's Project No.: 126725SG2019
Project: Prueter Drain	Contract Name: Prueter Drain

This [preliminary] [final] Certificate of Substantial Completion applies to:

- All Work The following specified portions of the Work:

Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Work or portion thereof designated above is hereby established, subject to the provisions of the Contract pertaining to Substantial Completion. The date of Substantial Completion in the final Certificate of Substantial Completion marks the commencement of the contractual correction period and applicable warranties required by the Contract.

A punch list of items to be completed or corrected is attached to this Certificate. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work shall be as provided in the Contract, except as amended as follows: *[Note: Amendments of contractual responsibilities recorded in this Certificate should be the product of mutual agreement of Owner and Contractor; see Paragraph 15.03.D of the General Conditions.]*

Amendments to Owner's responsibilities: None
 As follows

Amendments to Contractor's responsibilities: None
 As follows:

The following documents are attached to and made a part of this Certificate: *[punch list; others]*

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents, nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract.

EXECUTED BY ENGINEER:	RECEIVED:	RECEIVED:
By: _____ (Authorized signature)	By: _____ Owner (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____

**STANDARD GENERAL CONDITIONS OF THE
CONSTRUCTION CONTRACT**

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.
 3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 5. *Bidder*—An individual or entity that submits a Bid to Owner.
 6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.
 7. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.
 8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.
 9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.
 10. *Claim*—(a) A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein: seeking an adjustment of Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract; or (b) a demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal; or seeking resolution of a contractual issue that Engineer has declined to address. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. (“CERCLA”); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5501 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. (“RCRA”); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
12. *Contract*—The entire and integrated written contract between the Owner and Contractor concerning the Work.
13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents. .
15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
17. *Cost of the Work*—See Paragraph 13.01 for definition.
18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
20. *Engineer*—The individual or entity named as such in the Agreement.
21. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.
22. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.
23. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
24. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
25. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date or by a time prior to Substantial Completion of all the Work.

26. *Notice of Award*—The written notice by Owner to a Bidder of Owner’s acceptance of the Bid.
27. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.
28. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
29. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor’s plan to accomplish the Work within the Contract Times.
30. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.
31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.
32. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative or “RPR” includes any assistants or field staff of Resident Project Representative.
33. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
34. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer’s review of the submittals and the performance of related construction activities.
35. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor’s Applications for Payment.
36. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.
37. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands furnished by Owner which are designated for the use of Contractor.
38. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
39. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.
40. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part

thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.

41. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.
42. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
43. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
44. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.
45. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
46. *Unit Price Work*—Work to be paid for on the basis of unit prices.
47. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.
48. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 Terminology

- A. The words and terms discussed in the following paragraphs are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:*
 1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in

general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.

- C. *Day:*
1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:*
1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or 15.04).
- E. *Furnish, Install, Perform, Provide:*
1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
 4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.
- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 Delivery of Bonds and Evidence of Insurance

- A. *Bonds:* When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Contractor’s Insurance:* When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere

in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.

- C. *Evidence of Owner's Insurance:* After receipt of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or otherwise), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.
- B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

- A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Contract (or as otherwise specifically required by the Contract Documents), Contractor shall submit to Engineer for timely review:
 - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
 - 2. a preliminary Schedule of Submittals; and
 - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.03.A. Contractor shall have an additional 10 days to make corrections and

adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other submittals, in electronic media or digital format, either directly, or through access to a secure Project website.
- B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the items, or from those established in applicable transmittal protocols.

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic or digital versions of the Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version shall govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

3.02 *Reference Standards*

- A. Standards Specifications, Codes, Laws and Regulations
 1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the

standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard specification, manual, reference standard, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies:*

1. *Contractor's Verification of Figures and Field Measurements:* Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.
2. *Contractor's Review of Contract Documents:* If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:
 - a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Contract Documents*

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work thereunder.
- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly give written notice to Owner and Contractor that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

- A. Contractor and its Subcontractors and Suppliers shall not:
 - 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or
 - 2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to such date.

4.03 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.
 - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.
 - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 11.
- B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

- A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
 - 1. severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
 - 2. abnormal weather conditions;
 - 3. acts or failures to act of utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and
 - 4. acts of war or terrorism.

- D. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5.
- E. Paragraph 8.03 governs delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.
- F. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor.
- G. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 30 days of the commencement of the delaying, disrupting, or interfering event.

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner’s interest therein as necessary for giving notice of or filing a mechanic’s or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

- A. *Limitation on Use of Site and Other Areas:*
 - 1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor’s operations; (c) damage to any other adjacent land or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.
 - 2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.12, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or at law; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers,

directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.

- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
- D. *Loading of Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
 - 1. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;
 - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); and
 - 3. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:
 - 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
 - 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 - 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

- A. *Notice by Contractor:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site either:
1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate; or
 2. is of such a nature as to require a change in the Drawings or Specifications; or
 3. differs materially from that shown or indicated in the Contract Documents; or
 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

- B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine the necessity of Owner's obtaining additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A above; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Possible Price and Times Adjustments:*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
 - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,
 - c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
 - a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise; or
 - b. the existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
 - c. Contractor failed to give the written notice as required by Paragraph 5.04.A.
3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or adjacent to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:
 1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and
 2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;
 - c. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 - d. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.
- C. *Engineer's Review:* Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents,

or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and advise Owner in writing of Engineer's findings, conclusions, and recommendations. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question, addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Possible Price and Times Adjustments:*
1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing Underground Facility at the Site that was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;
 - b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
 - c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times; and
 - d. Contractor gave the notice required in Paragraph 5.05.B.
 2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
 3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

5.06 *Hazardous Environmental Conditions at Site*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
1. those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
 2. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the

accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.
- D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
- E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.
- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
- G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off.
- H. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special

conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.H shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6 – BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of all of Contractor's obligations under the Contract. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the Supplementary Conditions, or other specific provisions of the Contract. Contractor shall also furnish such other bonds as are required by the Supplementary Conditions or other specific provisions of the Contract.
- B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority

shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

- C. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.
- D. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the bond and surety requirements above.
- E. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.
- F. Upon request, Owner shall provide a copy of the payment bond to any Subcontractor, Supplier, or other person or entity claiming to have furnished labor or materials used in the performance of the Work.

6.02 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this Article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is maintaining the policies, coverages, and endorsements required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- D. Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- E. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, shall not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.

- F. If either party does not purchase or maintain all of the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.
- G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.
- H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price shall be adjusted accordingly.
- I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.
- J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

6.03 *Contractor's Insurance*

- A. *Workers' Compensation:* Contractor shall purchase and maintain workers' compensation and employer's liability insurance for:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts.
 - 2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).
 - 3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).
 - 4. Foreign voluntary worker compensation (if applicable).
- B. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against:
 - 1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees.
 - 2. claims for damages insured by reasonably available personal injury liability coverage.
 - 3. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- C. *Commercial General Liability—Form and Content:* Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:
 - 1. Products and completed operations coverage:
 - a. Such insurance shall be maintained for three years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.

2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
 3. Broad form property damage coverage.
 4. Severability of interest.
 5. Underground, explosion, and collapse coverage.
 6. Personal injury coverage.
 7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.
 8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.
- D. *Automobile liability*: Contractor shall purchase and maintain automobile liability insurance against claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.
- E. *Umbrella or excess liability*: Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.
- F. *Contractor's pollution liability insurance*: Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result of pollution conditions arising from Contractor's operations and completed operations. This insurance shall be maintained for no less than three years after final completion.
- G. *Additional insureds*: The Contractor's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary Conditions; include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.
- H. *Contractor's professional liability insurance*: If Contractor will provide or furnish professional services under this Contract, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance shall provide protection against claims arising out of performance of professional design or related services, and caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.
- I. *General provisions*: The policies of insurance required by this Paragraph 6.03 shall:
1. include at least the specific coverages provided in this Article.

2. be written for not less than the limits of liability provided in this Article and in the Supplementary Conditions, or required by Laws or Regulations, whichever is greater.
 3. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 10 days prior written notice has been given to Contractor. Within three days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.
 4. remain in effect at least until final payment (and longer if expressly required in this Article) and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract Documents.
 5. be appropriate for the Work being performed and provide protection from claims that may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable.
- J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.

6.04 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.
- B. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

6.05 *Property Insurance*

- A. *Builder's Risk:* Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the full insurable replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
 1. include the Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."
 2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required

by the Supplementary Conditions. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance may be provided through other insurance policies acceptable to Owner and Contractor.

3. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.
 4. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects).
 5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).
 6. extend to cover damage or loss to insured property while in transit.
 7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
 8. allow for the waiver of the insurer's subrogation rights, as set forth below.
 9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.
 10. not include a co-insurance clause.
 11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.
 12. include performance/hot testing and start-up.
 13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.
- B. *Notice of Cancellation or Change:* All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured.
- C. *Deductibles:* The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.
- D. *Partial Occupancy or Use by Owner:* If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or

occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.

- E. *Additional Insurance:* If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.05, it may do so at Contractor's expense.
- F. *Insurance of Other Property:* If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

6.06 *Waiver of Rights*

- A. All policies purchased in accordance with Paragraph 6.05, expressly including the builder's risk policy, shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all Subcontractors, all individuals or entities identified in the Supplementary Conditions as insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for:
 - 1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 - 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.
- D. Contractor shall be responsible for assuring that the agreement under which a Subcontractor performs a portion of the Work contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary

Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by builder's risk insurance and any other property insurance applicable to the Work.

6.07 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.
- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.05 shall distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

7.01 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.02 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for

the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.

- B. All materials and equipment incorporated into the Work shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.04 “Or Equals”

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or “or equal” item is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment, or items from other proposed suppliers under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer shall deem it an “or equal” item. For the purposes of this paragraph, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) it has a proven record of performance and availability of responsive service; and
 - 4) it is not objectionable to Owner.
 - b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.
- B. *Contractor’s Expense:* Contractor shall provide all data in support of any proposed “or equal” item at Contractor’s expense.
- C. *Engineer’s Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each “or-equal” request. Engineer may require Contractor to furnish additional data about the proposed “or-equal” item. Engineer will be the sole judge of acceptability. No “or-equal” item will be ordered, furnished, installed, or utilized until Engineer’s review is complete and Engineer determines that the proposed item is an “or-equal”, which will be

evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.

- D. *Effect of Engineer's Determination:* Neither approval nor denial of an "or-equal" request shall result in any change in Contract Price. The Engineer's denial of an "or-equal" request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.
- E. *Treatment as a Substitution Request:* If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer considered the proposed item as a substitute pursuant to Paragraph 7.05.

7.05 *Substitutes*

- A. Unless the specification or description of an item of material or equipment required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment under the circumstances described below. To the extent possible such requests shall be made before commencement of related construction at the Site.
 - 1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of material or equipment from anyone other than Contractor.
 - 2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.
 - 3. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 - a. shall certify that the proposed substitute item will:
 - 1) perform adequately the functions and achieve the results called for by the general design,
 - 2) be similar in substance to that specified, and
 - 3) be suited to the same use as that specified.
 - b. will state:
 - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times,
 - 2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
 - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
 - c. will identify:
 - 1) all variations of the proposed substitute item from that specified, and
 - 2) available engineering, sales, maintenance, repair, and replacement services.

- d. shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.
- C. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- D. *Reimbursement of Engineer's Cost:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- E. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute at Contractor's expense.
- F. *Effect of Engineer's Determination:* If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.

7.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.
- B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable, during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within five days.
- E. Owner may require the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the

identity of certain Subcontractors, Suppliers, or other individuals or entities for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor, Supplier, or other individual or entity so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity.

- F. If Owner requires the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, or both, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.
- G. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.
- H. On a monthly basis Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions.
- J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.
- K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.
- L. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- M. All Work performed for Contractor by a Subcontractor or Supplier shall be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.
- N. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.
- O. Nothing in the Contract Documents:
 - 1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier, or other individual or entity; nor
 - 2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

7.07 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design,

process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

7.08 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work

7.09 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

7.10 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such

Work or other action. It shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

- C. Owner or Contractor may give notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.11 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and annotate them to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer.

7.12 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - 1. all persons on the Site or who may be affected by the Work;
 - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify Owner; the owners of adjacent property, Underground Facilities, and other utilities; and other contractors and utility owners performing work at or adjacent to the Site, when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.
- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
- D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

- E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- F. Contractor's duties and responsibilities for safety and protection shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).
- G. Contractor's duties and responsibilities for safety and protection shall resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.13 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

7.14 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

7.15 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

7.16 *Shop Drawings, Samples, and Other Submittals*

- A. *Shop Drawing and Sample Submittal Requirements:*
 1. Before submitting a Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - c. determined and verified the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that submittal, and that Contractor approves the submittal.
 3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be set forth in a written communication separate from the Shop Drawings or Sample submittal; and, in addition, in the case of Shop Drawings by a specific notation made on each Shop Drawing submitted to Engineer for review and approval of each such variation.
- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals. Each submittal will be identified as Engineer may require.
1. *Shop Drawings:*
 - a. Contractor shall submit the number of copies required in the Specifications.
 - b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.D.
 2. *Samples:*
 - a. Contractor shall submit the number of Samples required in the Specifications.
 - b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 7.16.D.
 3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Other Submittals:* Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.
- D. *Engineer's Review:*
1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
 2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs incident thereto.
 3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
 4. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for any variation from the requirements of the Contract

Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such approved variation from the requirements of the Contract Documents in a Field Order.

5. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 7.16.A and B.
 6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, shall not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
 7. Neither Engineer's receipt, review, acceptance or approval of a Shop Drawing, Sample, or other submittal shall result in such item becoming a Contract Document.
 8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.D.4.
- E. *Resubmittal Procedures:*
1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.
 2. Contractor shall furnish required submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.
 3. If Contractor requests a change of a previously approved submittal item, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

7.17 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

1. observations by Engineer;
 2. recommendation by Engineer or payment by Owner of any progress or final payment;
 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 4. use or occupancy of the Work or any part thereof by Owner;
 5. any review and approval of a Shop Drawing or Sample submittal;
 6. the issuance of a notice of acceptability by Engineer;
 7. any inspection, test, or approval by others; or
 8. any correction of defective Work by Owner.
- D. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract shall govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

7.19 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such

services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable Laws and Regulations.

- B. If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.
- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this paragraph, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 7.16.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria specified by Owner or Engineer.

ARTICLE 8 – OTHER WORK AT THE SITE

8.01 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.
- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any utility work at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.
- D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's

Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

8.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:
 - 1. the identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
 - 2. an itemization of the specific matters to be covered by such authority and responsibility; and
 - 3. the extent of such authority and responsibilities.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

- A. If, in the course of performing other work at or adjacent to the Site for Owner, the Owner's employees, any other contractor working for Owner, or any utility owner causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment shall take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract. When applicable, any such equitable adjustment in Contract Price shall be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due to Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this paragraph.
- C. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due to Contractor.

- D. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9 – OWNER'S RESPONSIBILITIES

9.01 Communications to Contractor

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

9.02 Replacement of Engineer

- A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents shall be that of the former Engineer.

9.03 Furnish Data

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

9.04 Pay When Due

- A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

9.05 Lands and Easements; Reports, Tests, and Drawings

- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
- B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
- C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 Insurance

- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 Change Orders

- A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

9.08 Inspections, Tests, and Approvals

- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 *Limitations on Owner's Responsibilities*

- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

9.10 *Undisclosed Hazardous Environmental Condition*

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *Evidence of Financial Arrangements*

- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
- B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract.

10.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.08. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Project Representative*

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress

and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 10.08. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent, or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

10.04 *Rejecting Defective Work*

- A. Engineer has the authority to reject Work in accordance with Article 14.

10.05 *Shop Drawings, Change Orders and Payments*

- A. Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, are set forth in Paragraph 7.16.
- B. Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, are set forth in Paragraph 7.19.
- C. Engineer's authority as to Change Orders is set forth in Article 11.
- D. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.06 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

10.07 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.08 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 15.06.A will only be to determine generally that their content complies with the

requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.

- E. The limitations upon authority and responsibility set forth in this Paragraph 10.08 shall also apply to the Resident Project Representative, if any.

10.09 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs (if any) of which Engineer has been informed.

ARTICLE 11 – AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

11.01 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.

1. *Change Orders:*

- a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.
- b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.

- 2. *Work Change Directives:* A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the completion of the Work set out in the Work Change Directive. Owner must submit any Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.

- 3. *Field Orders:* Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.02 *Owner-Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Such changes shall

be supported by Engineer's recommendation, to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work shall be performed under the applicable conditions of the Contract Documents. Nothing in this paragraph shall obligate Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.03 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.

11.04 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall comply with the provisions of Article 12.
- B. An adjustment in the Contract Price will be determined as follows:
 - 1. where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03); or
 - 2. where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.04.C.2); or
 - 3. where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.04.C).
- C. *Contractor's Fee:* When applicable, the Contractor's fee for overhead and profit shall be determined as follows:
 - 1. a mutually acceptable fixed fee; or
 - 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 13.01.B.3, the Contractor's fee shall be five percent;
 - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.01.C.2.a and 11.01.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the

Subcontractor that actually performs the Work, a fee of five percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted work the maximum total fee to be paid by Owner shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;

- d. no fee shall be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
- e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
- f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.
- B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

11.06 *Change Proposals*

- A. Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under the Contract. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.
 - 1. *Procedures:* Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal. The supporting data shall be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.
 - 2. *Engineer's Action:* Engineer will review each Change Proposal and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

3. *Binding Decision:* Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- B. *Resolution of Certain Change Proposals:* If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

11.07 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
 1. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
 2. changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
 3. changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.02, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and
 4. changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.
- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

11.08 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

ARTICLE 12 – CLAIMS

12.01 *Claims*

- A. *Claims Process:* The following disputes between Owner and Contractor shall be submitted to the Claims process set forth in this Article:
 1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
 2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents; and
 3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters.

- B. *Submittal of Claim:* The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.
- C. *Review and Resolution:* The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim shall be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation:*
 - 1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate shall stay the Claim submittal and response process.
 - 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process shall resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process shall resume as of the date of the conclusion of the mediation, as determined by the mediator.
 - 3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.
- E. *Partial Approval:* If the party receiving a Claim approves the Claim in part and denies it in part, such action shall be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. *Denial of Claim:* If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim shall be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.
- G. *Final and Binding Results:* If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim shall be incorporated in a Change Order to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

- A. *Purposes for Determination of Cost of the Work:* The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:

1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or
 2. To determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included:* Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 13.01.C, and shall include only the following items:
1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.
 2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
 3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
 4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
 5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

- c. Rentals of all construction equipment and machinery, and the parts thereof, whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
 - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
 - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
 - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 6.05), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.
 - g. The cost of utilities, fuel, and sanitary facilities at the Site.
 - h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
 - i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.
- C. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:
1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
 2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
 4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

- D. *Contractor's Fee*: When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.
- E. *Documentation*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

13.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.
- B. *Cash Allowances*: Contractor agrees that:
 - 1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 - 2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.
- C. *Contingency Allowance*: Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

13.03 Unit Price Work

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of the following paragraph.
- E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price if:

1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement;
2. there is no corresponding adjustment with respect to any other item of Work; and
3. Contractor believes that it is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price, and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 14 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

14.01 Access to Work

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

14.02 Tests, Inspections, and Approvals

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work shall be governed by the provisions of Paragraph 14.05.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
 1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
 2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
 3. by manufacturers of equipment furnished under the Contract Documents;
 4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
 5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests shall be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.
- F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering shall be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

- A. *Contractor's Obligation:* It is Contractor's obligation to assure that the Work is not defective.
- B. *Engineer's Authority:* Engineer has the authority to determine whether Work is defective, and to reject defective Work.
- C. *Notice of Defects:* Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- D. *Correction, or Removal and Replacement:* Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.
- E. *Preservation of Warranties:* When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.
- F. *Costs and Damages:* In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work shall be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

- A. Engineer has the authority to require special inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.
- B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.
- C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.
 - 1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.
 - 2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, then Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.
- C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include

but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

ARTICLE 15 – PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 Progress Payments

- A. *Basis for Progress Payments:* The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. *Applications for Payments:*
 - 1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
 - 2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
 - 3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.
- C. *Review of Applications:*
 - 1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
 - 2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;

- b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
 3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
 4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
 5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.
 6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or
 - e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due:*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner:*

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
 - a. claims have been made against Owner on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;
 - b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
 - c. Contractor has failed to provide and maintain required bonds or insurance;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
 - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;
 - f. the Work is defective, requiring correction or replacement;
 - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - h. the Contract Price has been reduced by Change Orders;
 - i. an event that would constitute a default by Contractor and therefore justify a termination for cause has occurred;
 - j. liquidated damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
 - k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
 - l. there are other items entitling Owner to a set off against the amount recommended.
2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed shall be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.
3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 15.01.C.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than seven days after the time of payment by Owner.

15.03 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which shall fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.
- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately

functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. At any time Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through E for that part of the Work.
2. At any time Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.05 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *Final Payment*

A. *Application for Payment:*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.11), and other documents, Contractor may make application for final payment.
2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents;
 - b. consent of the surety, if any, to final payment;
 - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.
 - d. a list of all disputes that Contractor believes are unsettled; and

- e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.
- B. *Engineer's Review of Application and Acceptance:*
1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to the provisions of Paragraph 15.07. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.
- C. *Completion of Work:* The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment.
- D. *Payment Becomes Due:* Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

15.07 *Waiver of Claims*

- A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.
- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted or appealed under the provisions of Article 17.

15.08 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents), any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. correct the defective repairs to the Site or such other adjacent areas;
 - 2. correct such defective Work;
 - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension. Any Change Proposal seeking such adjustments shall be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:
 - 1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule);
 - 2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
 - 3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
or
 - 4. Contractor's repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the contract, Owner may proceed to:
 - 1. declare Contractor to be in default, and give Contractor (and any surety) notice that the Contract is terminated; and
 - 2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.
- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and
 - 3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid on account of loss of anticipated overhead, profits, or revenue, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this Article:
 - 1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full; and
 - 2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this Article, Owner or Contractor may:
 - 1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions; or

2. agree with the other party to submit the dispute to another dispute resolution process; or
3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18 – MISCELLANEOUS

18.01 *Giving Notice*

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
 1. delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or
 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice.

18.02 *Computation of Times*

- A. When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

18.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 *Limitation of Damages*

- A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

- A. A party's non-enforcement of any provision shall not constitute a waiver of that provision, nor shall it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

18.07 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

18.08 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

Supplementary Conditions

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract, EJCDC® C-700 (2013 Edition). All provisions that are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added thereto.

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

SC-5.03 *Subsurface and Physical Conditions*

SC-5.03 Add the following paragraph immediately after paragraph 5.03.B:

- C. Limited Geotechnical investigation has been performed in the project area. All results from the investigation have been included either on the plans or in the specifications.**

SC-5.06 Hazardous Environmental Conditions

SC 5.06 Delete Paragraphs 5.06.A and 5.06.B in their entirety and insert the following:

- A. No reports or drawings related to Hazardous Environmental Conditions at the Site are known to Owner.**
- B. Not Used.**

ARTICLE 6 – BONDS AND INSURANCE

SC-6.03 *Contractor's Liability Insurance*

SC 6.03 Add the following new paragraph immediately after Paragraph 6.03.J:

- K. The limits of liability for the insurance required by Paragraph 6.03 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:**

- 1. Workers' Compensation, and related coverages under Paragraphs 6.03.A.1 and A.2 of the General Conditions:**

Part One: Compensation	Statutory (In Thousands)
Part Two: Employers' Liability:	
accident	\$ 100
disease	\$ 100
aggregate disease	\$ 500

2. Contractor's Commercial General Liability under Paragraphs 6.03.B and 6.03.C of the General Conditions:

General Aggregate Limit	\$1,000
Products/Completed Operations Aggregate Limit	\$1,000
Personal/Adverse Injury	\$1,000
Each Occurrence Limit	\$1,000

3. Automobile Liability under Paragraph 6.03.D of the General Conditions:

Bodily Injury-Each Occurrence Limit	\$ 500
Property Damage-Each Occurrence Limit	\$ 250

OR

Combined Single Limit	\$1,000
No Fault	Statutory

4. Excess or Umbrella Liability:

Per Occurrence \$1,000,000

5. Additional Insureds: In addition to Owner and Engineer, include as additional insureds the following: Saginaw County Public Works Commissioner, Prueter Drain Drainage District, Spicer Group, Inc., Saginaw County, Buena Vista Charter Township, Saginaw County Road Commission, the People of the State of Michigan, the State of Michigan, and governmental bodies performing permit activities under a maintenance contract, and all officers, agents, and employees of the above, for claims arising out of, under, or by reason of operations covered by a permit issued to (CONTRACTOR) for the construction of the Prueter Drain, Saginaw County, Michigan.

6. Owner's and Contractor's Protective Liability

Contractor shall purchase and maintain OWNER'S and Contractor's Protective Liability Insurance which shall:

- (1) Be a separate policy to protect OWNER, ENGINEER, their consultants, agents, employees, and such public corporations in whose jurisdiction the Work is located for their liability for work performed by Contractor or Subcontractors under this contract.
- (2) Name OWNER as the insured.
- (3) Include any specific insurance language requirements for the following named insured.
- (4) Name the following as additional insured which will be held harmless and indemnified: Spicer Group, Inc., and others.

Separate:

Each Occurrence	\$1,000
General Aggregate	\$1,000

In lieu of the Owner's and Contractor's Protective Liability, the Contractor may provide an endorsement to their policy for a per project aggregate coverage with the following limits:

Aggregate Limit	\$1,000
Each Occurrence Limit	\$1,000
(ISO form CG2503 or it's equivalent)	

A copy of this endorsement must accompany the Certificate of Insurance, the Certificate will clearly state the additional insured requirement and the policy contains the per project aggregate endorsement.

7. **Additional Insureds: In addition to Owner and Engineer, include as additional insureds the following:** Saginaw County Public Works Commissioner, Prueter Drain Drainage District, Spicer Group, Inc., Saginaw County, Buena Vista Charter Township, Saginaw County Road Commission, the People of the State of Michigan, the State of Michigan, and governmental bodies performing permit activities under a maintenance contract, and all officers, agents, and employees of the above, for claims arising out of, under, or by reason of operations covered by a permit issued to (CONTRACTOR) for the construction of the Prueter Drain, Saginaw County, Michigan.

ARTICLE 7 – CONTRACTOR’S RESPONSIBILITIES

SC 7.02 Labor; Working Hours

SC-7.02.B. Add the following new subparagraphs immediately after Paragraph 7.02.B:

1. **Regular working hours will be 7 A.M to 7 P.M.**
2. **Owner's legal holidays shall be defined as U.S. Federal Holidays.**

SC-7.02.B. Amend the first and second sentences of Paragraph 7.02.B to state “...all Work at the Site shall be performed during regular working hours, Monday through Saturday. Contractor will not perform Work on a Sunday or any legal holiday.”

SC-7.08 Permits

SC 7.08 Add the following new subparagraphs immediately after Paragraph 7.08.A:

- B. **A Soil Erosion and Sedimentation Control (SESC) Permit is not required since the Owner is an Authorized Public Agency (APA). However, the Contractor will need to construct the project in accordance with SESC measure as described in the bidding plans and specifications.**
- C. **Contractor to coordinate with local Road Commission having jurisdiction to obtain necessary permits.**

ARTICLE 10 – ENGINEER’S STATUS DURING CONSTRUCTION

SC-10.03 Project Representative

SC-10.03 Add the following new paragraphs immediately after Paragraph 10.03.A:

- B. **The Resident Project Representative (RPR) will be Engineer's representative at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions.**
 1. **General: RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall only be through or with the full knowledge and approval of Contractor. RPR shall generally communicate with Owner only with the knowledge of and under the direction of Engineer.**

2. **Schedules:** Review the progress schedule, schedule of Shop Drawing and Sample submittals, and Schedule of Values prepared by Contractor and consult with Engineer concerning acceptability.
3. **Conferences and Meetings:** Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings, and prepare and circulate copies of minutes thereof.
4. **Liaison:**
 - a. Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.
 - b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
 - c. Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.
5. **Interpretation of Contract Documents:** Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.
6. **Shop Drawings and Samples:**
 - a. Record date of receipt of Samples and Contractor-approved Shop Drawings.
 - b. Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.
 - c. Advise Engineer and Contractor of the commencement of any portion of the Work requiring a Shop Drawing or Sample submittal for which RPR believes that the submittal has not been approved by Engineer.
7. **Modifications:** Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, if any, to Engineer. Transmit to Contractor in writing decisions as issued by Engineer.
8. **Review of Work and Rejection of Defective Work:**
 - a. Conduct on-Site observations of Contractor's work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Report to Engineer whenever RPR believes that any part of Contractor's work in progress is defective, will not produce a completed Project that conforms generally to the Contract Documents, or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.

9. **Inspections, Tests, and System Start-ups:**
 - a. **Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.**
 - b. **Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups.**
10. **Records:**
 - a. **Prepare a daily report or keep a diary or log book, recording Contractor's hours on the Site, Subcontractors present at the Site, weather conditions, data relative to questions of Change Orders, Field Orders, Work Change Directives, or changed conditions, Site visitors, deliveries of equipment or materials, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to Engineer.**
 - b. **Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.**
 - c. **Maintain records for use in preparing Project documentation.**
11. **Reports:**
 - a. **Furnish to Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.**
 - b. **Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.**
 - c. **Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, force majeure or delay events, damage to property by fire or other causes, or the discovery of any Constituent of Concern or Hazardous Environmental Condition.**
12. **Payment Requests: Review applications for payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the Schedule of Values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.**
13. **Certificates, Operation and Maintenance Manuals: During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Contract Documents to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.**

14. Completion:

- a. Participate in Engineer's visits to the Site to determine Substantial Completion, assist in the determination of Substantial Completion and the preparation of a punch list of items to be completed or corrected.
- b. Participate in Engineer's final visit to the Site to determine completion of the Work, in the company of Owner and Contractor, and prepare a final punch list of items to be completed and deficiencies to be remedied.
- c. Observe whether all items on the final list have been completed or corrected and make recommendations to Engineer concerning acceptance and issuance of the notice of acceptability of the work.

C. The RPR shall not:

1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).
2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.
3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.
4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor's work.
5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
7. Accept Shop Drawing or Sample submittals from anyone other than Contractor.
8. Authorize Owner to occupy the Project in whole or in part.

Work Change Directive No.

Date of Issuance:

Effective Date:

Owner: Saginaw County Public Works
Commissioner

Owner's Contract No.:

Contractor:

Contractor's Project No.:

Engineer: Spicer Group, Inc.

Engineer's Project No.: 126725SG2019

Project: Prueter Drain

Contract Name: Prueter Drain

Contractor is directed to proceed promptly with the following change(s):

Description:

Attachments: *[List documents supporting change]*

Purpose for Work Change Directive:

Directive to proceed promptly with the Work described herein, prior to agreeing to changes on Contract Price and Contract Time, is issued due to: *[check one or both of the following]*

- Non-agreement on pricing of proposed change.
- Necessity to proceed for schedule or other Project reasons.

Estimated Change in Contract Price and Contract Times (non-binding, preliminary):

Contract Price \$ [increase] [decrease].

Contract Time days [increase] [decrease].

Basis of estimated change in Contract Price:

- Lump Sum Unit Price
- Cost of the Work Other

RECOMMENDED:

AUTHORIZED BY:

RECEIVED:

By: Engineer (Authorized
Signature)

By: Owner (Authorized
Signature)

By: Contractor (Authorized
Signature)

Title:

Title:

Title:

Date:

Date:

Date:

Approved by Funding Agency (if applicable)

By:

Date:

Title:

Date of Issuance:	Effective Date:
Owner: Saginaw County Public Works Commissioner	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer: Spicer Group, Inc.	Engineer's Project No.: 126725SG2019
Project: Prueter Drain	Contract Name: Prueter Drain

The Contract is modified as follows upon execution of this Change Order:

Description:

Attachments: *[List documents supporting change]*

CHANGE IN CONTRACT PRICE	CHANGE IN CONTRACT TIMES <i>[note changes in Milestones if applicable]</i>
Original Contract Price: \$ _____	Original Contract Times: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
[Increase] [Decrease] from previously approved Change Orders No. ___ to No. ___: \$ _____	[Increase] [Decrease] from previously approved Change Orders No. ___ to No. ___: Substantial Completion: _____ Ready for Final Payment: _____ days
Contract Price prior to this Change Order: \$ _____	Contract Times prior to this Change Order: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
[Increase] [Decrease] of this Change Order: \$ _____	[Increase] [Decrease] of this Change Order: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
Contract Price incorporating this Change Order: \$ _____	Contract Times with all approved Change Orders: Substantial Completion: _____ Ready for Final Payment: _____ days or dates

RECOMMENDED:	ACCEPTED:	ACCEPTED:
By: _____ Engineer (if required)	By: _____ Owner (Authorized	By: _____ Contractor (Authorized
Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____

Approved by Funding Agency (if applicable)

By: _____ Date: _____
Title: _____

Date of Issuance:	Effective Date:
Owner: Saginaw County Public Works Commissioner	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer: Spicer Group, Inc.	Engineer's Project No.: 126725SG2019
Project: Prueter Drain	Contract Name: Prueter Drain

Contractor is hereby directed to promptly execute this Field Order, issued in accordance with General Conditions Paragraph 11.01, for minor changes in the Work without changes in Contract Price or Contract Times. If Contractor considers that a change in Contract Price or Contract Times is required, submit a Change Proposal before proceeding with this Work.

Reference: _____	_____
Specification(s)	Drawing(s) / Detail(s)

Description:

Attachments:

ISSUED:	RECEIVED:
By: _____ Engineer (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Title: _____	Title: _____
Date: _____	Date: _____

Copy to: Owner

LANDOWNER AGREEMENT FORM

Project Name: Prueter Drain

Date: _____

Landowner's Name: _____

Parcel No. _____

I am the owner of property at the address listed above. I hereby give permission to the Prueter Drain Drainage District; and employees, agents, and vendors of the Saginaw County Public Works Commissioner's Office to enter my property for the following purpose:

This activity will take place on the following location:

My property can be utilized as described above until the following date:

CONTRACTOR

LANDOWNER

By: _____
(Authorized Signature)

By: _____
(Authorized Signature)

Date: _____

Date: _____

*Renters cannot authorize.

AFFIDAVIT AND CONSENT OF SURETY

STATE OF MICHIGAN

COUNTY OF _____

The undersigned CONTRACTOR, being duly sworn, deposes and says that he entered into an Agreement (Contract) with Saginaw County Public Works Commissioner (OWNER) on the _____ day of _____ 20____. For the performance of certain work generally described as follows: Prueter Drain.

CONTRACTOR further says that the Work under the terms of the Contract has been completed and all sums due to Contractors, Subcontractors, Supplies and laborers with whom CONTRACTOR has contracted for performance under the Contract have been paid in full.

Furthermore, in consideration of final payment under the Contract. CONTRACTOR hereby waives and releases any and all claims or rights which CONTRACTOR may have in connection with the Contract against Owner or the premises upon which the Contract Work was performed and agrees to indemnify Owner against any and all such claims or rights which may above asserted by Contractors, Subcontractors, Suppliers or laborers with whom CONTRACTOR has contracted for performance under the Contract.

DATE: _____, 20____

Signed in the presence of:

_____	_____
	Contractor
_____	_____
	Signature

	Name and Title*

Subscribed and sworn to before me this _____ day of _____, 20____

Notary Public: _____

My commission expires: _____ County: _____

CONSENT OF SURETY

The undersigned as Surety on the Contract hereby consents to the making of final payment to the CONTRACTOR under the Contract.

Date _____, 20____

Surety Company*

Attorney-in-Fact (Signature)

Name and Title*

*Typed or printed in ink.

(Attach copy of power of attorney certified to date of consent)

END OF AFFIDAVIT AND CONSENT OF SURETY

SECTION 01 10 00

SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Contract description.
 - 2. Work by Owner or other Work at the Site.
 - 3. Owner-furnished products.
 - 4. Work sequence.
 - 5. Permits.
 - 6. Specification conventions.

1.2 CONTRACT DESCRIPTION

- A. Work of the Project includes:
 - 1. Road crossing replacements.
 - 2. Placement of fill and riprap.
 - 3. Installation of storm sewer and appurtenances.
 - 4. Installation of water main and appurtenances.
 - 5. Curb and gutter replacement.
 - 6. Pavement replacement and resurfacing.
 - 7. Site grading and seeding.

- B. Perform Work of Contract under stipulated sum Contract with Owner according to Conditions of Contract.

1.3 WORK BY OWNER OR OTHERS

- A. Relocation of certain existing utilities as noted on the plans.

- B. Final restoration of the intersection of M-46 and Outer Drive will be completed by MDOT Design/Build Project.

1.4 OWNER-FURNISHED PRODUCTS

- A. None.

1.5 WORK SEQUENCE

- A. Coordinate construction schedule and operations with Owner and Engineer.

- B. Include in construction schedule and work sequence the items listed under Section 7.02.B of the Supplementary Conditions.

1.6 PERMITS

- A. Necessary permits for construction of Work including the following:
1. Contractor will coordinate with the Saginaw County Road Commission and obtain necessary permits for work within the Saginaw County Road Commission right-of-way.
 2. Contractor will coordinate with MDOT for work within the MDOT right-of-way. (**MDOT Permit will be obtained by the SCPWC**).

1.7 SPECIFICATION CONVENTIONS

- A. These Specifications are written in imperative mood and streamlined form. This imperative language is directed to Contractor unless specifically noted otherwise. The words "shall be" are included by inference where a colon (:) is used within sentences or phrases.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

SECTION 01 20 00

PRICE AND PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Cash allowances.
- B. Contingency allowances.
- C. Testing and inspection allowances.
- D. Schedule of Values.
- E. Application for Payment.
- F. Change procedures.
- G. Defect assessment.
- H. Unit prices.
- I. Alternates.

1.2 CASH ALLOWANCES

- A. Costs Included in Cash Allowances: Cost of product to Contractor or Subcontractor, less applicable trade discounts; delivery to Site and applicable taxes unless stated otherwise in Allowance Schedule.
- B. Costs Not Included in Cash Allowances but Included in Contract Sum/Price: Product handling at Site including unloading, uncrating, and storage; protection of products from elements and from damage; and labor for installation and finishing unless stated otherwise in Allowance Schedule.
- C. Engineer Responsibilities:
 - 1. Consult with Contractor for consideration and selection of products.
 - 2. Select products in consultation with Owner and transmit decision to Contractor.
 - 3. Prepare Change Order.
- D. Contractor Responsibilities:
 - 1. Assist Engineer in selection of products.
 - 2. Obtain proposals from suppliers and offer recommendations.
 - 3. Upon notification of selection by Engineer, execute purchase agreement with designated supplier.
 - 4. Arrange for and process Shop Drawings, Product Data, and Samples. Arrange for delivery.
 - 5. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.

E. Differences in costs will be adjusted by Change Order.

1.3 CONTINGENCY ALLOWANCES

- A. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead, and profit will be included in Change Orders authorizing expenditure of funds from this contingency allowance.
- B. Funds will be drawn from contingency allowance only by Change Order.
- C. At closeout of Contract, funds remaining in contingency allowance will be credited to Owner by Change Order.

1.4 SCHEDULE OF VALUES

- A. Submit printed schedule on Contractor's standard form or electronic media printout will be considered for this use.
- B. Submit Schedule of Values within 20 days after date of Owner-Contractor Agreement.
- C. Format: Use Table of Contents of this Project Manual. Identify each line item with number and title of major Specification Section. Also identify bonds and insurance.
- D. Include in each line item amount of allowances as specified in this Section.
- E. Include separately from each line item, direct proportional amount of Contractor's overhead and profit.
- F. Revise schedule to list approved Change Orders with each Application for Payment.

1.5 APPLICATION FOR PAYMENT

- A. Submit electronic file of each Application for Payment on EJCDC C-620 - Contractor's Application for Payment.
- B. Content and Format: Use Schedule of Values for listing items in Application for Payment.
- C. Submit updated construction schedule with each Application for Payment.
- D. Payment Period: Submit at intervals stipulated in the Agreement.
- E. Submit submittals with transmittal letter as specified in Section 01 33 00 - Submittal Procedures.
- F. Substantiating Data: When Engineer requires substantiating information, submit data justifying dollar amounts in question. Include the following with Application for Payment:
 - 1. Current construction photographs specified in Section 01 33 00 - Submittal Procedures.
 - 2. Partial release of liens from major Subcontractors and vendors.
 - 3. Record Documents as specified in Section 01 70 00 - Execution and Closeout Requirements, for review by Owner, which will be returned to Contractor.
 - 4. Affidavits attesting to off-Site stored products.

5. Construction Progress Schedule, revised and current as specified in Section 01 33 00 - Submittal Procedures.

1.6 CHANGE PROCEDURES

- A. Submittals: Submit name of individual who is authorized to receive change documents and is responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.
- B. Carefully study and compare Contract Documents before proceeding with fabrication and installation of Work. Promptly advise Engineer of any error, inconsistency, omission, or apparent discrepancy.
- C. Requests for Interpretation (RFI) and Clarifications: Allot time in construction scheduling for liaison with Engineer; establish procedures for handling queries and clarifications.
 1. Use Contractor form for requesting interpretations.
 2. Engineer may respond with a direct answer on the Request for Interpretation form, EJCDC C-942 - Field Order.
- D. Engineer will advise of minor changes in the Work not involving adjustment to Contract Sum/Price or Contract Time by issuing supplemental instructions on EJCDC C-940.
- E. Engineer may issue Proposal Request including a detailed description of proposed change with supplementary or revised Drawings and Specifications, a change in Contract Time for executing the change with stipulation of overtime work required and with the period of time during which the requested price will be considered valid. Contractor will prepare and submit estimate within 14 days.
- F. Contractor may propose changes by submitting a request for change to Engineer, describing proposed change and its full effect on the Work. Include a statement describing reason for the change and the effect on Contract Sum/Price and Contract Time with full documentation and a statement describing effect on the Work by separate or other Contractors.
- G. Stipulated Sum/Price Change Order: Based on and Contractor's estimated price quotation or Contractor's request for Change Order as approved by Engineer.
- H. Unit Price Change Order: For Contract unit prices and quantities, the Change Order will be executed on a fixed unit price basis. For unit costs or quantities of units of that which are not predetermined, execute Work under Work Directive Change. Changes in Contract Sum/Price or Contract Time will be computed as specified for Force Account Change Order.
- I. Work Directive Change: Engineer may issue directive, on EJCDC C-940 - Work Change Directive signed by Owner, instructing Contractor to proceed with change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute change.
- J. Time and Material Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in Conditions of the Contract. Engineer will determine change allowable in Contract Sum/Price and Contract Time as provided in Contract Documents.

- K. Maintain detailed records of Work done on time and material basis. Provide full information required for evaluation of proposed changes and to substantiate costs for changes in the Work.
- L. Document each quotation for change in Project Cost or Time with sufficient data to allow evaluation of quotation.
- M. Change Order Forms: EJCDC C-941 - Change Order.
- N. Execution of Change Orders: Engineer will issue Change Orders for signatures of parties as provided in Conditions of the Contract.
- O. Correlation of Contractor Submittals:
 1. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as separate line item and adjust Contract Sum/Price.
 2. Promptly revise Progress Schedules to reflect change in Contract Time, revise subschedules to adjust times for other items of Work affected by the change, and resubmit.
 3. Promptly enter changes in Record Documents.

1.7 DEFECT ASSESSMENT

- A. Replace the Work, or portions of the Work, not conforming to specified requirements.
- B. If, in the opinion of Engineer, it is not practical to remove and replace the Work, Engineer will direct appropriate remedy or adjust payment.
- C. The defective Work may remain, but unit sum/price will be adjusted to new sum/price at discretion of Owner.
- D. Defective Work will be partially repaired according to instructions of Engineer, and unit sum/price will be adjusted to new sum/price at discretion of Owner.
- E. Individual Specification Sections may modify these options or may identify specific formula or percentage sum/price reduction.
- F. Authority of Engineer to assess defects and identify payment adjustments is final.
- G. Nonpayment for Rejected Products: Payment will not be made for rejected products for any of the following reasons:
 1. Products wasted or disposed of in a manner that is not acceptable.
 2. Products determined as unacceptable before or after placement.
 3. Products not completely unloaded from transporting vehicle.
 4. Products placed beyond lines and levels of the required Work.
 5. Products remaining on hand after completion of the Work.
 6. Loading, hauling, and disposing of rejected products.

1.8 UNIT PRICES

- A. Authority: Measurement methods are delineated in individual Specification Sections.
- B. Measurement methods delineated in individual Specification Sections complement criteria of this Section. In event of conflict, requirements of individual Specification Section govern.

- C. Take measurements and compute quantities. Engineer will verify measurements and quantities.
- D. Unit Quantities: Quantities and measurements indicated on Bid Form are for Contract purposes only. Quantities and measurements supplied or placed in the Work shall determine payment.
 - 1. When actual Work requires more or fewer quantities than those quantities indicated, provide required quantities at contracted unit sum/prices.
 - 2. When actual Work requires 5 percent or greater change in quantity than those quantities indicated, Owner or Contractor may claim a Contract Price adjustment.
- E. Payment Includes: Full compensation for required labor, products, tools, equipment, plant and facilities, transportation, services and incidentals; erection, application, or installation of item of the Work; overhead and profit.
- F. Final payment for Work governed by unit prices will be made on basis of actual measurements and quantities accepted by Engineer multiplied by unit sum/price for Work incorporated in or made necessary by the Work.
- G. Measurement of Quantities:
 - 1. Weigh Scales: Inspected, tested, and certified by applicable State weights and measures department within past year.
 - 2. Platform Scales: Of sufficient size and capacity to accommodate conveying vehicle.
 - 3. Metering Devices: Inspected, tested, and certified by applicable State department within past year.
 - 4. Measurement by Weight: Concrete reinforcing steel, rolled or formed steel, or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.
 - 5. Measurement by Volume: Measured by cubic dimension using mean length, width, and height or thickness.
 - 6. Measurement by Area: Measured by square dimension using mean length and width or radius.
 - 7. Linear Measurement: Measured by linear dimension, at item centerline or mean chord.
 - 8. Stipulated Sum/Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as completed item or unit of the Work.

1.9 ALTERNATES

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in Owner-Contractor Agreement. The Owner-Contractor Agreement may identify certain Alternates to remain an Owner option for a stipulated period of time.
- B. Coordinate related Work and modify surrounding Work. Description for each Alternate is recognized to be abbreviated but requires that each change shall be complete for scope of Work affected.
 - 1. Coordinate related requirements among Specification Sections as required.
 - 2. Include as part of each Alternate: Miscellaneous devices, appurtenances, and similar items incidental to or necessary for complete installation.
 - 3. Coordinate Alternate with adjacent Work and modify or adjust as necessary to ensure integration.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Coordination and Project conditions.
- B. Preconstruction meeting.
- C. Site mobilization meeting.
- D. Progress meetings.
- E. Preinstallation meetings.
- F. Closeout meeting.

1.2 COORDINATION AND PROJECT CONDITIONS

- A. Coordinate scheduling, submittals, and Work of various Sections of Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Verify that utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate Work of various Sections having interdependent responsibilities for installing, connecting to, and placing operating equipment in service.
- C. Coordinate with MDOT Project Number 127021A/129594A, Design build 2.4 miles of reconstruction and widening on I-75 from Hess Avenue to I-675 and reconstruction of M-46, reconstruction of the I-75/M-46 interchange and replacing structures at M-46 over 1-75.**
- D. Coordination Meetings: In addition to other meetings specified in this Section, hold coordination meetings with personnel and Subcontractors to ensure coordination of Work.
- E. Coordinate completion and clean-up of Work of separate Sections in preparation for Substantial Completion.
- F. After Owner's occupancy of premises, coordinate access to Site for correction of defective Work and Work not complying with Contract Documents, to minimize disruption of Owner's activities.

1.3 PRECONSTRUCTION MEETING

- A. Engineer or Owner will schedule and preside over meeting after Notice of Award.

- B. Attendance Required: Engineer, Owner, Resident Project Representative, appropriate governmental agency representatives, Construction Manager, major Subcontractors, and Contractor.
- C. Minimum Agenda:
 1. Submission of executed bonds and insurance certificates.
 2. Distribution of Contract Documents.
 3. Submission of list of Subcontractors, list of products, schedule of values, and Progress Schedule.
 4. Designation of personnel representing parties in Contract and Engineer.
 5. Communication procedures.
 6. Procedures and processing of requests for interpretations, field decisions, field orders, submittals, substitutions, Applications for Payments, proposal request, Change Orders, and Contract closeout procedures.
 7. Scheduling.
 8. Critical Work sequencing.
 9. Scheduling activities of critical items.
- D. Construction Manager: Record minutes and distribute copies to participants within 5 days after meeting, to Engineer, Owner, and those affected by decisions made.

1.4 SITE MOBILIZATION MEETING

- A. Engineer will schedule and preside over meeting at Project Site prior to Contractor occupancy.
- B. Attendance Required: Engineer, Owner, Contractor, Contractor's superintendent, Construction Manager, major Contractors, major Subcontractors.
- C. Minimum Agenda:
 1. Use of premises by Owner and Contractor.
 2. Owner's requirements.
 3. Construction facilities and controls.
 4. Temporary utilities.
 5. Survey and site layout.
 6. Security and housekeeping procedures.
 7. Schedules.
 8. Procedures for testing.
 9. Procedures for maintaining record documents.
 10. Requirements for startup of equipment.
 11. Inspection and acceptance of equipment put into service during construction period.
- D. Construction Manager: Record minutes and distribute to participants within 5 days after meeting to Engineer, Owner, and those affected by decisions made.

1.5 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at maximum monthly intervals.

- B. Engineer will make arrangements for meetings, prepare agenda with copies for participants, and preside over meetings.
- C. Attendance Required: Job superintendent, major Subcontractors, Contractors and suppliers, and Engineer, Owner, as appropriate to agenda topics for each meeting.
- D. Minimum Agenda:
 - 1. Review minutes of previous meetings.
 - 2. Review of Work progress.
 - 3. Field observations, problems, and decisions.
 - 4. Identification of problems impeding planned progress.
 - 5. Review of submittal schedule and status of submittals.
 - 6. Review of off-Site fabrication and delivery schedules.
 - 7. Maintenance of Progress Schedule.
 - 8. Corrective measures to regain projected schedules.
 - 9. Planned progress during succeeding work period.
 - 10. Coordination of projected progress.
 - 11. Maintenance of quality and work standards.
 - 12. Effect of proposed changes on Progress Schedule and coordination.
 - 13. Other business relating to Work.
- E. Construction Manager: Record minutes and distribute to participants within 5 days after meeting to Engineer, Owner, and those affected by decisions made.

1.6 PREINSTALLATION MEETINGS

- A. When required in individual Specification Sections, convene preinstallation meetings at Project Site before starting Work of specific Section.
- B. Require attendance of parties directly affecting, or affected by, Work of specific Section.
- C. Notify Engineer four days in advance of meeting date.
- D. Prepare agenda and preside over meeting:
 - 1. Review conditions of installation, preparation, and installation procedures.
 - 2. Review coordination with related Work.
- E. Record minutes and distribute to participants within 5 days after meeting to Engineer, Owner, and those affected by decisions made.

1.7 CLOSEOUT MEETING

- A. Schedule Project closeout meeting with sufficient time to prepare for requesting Substantial Completion. Preside over meeting and be responsible for minutes.
- B. Attendance Required: Contractor, Construction Manager, Engineer, Owner, and others appropriate to agenda.
- C. Notify Engineer four days in advance of meeting date.

D. Minimum Agenda:

1. Start-up of facilities and systems.
2. Operations and maintenance manuals.
3. Testing, adjusting, and balancing.
4. System demonstration and observation.
5. Operation and maintenance instructions for Owner's personnel.
6. Contractor's inspection of Work.
7. Contractor's preparation of an initial "punch list."
8. Procedure to request Engineer inspection to determine date of Substantial Completion.
9. Completion time for correcting deficiencies.
10. Inspections by authorities having jurisdiction.
11. Certificate of Occupancy and transfer of insurance responsibilities.
12. Partial release of retainage.
13. Final cleaning.
14. Preparation for final inspection.
15. Closeout Submittals:
 - a. Project record documents.
 - b. Operating and maintenance documents.
 - c. Operating and maintenance materials.
 - d. Affidavits.
16. Final Application for Payment.
17. Contractor's demobilization of Site.
18. Maintenance.

- E. Record minutes and distribute to participants within 5 days after meeting to Engineer, Owner, and those affected by decisions made.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Definitions.
- B. Submittal procedures.
- C. Construction progress schedules.
- D. Proposed product list.
- E. Product data.
- F. Use of electronic CAD files of Project Drawings.
- G. Shop Drawings.
- H. Samples.
- I. Other submittals.
- J. Design data.
- K. Test reports.
- L. Certificates.
- M. Manufacturer's instructions.
- N. Manufacturer's field reports.
- O. Erection Drawings.
- P. Contractor review.
- Q. Engineer review.

1.2 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Engineer's responsive action.

- B. Informational Submittals: Written and graphic information and physical Samples that do not require Engineer's responsive action. Submittals may be rejected for not complying with requirements.

1.3 SUBMITTAL PROCEDURES

- A. Transmit each submittal with Engineer-accepted form.
- B. Sequentially number transmittal forms. Mark revised submittals with original number and sequential alphabetic suffix.
- C. Identify: Project, Contractor, Subcontractor and supplier, pertinent Drawing and detail number, and Specification Section number appropriate to submittal.
- D. Apply Contractor's stamp, signed or initialed, certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is according to requirements of the Work and Contract Documents.
- E. Schedule submittals to expedite Project, and deliver to Engineer. Coordinate submission of related items.
- F. For each submittal for review, allow 15 days excluding delivery time to and from Contractor.
- G. Identify variations in Contract Documents and product or system limitations that may be detrimental to successful performance of completed Work.
- H. Allow space on submittals for Contractor and Engineer review stamps.
- I. When revised for resubmission, identify changes made since previous submission.
- J. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.
- K. Submittals not requested will not be recognized nor processed.
- L. Incomplete Submittals: Engineer will not review. Complete submittals for each item are required. Delays resulting from incomplete submittals are not the responsibility of Engineer.

1.4 PROPOSED PRODUCT LIST

- A. Within 15 days after date of Owner-Contractor Agreement, submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
- B. For products specified only by reference standards, indicate manufacturer, trade name, model or catalog designation, and reference standards.

1.5 PRODUCT DATA

- A. Product Data: Action Submittal: Submit to Engineer for review for assessing conformance with information given and design concept expressed in Contract Documents.
- B. Submit number of copies Contractor requires, plus three copies Engineer will retain.
- C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- D. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- E. After review, produce copies and distribute according to "Submittal Procedures" Article and for record documents described in Section 01 70 00 - Execution and Closeout Requirements.
- F. Contractor to provide shop drawings and manufacturer certifications to confirm compliance with all American Iron and Steel requirements for all iron and steel products used on the project.

1.6 ELECTRONIC CAD FILES OF PROJECT DRAWINGS

- A. Electronic CAD Files of Project Drawings: May only be used to expedite production of Shop Drawings for the Project. Use for other Projects or purposes is not allowed.
- B. Electronic CAD Files of Project Drawings: Distributed only under the following conditions:
 - 1. Use of files is solely at receiver's risk. Engineer does not warrant accuracy of files. Receiving files in electronic form does not relieve receiver of responsibilities for measurements, dimensions, and quantities set forth in Contract Documents. In the event of ambiguity, discrepancy, or conflict between information on electronic media and that in Contract Documents, notify Engineer of discrepancy and use information in hard-copy Drawings and Specifications.
 - 2. CAD files do not necessarily represent the latest Contract Documents, existing conditions, and as-built conditions. Receiver is responsible for determining and complying with these conditions and for incorporating addenda and modifications.
 - 3. User is responsible for removing information not normally provided on Shop Drawings and removing references to Contract Documents. Shop Drawings submitted with information associated with other trades or with references to Contract Documents will not be reviewed and will be immediately returned.
 - 4. Receiver shall not hold Engineer responsible for data or file clean-up required to make files usable, nor for error or malfunction in translation, interpretation, or use of this electronic information.
 - 5. Receiver shall understand that even though Engineer has computer virus scanning software to detect presence of computer viruses, there is no guarantee that computer viruses are not present in files or in electronic media.
 - 6. Receiver shall not hold Engineer responsible for such viruses or their consequences, and shall hold Engineer harmless against costs, losses, or damage caused by presence of computer virus in files or media.

1.7 SHOP DRAWINGS

- A. Shop Drawings: Action Submittal: Submit to Engineer for assessing conformance with information given and design concept expressed in Contract Documents.
- B. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. When required by individual Specification Sections, provide Shop Drawings signed and sealed by a professional Engineer responsible for designing components shown on Shop Drawings.
 - 1. Include signed and sealed calculations to support design.
 - 2. Submit Shop Drawings and calculations in form suitable for submission to and approval by authorities having jurisdiction.
 - 3. Make revisions and provide additional information when required by authorities having jurisdiction.
- D. Submit number of opaque reproductions Contractor requires, plus two copies Engineer will retain.
- E. After review, produce copies and distribute according to "Submittal Procedures" Article and for record documents described in Section 01 70 00 - Execution and Closeout Requirements.

1.8 SAMPLES

- A. Samples: Action Submittal: Submit to Engineer for assessing conformance with information given and design concept expressed in Contract Documents.
- B. Samples for Selection as Specified in Product Sections:
 - 1. Submit to Engineer for aesthetic, color, and finish selection.
 - 2. Submit Samples of finishes, textures, and patterns for Engineer selection.
- C. Submit Samples to illustrate functional and aesthetic characteristics of products, with integral parts and attachment devices. Coordinate Sample submittals for interfacing work.
- D. Include identification on each Sample, with full Project information.
- E. Submit number of Samples specified in individual Specification Sections; Engineer will retain one Sample.
- F. Reviewed Samples that may be used in the Work are indicated in individual Specification Sections.
- G. Samples will not be used for testing purposes unless specifically stated in Specification Section.
- H. After review, produce copies and distribute according to "Submittal Procedures" Article and for record documents described in Section 01 70 00 - Execution and Closeout Requirements.

1.9 OTHER SUBMITTALS

- A. Closeout Submittals: Comply with Section 01 70 00 - Execution and Closeout Requirements.
- B. Informational Submittal: Submit data for Engineer's knowledge as Contract administrator or for Owner.
- C. Submit information for assessing conformance with information given and design concept expressed in Contract Documents.

1.10 TEST REPORTS

- A. Informational Submittal: Submit reports for Engineer's knowledge as Contract administrator or for Owner.
- B. Submit test reports for information for assessing conformance with information given and design concept expressed in Contract Documents.

1.11 CERTIFICATES

- A. Informational Submittal: Submit certification by manufacturer, installation/application Subcontractor, or Contractor to Engineer, in quantities specified for Product Data.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or product but must be acceptable to Engineer.

1.12 MANUFACTURER'S INSTRUCTIONS

- A. Informational Submittal: Submit manufacturer's installation instructions for Engineer's knowledge as Contract administrator or for Owner.
- B. Submit printed instructions for delivery, storage, assembly, installation, startup, adjusting, and finishing, to Engineer in quantities specified for Product Data.
- C. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.13 MANUFACTURER'S FIELD REPORTS

- A. Informational Submittal: Submit reports for Engineer's knowledge as Contract administrator or for Owner.
- B. Submit report in duplicate within 5 days of observation to Engineer for information.
- C. Submit reports for information for assessing conformance with information given and design concept expressed in Contract Documents.

1.14 ERECTION DRAWINGS

- A. Informational Submittal: Submit Drawings for Engineer's knowledge as Contract administrator or for Owner.
- B. Submit Drawings for information assessing conformance with information given and design concept expressed in Contract Documents.
- C. Data indicating inappropriate or unacceptable Work may be subject to action by Engineer or Owner.

1.15 CONTRACTOR REVIEW

- A. Review for compliance with Contract Documents and approve submittals before transmitting to Engineer.
- B. Contractor: Responsible for:
 - 1. Determination and verification of materials including manufacturer's catalog numbers.
 - 2. Determination and verification of field measurements and field construction criteria.
 - 3. Checking and coordinating information in submittal with requirements of Work and of Contract Documents.
 - 4. Determination of accuracy and completeness of dimensions and quantities.
 - 5. Confirmation and coordination of dimensions and field conditions at Site.
 - 6. Construction means, techniques, sequences, and procedures.
 - 7. Safety precautions.
 - 8. Coordination and performance of Work of all trades.
- C. Stamp, sign or initial, and date each submittal to certify compliance with requirements of Contract Documents.
- D. Do not fabricate products or begin Work for which submittals are required until approved submittals have been received from Engineer.

1.16 ENGINEER REVIEW

- A. Do not make "mass submittals" to Engineer. "Mass submittals" are defined as six or more submittals or items in one day or 15 or more submittals or items in one week. If "mass submittals" are received, Engineer's review time stated above will be extended as necessary to perform proper review. Engineer will review "mass submittals" based on priority determined by Engineer after consultation with Owner and Contractor.
- B. Informational submittals and other similar data are for Engineer's information, do not require Engineer's responsive action, and will not be reviewed or returned with comment.
- C. Submittals made by Contractor that are not required by Contract Documents may be returned without action.
- D. Submittal approval does not authorize changes to Contract requirements unless accompanied by Change Order.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Quality control.
- B. Tolerances.
- C. References.
- D. Labeling.
- E. Testing and inspection services.
- F. Manufacturers' field services.

1.2 QUALITY CONTROL

- A. Monitor quality control over suppliers, manufacturers, products, services, Site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with specified standards as the minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- C. Perform Work using persons qualified to produce required and specified quality.
- D. Products, materials, and equipment may be subject to inspection by Engineer and Owner at place of manufacture or fabrication. Such inspections shall not relieve Contractor of complying with requirements of Contract Documents.
- E. Supervise performance of Work in such manner and by such means to ensure that Work, whether completed or in progress, will not be subjected to harmful, dangerous, damaging, or otherwise deleterious exposure during construction period.

1.3 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' recommended tolerances and tolerance requirements in reference standards. When such tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.

- C. Adjust products to appropriate dimensions; position before securing products in place.

1.4 REFERENCES

- A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current as of date of Contract Documents except where specific date is established by code.
- C. Obtain copies of standards and maintain on Site when required by product Specification Sections.
- D. When requirements of indicated reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.
- E. Neither contractual relationships, duties, or responsibilities of parties in Contract nor those of Engineer shall be altered from Contract Documents by mention or inference in reference documents.

1.5 LABELING

- A. Attach label from agency approved by authorities having jurisdiction for products, assemblies, and systems required to be labeled by applicable code.
- B. Label Information: Include manufacturer's or fabricator's identification, approved agency identification, and the following information, as applicable, on each label:
 - 1. Model number.
 - 2. Serial number.
 - 3. Performance characteristics.
- C. Manufacturer's Nameplates, Trademarks, Logos, and Other Identifying Marks on Products: Not allowed on surfaces exposed to view in public areas, interior or exterior.

1.6 TESTING AND INSPECTION SERVICES

- A. Owner will employ Engineer to perform testing and inspection.
- B. Engineer will perform tests, inspections, and other services specified in individual Specification Sections and as required by Engineer, Owner, or authorities having jurisdiction.
 - 1. Laboratory: Authorized to operate in State of Michigan.
 - 2. Laboratory Staff: Maintain full-time specialist on staff to review services.
 - 3. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to National Bureau of Standards or accepted values of natural physical constants.
- C. Testing, inspections, and source quality control may occur on or off Project Site. Perform off-Site testing as required by Engineer or Owner.

- D. Reports shall be submitted to Engineer, Contractor, and authorities having jurisdiction indicating observations and results of tests and compliance or noncompliance with Contract Documents.
 - 1. Submit final report indicating correction of Work previously reported as noncompliant.
- E. Cooperate with Engineer; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
 - 1. Notify Engineer 48 hours before expected time for operations requiring services.
 - 2. Make arrangements with Engineer and pay for additional Samples and tests required for Contractor's use.
- F. Employment of testing agency or laboratory shall not relieve Contractor of obligation to perform Work according to requirements of Contract Documents.
- G. Retesting or re-inspection required because of nonconformance with specified or indicated requirements shall be performed by Engineer.
- H. Agency Responsibilities:
 - 1. Test Samples of mixes submitted by Contractor.
 - 2. Provide qualified personnel at Site. Cooperate with Engineer and Contractor in performance of services.
 - 3. Perform indicated sampling and testing of products according to specified standards.
 - 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 - 5. Promptly notify Engineer and Contractor of observed irregularities or nonconformance of Work or products.
 - 6. Perform additional tests required by Engineer.
 - 7. Attend preconstruction meetings and progress meetings.
- I. Agency Reports: After each test, promptly submit two copies of report to Engineer, Contractor, and authorities having jurisdiction. When requested by Engineer, provide interpretation of test results. Include the following:
 - 1. Date issued.
 - 2. Project title and number.
 - 3. Name of inspector.
 - 4. Date and time of sampling or inspection.
 - 5. Identification of product and Specification Section.
 - 6. Location in Project.
 - 7. Type of inspection or test.
 - 8. Date of test.
 - 9. Results of tests.
 - 10. Conformance with Contract Documents.
- J. Limits on Testing Authority:
 - 1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 - 2. Agency or laboratory may not approve or accept any portion of the Work.
 - 3. Agency or laboratory may not assume duties of Contractor.
 - 4. Agency or laboratory has no authority to stop the Work.

1.7 MANUFACTURER'S FIELD SERVICES

- A. When specified in individual Specification Sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe Site conditions, conditions of surfaces and installation, quality of workmanship, startup of equipment, testing, adjusting, and balancing of equipment commissioning as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Engineer 30 days in advance of required observations. Observer is subject to approval of Engineer and Owner.
- C. Report observations and Site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturer's written instructions.
- D. Refer to Section 01 33 00 - Submittal Procedures, "Manufacturer's Field Reports" Article.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Temporary Utilities:
 - 1. Temporary electricity.
 - 2. Temporary lighting for construction purposes.
 - 3. Temporary heating.
 - 4. Temporary cooling.
 - 5. Temporary ventilation.
 - 6. Communication services.
 - 7. Temporary water service.
 - 8. Temporary sanitary facilities.

- B. Construction Facilities:
 - 1. Field offices and sheds.
 - 2. Vehicular access.
 - 3. Parking.
 - 4. Progress cleaning and waste removal.
 - 5. Project identification.
 - 6. Traffic regulation.
 - 7. Fire-prevention facilities.

- C. Temporary Controls:
 - 1. Barriers.
 - 2. Enclosures and fencing.
 - 3. Security.
 - 4. Water control.
 - 5. Dust control.
 - 6. Erosion and sediment control.
 - 7. Noise control.
 - 8. Pest and rodent control.
 - 9. Pollution control.

- D. Removal of utilities, facilities, and controls.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 2. ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

3. ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

1.3 TEMPORARY ELECTRICITY

- A. Provide and pay for power service required from utility source as needed for construction operation.
- B. Complement existing power service capacity and characteristics as required for construction operations.
- C. Provide power outlets with branch wiring and distribution boxes located as required for construction operations. Provide suitable, flexible power cords as required for portable construction tools and equipment.
- D. Provide main service disconnect and overcurrent protection at convenient location.
- E. Permanent convenience receptacles may be used during construction.
- F. Provide distribution equipment, wiring, and outlets for single-phase branch circuits for power and lighting.

1.4 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

- A. Provide and maintain lighting for construction operations.
- B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, lamps, and the like, for specified lighting levels.
- C. Maintain lighting and provide routine repairs.
- D. Permanent building lighting may be used during construction.

1.5 TEMPORARY HEATING

- A. Provide and pay for heating devices and heat as needed to maintain specified conditions for construction operations.
- B. Before operating permanent equipment for temporary heating purposes, verify installation is approved for operation, equipment is lubricated, and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts. Replace filters at Substantial Completion.

1.6 TEMPORARY COOLING

- A. Provide and pay for cooling devices and cooling as needed to maintain specified conditions for construction operations.

- B. Before operating permanent equipment for temporary cooling purposes, verify installation is approved for operation, equipment is lubricated, and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts. Replace filters at Substantial Completion.

1.7 TEMPORARY VENTILATION

- A. Ventilate enclosed areas to achieve curing of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

1.8 TEMPORARY WATER SERVICE

- A. Provide and pay for suitable quality water service as needed to maintain specified conditions for construction operations.

1.9 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Existing facility use is not permitted. Provide facilities at time of Project mobilization.

1.10 VEHICULAR ACCESS

- A. Construct temporary all-weather access roads from public thoroughfares to serve construction area, of width and load-bearing capacity to accommodate unimpeded traffic for construction purposes.
- B. Construct temporary bridges and culverts to span low areas and allow unimpeded drainage.
- C. Extend and relocate vehicular access as Work progress requires and provide detours as necessary for unimpeded traffic flow.
- D. Locate as approved by Engineer or as approved by Owner.
- E. Provide unimpeded access for emergency vehicles. Maintain 10 foot-wide driveways with turning space between and around combustible materials.
- F. Provide and maintain access to fire hydrants and control valves and keep free of obstructions.
- G. Provide means of removing mud from vehicle wheels before entering streets.
- H. Use designated existing on-Site roads for construction traffic.

1.11 PARKING

- A. Arrange for, Provide, or Construct temporary surface parking areas to accommodate construction personnel.
- B. Locate as approved by Engineer or as approved by Owner.

- C. If Site space is not adequate, provide additional off-Site parking.
- D. Use of existing on-site streets and driveways used for construction traffic is permitted. Tracked vehicles are not allowed on paved areas.
- E. Use of existing parking facilities used by construction personnel is permitted.
- F. Do not allow heavy vehicles or construction equipment in parking areas.
- G. Permanent Pavements and Parking Facilities:
 - 1. Before Substantial Completion, bases for permanent roads and parking areas may be used for construction traffic.
 - 2. Avoid traffic loading beyond paving design capacity. Tracked vehicles are not allowed.
 - 3. Use of permanent parking structures is permitted.
- H. Maintenance:
 - 1. Maintain traffic and parking areas in sound condition free of excavated material, construction equipment, products, mud, snow, ice, and the like.
 - 2. Maintain existing and permanent paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original condition.
- I. Removal, Repair:
 - 1. Remove temporary materials and construction when permanent paving is usable.
 - 2. Remove underground Work and compacted materials to depth of 1 feet; fill and grade Site as indicated.
 - 3. Repair existing and permanent facilities damaged by use, to original condition.
- J. Mud from Site vehicles: Provide means of removing mud from vehicle wheels before entering streets.

1.12 PROGRESS CLEANING AND WASTE REMOVAL

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain Site in clean and orderly condition.
- B. Collect and remove waste materials, debris, and rubbish from Site periodically and dispose of off-Site.

1.13 TRAFFIC REGULATION

- A. Signs, Signals, and Devices:
 - 1. Post-Mounted and Wall-Mounted Traffic Control and Informational Signs: As approved by authorities having jurisdiction.
 - 2. Traffic Control Signals: As approved by local jurisdictions.
 - 3. Traffic Cones, Drums, Flares, and Lights: As approved by authorities having jurisdiction.
 - 4. Flag Person Equipment: As required by authorities having jurisdiction.

- B. Flag Persons: Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.
- C. Flares and Lights: Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.
- D. Haul Routes:
 1. Consult with authorities having jurisdiction and establish public thoroughfares to be used for haul routes and Site access.
- E. Traffic Signs and Signals:
 1. Provide signs at approaches to Site and on Site, at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.
 2. Provide, operate, and maintain traffic control signals to direct and maintain orderly flow of traffic in areas under Contractor's control and areas affected by Contractor's operations.
 3. Relocate signs and signals as Work progresses, to maintain effective traffic control.
- F. Removal:
 1. Remove equipment and devices when no longer required.
 2. Repair damage caused by installation.
 3. Remove post settings to depth of 2 feet.

1.14 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.
- B. Provide barricades required by authorities having jurisdiction for public rights-of-way.
 1. Barricade Construction: As indicated on Drawings.
- C. Tree and Plant Protection: Preserve and protect existing trees and plants designated to remain.
 1. Protect areas within drip lines from traffic, parking, storage, dumping, chemically injurious materials and liquids, ponding, and continuous running water.
 2. Replace trees and plants damaged by construction operations.
- D. Protect non-owned vehicular traffic, stored materials, Site, and structures from damage.

1.15 ENCLOSURES AND FENCING

- A. Construction: Contractor's option.
- B. Exterior Enclosures:
 1. Provide temporary weathertight closure of exterior openings to accommodate acceptable working conditions and protection for products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual Specification Sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.16 SECURITY

- A. Security Program:
 - 1. Protect Work on existing premises from theft, vandalism, and unauthorized entry.
 - 2. Initiate program at Project mobilization.
 - 3. Maintain program throughout construction period until Owner's acceptance precludes need for Contractor's security.

- B. Entry Control:
 - 1. Restrict entrance of persons and vehicles to Project Site.
 - 2. Allow entrance only to authorized persons with proper identification.
 - 3. Maintain log of workers and visitors and make available to Owner on request.
 - 4. Control entrance of persons and vehicles related to Owner's operations.

- C. Restrictions:
 - 1. Do no work on days indicated in Owner-Contractor Agreement.

1.17 WATER CONTROL

- A. Grade Site to drain. Maintain excavations free of water. Provide, operate, and maintain necessary pumping equipment.

- B. Protect Site from puddles or running water.

1.18 DUST CONTROL

- A. Execute Work by methods that minimize raising dust from construction operations.

- B. Provide positive means to prevent airborne dust from dispersing into atmosphere.

1.19 EROSION AND SEDIMENT CONTROL

- A. Plan and execute construction by methods to control surface drainage from cuts and fills from borrow and waste disposal areas. Prevent erosion and sedimentation.

- B. Minimize surface area of bare soil exposed at one time.

- C. Provide temporary measures including berms, dikes, drains, and other devices to prevent water flow.

- D. Construct fill and waste areas by selective placement to avoid erosive surface silts and clays.

- E. Periodically inspect earthwork to detect evidence of erosion and sedimentation. Promptly apply corrective measures.

- F. Comply with sediment and erosion control plan indicated on Drawings.

1.20 NOISE CONTROL

- A. Provide methods, means, and facilities to minimize noise produced by construction operations.

1.21 POLLUTION CONTROL

- A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances and pollutants produced by construction operations.
- B. Comply with pollution and environmental control requirements of authorities having jurisdiction.

1.22 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, and materials before Final Application for Payment inspection.
- B. Remove underground installations to minimum depth of 2 feet.
- C. Clean and repair damage caused by installation or use of temporary Work.
- D. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

SECTION 01 55 26 - TRAFFIC CONTROL

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
- B. Traffic Control.
- C. Signs, Signals, and Devices.
- D. Traffic Signs and Signals.
- E. Construction Parking Control.
- F. Regulators.
- G. Lighting Devices.
- H. Haul Routes.
- I. Removal.

1.2 Related Sections:

- A. Section 01 10 00 – Summary.
- B. Section 01 30 00 – Administrative Requirements.
- C. Section 01 50 00 – Temporary Facilities and Controls.

1.3 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Traffic Control Prueter Drive:
 - 1. Basis of Measurement: At the lump sum price bid as stated in the proposal.
 - 2. Basis of Payment: Includes all labor, material and equipment necessary to furnish, install and maintain traffic control devices to meet the requirements of the authority having jurisdiction, as specified and as shown on plans per MDOT Standard Specifications for Construction, current edition.
- B. Traffic Control MDOT M-46 Hwy:
 - 1. Basis of Measurement: Included in other pay items.
 - 2. Basis of Payment: Includes all labor, material and equipment necessary to furnish, install and maintain traffic control devices to meet the requirements of the authority having jurisdiction, as specified and as shown on plans per MDOT Standard Specifications for Construction, current edition.

- C. Pavt Mrkg, Ovly Cold Plastic, 6 inch, Cross Hatching, White:
 - 1. Basis of Measurement: At the unit price bid per linear foot as stated in the proposal.
 - 2. Basis of Payment: Includes all labor, material and equipment to install pavement markings as indicated on the plans per MDOT Standard Specifications for Construction, current edition.

- D. Pavt Mrkg, Wet reflective, Type R, Tape, 24 inch, Stop Bar:
 - 1. Basis of Measurement: At the unit price bid per linear foot as stated in the proposal.
 - 2. Basis of Payment: Includes all labor, material and equipment to install pavement markings as indicated on the plans per MDOT Standard Specifications for Construction, current edition.

- E. Pavt Mrkg, Waterborne, 4 inch, White:
 - 1. Basis of Measurement: At the unit price bid per linear foot as stated in the proposal.
 - 2. Basis of Payment: Includes all labor, material and equipment to install pavement markings as indicated on the plans per MDOT Standard Specifications for Construction, current edition.

- F. Pavt Mrkg, Waterborne, 4 inch, Yellow:
 - 1. Basis of Measurement: At the unit price bid per linear foot as stated in the proposal.
 - 2. Basis of Payment: Includes all labor, material and equipment to install pavement markings as indicated on the plans per MDOT Standard Specifications for Construction, current edition.

- G. Pavt Mrkg, Waterborne, 2nd Application, 4 inch, White:
 - 1. Basis of Measurement: At the unit price bid per linear foot as stated in the proposal.
 - 2. Basis of Payment: Includes all labor, material and equipment to install pavement markings as indicated on the plans per MDOT Standard Specifications for Construction, current edition.

- H. Pavt Mrkg, Waterborne, 2nd Application, 4 inch, Yellow:
 - 1. Basis of Measurement: At the unit price bid per linear foot as stated in the proposal.
 - 2. Basis of Payment: Includes all labor, material and equipment to install pavement markings as indicated on the plans per MDOT Standard Specifications for Construction, current edition.

- I. Pavt Mrkg, Wet Reflective, Type R, Tape, 4 inch, White, Temp:
 - 1. Basis of Measurement: At the unit price bid per linear foot as stated in the proposal.
 - 2. Basis of Payment: Includes all labor, material and equipment to install pavement markings as indicated on the plans per MDOT Standard Specifications for Construction, current edition.

- J. Pavt Mrkg, Wet Reflective, Type R, Tape, 4 inch, Yellow, Temp:
 - 1. Basis of Measurement: At the unit price bid per linear foot as stated in the proposal.
 - 2. Basis of Payment: Includes all labor, material and equipment to install pavement markings as indicated on the plans per MDOT Standard Specifications for Construction, current edition.

- K. Pavt Mrkg, Ovly Cold Plastic, Lt Turn Arrow, Sym,:
 - 1. Basis of Measurement: At the unit price bid per each as stated in the proposal.
 - 2. Basis of Payment: Includes all labor, material and equipment to install pavement markings as indicated on the plans per MDOT Standard Specifications for Construction, current edition.

- L. Pavt Mrkg, Ovly Cold Plastic, 24-inch Stop Bar:
 - 1. Basis of Measurement: At the unit price bid per lineal foot as stated in the proposal.
 - 2. Basis of Payment: Includes all labor, material and equipment to install pavement markings as indicated on the plans per MDOT Standard Specifications for Construction, current edition.

- M. Pavt Mrkg, Wet reflective, Type R, Tape, Lt Turn Arrow Sym:
 - 1. Basis of Measurement: At the unit price bid per each as stated in the proposal.
 - 2. Basis of Payment: Includes all labor, material and equipment to install pavement markings as indicated on the plans per MDOT Standard Specifications for Construction, current edition.

- N. Pavt Mrkg, Longit, 6 inch or less Width, Rem:
 - 1. Basis of Measurement: At the unit price bid per linear foot as stated in the proposal.
 - 2. Basis of Payment: Includes all labor, material and equipment to remove pavement markings as indicated on the plans per MDOT Standard Specifications for Construction, current edition.

- O. Rem Spec Mrkg:
 - 1. Basis of Measurement: At the unit price bid per square foot as stated in the proposal.
 - 2. Basis of Measurement: Includes all labor, material and equipment to remove pavement markings as indicated on the plans per MDOT Standard Specifications for Construction, current edition.

- P. Plastic Drum, High Intensity, Furn, Oper:
 - 1. Basis of Measurement: At the unit price bid per each as stated in the proposal.
 - 2. Basis of Payment: Includes all labor, material and equipment necessary to furnish install and operate traffic control signaling devices as indicated on the plans per MDOT Standard Specifications for Construction, current edition.

- Q. Sign, Type B, Temp, Prismatic, Furn, Oper:
 - 1. Basis of Measurement: At the unit price bid per square foot as stated in the proposal.
 - 2. Basis of Payment: Includes all labor, material and equipment necessary to furnish install and operate traffic control signaling devices as indicated on the plans per MDOT Standard Specifications for Construction, current edition.

- R. Sign, Type B, Temp, Prismatic, Special, Furn, Oper:
 - 1. Basis of Measurement: At the unit price bid per square foot as stated in the proposal.
 - 2. Basis of Payment: Includes all labor, material and equipment necessary to furnish install and operate traffic control signaling devices as indicated on the plans per MDOT Standard Specifications for Construction, current edition.

S. Sign Cover:

1. Basis of Measurement: at the unit price bid per each as stated in the proposal.
2. Basis of Measurement: Includes labor, material and equipment for furnishing, installing, removing, and relocating the sign covers as indicated on the plans and per MDOT Standard Specifications for Construction, current edition.

T. Barricade, Type III, High Intensity, Double Sided, Lighted, Furn, Oper:

1. Basis of Measurement: At the unit price bid per each as stated in the proposal.
2. Basis of Payment: Includes all labor, material and equipment necessary to furnish install and operate traffic control signaling devices as indicated on the plans per MDOT Standard Specifications for Construction, current edition.

U. Lighted Arrow, Type C, Furn, Oper:

1. Basis of Measurement: At the unit price bid per each as stated in the proposal.
2. Basis of Payment: Includes all labor, material and equipment necessary to furnish install and operate traffic control signaling devices as indicated on the plans per MDOT Standard Specifications for Construction, current edition.

V. Wireless Vehicle Sensor Node, Rem, Salv

1. Basis of Measure: At the unit price bid per each as stated in the proposal.
2. Basis of Payment: Include all labor, material and equipment necessary to remove the wireless vehicle sensor nodes and return them to the MDOT Bay City TSC.

W. TS Head, Adj

1. Basis of Measurement: At the unit price bid per each as stated in the proposal.
2. Basis of Payment: Includes material, labor and equipment to adjust the turn signal head as indicated on the plans per MDOT Standard Specifications for Construction, current edition.

X. Recable, TS,

1. Basis of Measurement: At the unit price bid per lineal foot as stated in the proposal.
2. Basis of Payment: Includes material, labor and equipment to install the cable as indicated on the plans per MDOT Standard Specifications for Construction, current edition.

Y. TS, Bag

1. Basis of Measurement: At the unit price bid per each as stated in the proposal.
2. Basis of Payment: Includes material, labor and equipment to install the TS bag as indicated on the plans per MDOT Standard Specifications for Construction, current edition.

Z. TS, Bag Rem

1. Basis of Measurement: At the unit price bid per each as stated in the proposal.
2. Basis of Payment: Includes material, labor and equipment to remove the TS bag as indicated on the plans per MDOT Standard Specifications for Construction, current edition.

AA. Minor Traf Devices:

1. Basis of Measurement: At the lump sum price bid as stated in the proposal.
2. Basis of Payment: Includes material, labor and equipment for providing, installing, maintaining, relocating, and removing traffic cones and other traffic devices, not shown on the plans; removing, storing, and reinstalling department owned signs and supports; and installing reflective conspicuity tape on vehicles and equipment.

1.4 TRAFFIC CONTROL

- A. Comply with the rules and regulations of the County, City, Township, Village, or MDOT having jurisdiction over the road.
- B. Provide, install, and maintain traffic control devices.
- C. Control devices shall conform to the Michigan Manual of Uniform Traffic Control Devices Part 6 Construction and Maintenance, Quality Standards for Work Zone Traffic Control Devices published by the American Traffic Safety Services Association (ATSSA) and the MDOT Standard Specifications for Construction, current edition.
- D. Maintain through traffic unless written permission to do otherwise is obtained from the authority having jurisdiction over the road.
- E. Provide and maintain detour signs if allowed to close road.

1.5 SIGNS, SIGNALS, AND DEVICES

- A. Traffic Control Signals: As approved by local jurisdictions.
- B. Traffic Cones and Drums, and Lights: As approved by local jurisdictions.
- C. Traffic Regulators (Flagman) Equipment: As approved by local jurisdictions.
- D. Post Mounted and Wall Mounted Traffic Control and Informational Signs: Specified in paragraph 1.4 Traffic Control.
- E. Automatic Traffic Control Signals: As approved by local jurisdictions.

1.6 TRAFFIC SIGNS AND SIGNALS

- A. Install traffic control devices at approaches to Site and on Site, at crossroads, for detours, in parking areas, and elsewhere, as needed to direct construction and affected public traffic.
- B. Install and operate traffic signals to direct and maintain orderly flow of traffic in areas under Contractor's control, and areas affected by Contractor's operations.
- C. Relocate traffic control devices as Work progresses, to maintain effective traffic control.

1.7 CONSTRUCTION PARKING CONTROL

- A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and Landowner's operations.
- B. Monitor parking of construction personnel's vehicles in existing facilities. Maintain vehicular access to and through parking areas.
- C. Prevent parking on or adjacent to access roads or in non-designated areas.
- D. Staging of equipment and storage of materials will not be allowed on business or residential parking areas without written permission from the landowner. See plans for a designated parking area.

1.8 REGULATORS (FLAGMEN)

- A. Provide trained and equipped regulators to move vehicles and pedestrians when construction operations or traffic encroach on public traffic lanes.

1.9 LIGHTING DEVICES

- A. Use lights during hours of low visibility to delineate traffic lanes and to guide traffic.

1.10 HAUL ROUTES

- A. Consult with authority having jurisdiction in establishing public thoroughfares to be used for haul routes and Site access.
- B. Confine construction traffic to designated haul routes.
- C. Provide traffic control devices and/or regulators at critical areas of haul routes to minimize interference with public traffic.

1.11 FENCING AND GUARDRAILS

- A. Remove and install fencing and guardrails per MDOT Standard Plans and MDOT Standard Specifications for Construction, current edition.

1.12 REMOVAL

- A. Remove equipment and traffic control devices when no longer required.
- B. Repair damage caused by installation.
- C. Remove post settings to a depth of 1 foot.

END OF SECTION

SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Products.
- B. Product delivery requirements.
- C. Product storage and handling requirements.
- D. Product options or Substitutions.
- E. Equipment electrical characteristics and components.

1.2 PRODUCTS

- A. At minimum, comply with specified requirements and reference standards.
- B. Specified products define standard of quality, type, function, dimension, appearance, and performance required.
- C. Furnish products of qualified manufacturers that are suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise. Confirm that manufacturer's production capacity can provide sufficient product, on time, to meet Project requirements.
- D. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse.
- E. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
- F. Provide interchangeable components of the same manufacturer, for similar components.

1.3 PRODUCT DELIVERY REQUIREMENTS

- A. Transport and handle products according to manufacturer's instructions.
- B. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products; use methods to prevent soiling, disfigurement, or damage.

1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

- A. Store and protect products according to manufacturer's instructions.
- B. Store products with seals and labels intact and legible.
- C. Store sensitive products in weathertight, climate-controlled enclosures in an environment suitable to product.
- D. For exterior storage of fabricated products, place products on sloped supports aboveground.
- E. Provide off-Site storage and protection when Site does not permit on-Site storage or protection.
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- G. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.
- H. Provide equipment and personnel to store products; use methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

1.5 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Products complying with specified reference standards or description.
- B. Products Specified by Naming One or More Manufacturers: Products of one of manufacturers named and complying with Specifications; no options or substitutions allowed.
- C. Engineer will consider requests for substitutions only within 15 days after date of Owner-Contractor Agreement.
- D. Instructions to Bidders (IB) specify time for submitting requests for Substitutions after the Effective Date of the Agreement to requirements specified in this Section.
- E. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.
- F. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- G. A request constitutes a representation that the Contractor:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 - 2. Will provide the same warranty for the Substitution as for the specified product.

3. Will coordinate installation and make changes to other Work, which may be required for the Work to be complete with no additional cost to Owner.
 4. Waives claims for additional costs or time extension, which may subsequently become apparent.
 5. Will reimburse Owner for review or redesign services associated with re-approval by authorities.
- H. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- I. Substitution Submittal Procedure:
1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
 2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence.
 3. The Engineer will notify Contractor, in writing, of decision to accept or reject request.

PART 2 - PRODUCTS – Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

SECTION 01 70 00

EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Field engineering.
- B. Closeout procedures.
- C. Starting of systems.
- D. Demonstration and instructions.
- E. Testing, adjusting, and balancing.
- F. Project record documents.
- G. Operation and maintenance data.
- H. Manual for materials and finishes.
- I. Manual for equipment and systems.
- J. Spare parts and maintenance products.
- K. Product warranties and product bonds.
- L. Maintenance service.
- M. Examination.
- N. Preparation.
- O. Execution.
- P. Cutting and patching.
- Q. Protecting installed construction.
- R. Final cleaning.

1.2 FIELD ENGINEERING

- A. Owner will locate and Contractor shall protect survey control and reference points. Promptly notify Engineer of discrepancies discovered.

- B. Control datum for survey is established by Owner-provided survey.
- C. Verify setbacks and easements; confirm Drawing dimensions and elevations.
- D. Provide field engineering services. Establish elevations, lines, and levels using recognized engineering survey practices.
- E. Submit copy of Site drawing and certificate signed by land surveyor certifying elevations and locations of the Work are in conformance with Contract Documents.
- F. Maintain complete and accurate log of control and survey Work as Work progresses.
- G. On completion of foundation walls and major Site improvements, prepare certified survey illustrating dimensions, locations, angles, and elevations of construction and Site Work.
- H. Protect survey control points prior to starting Site Work; preserve permanent reference points during construction.
- I. Promptly report to Engineer loss or destruction of reference point or relocation required because of changes in grades or other reasons.
- J. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Engineer.

1.3 CLOSEOUT PROCEDURES

- A. Prerequisites to Substantial Completion: Complete following items before requesting Certification of Substantial Completion, either for entire Work or for portions of Work:
 1. Submit maintenance manuals, Project record documents, digital images of construction photographs, and other similar final record data in compliance with this Section.
 2. Complete facility startup, testing, adjusting, balancing of systems and equipment, demonstrations, and instructions to Owner's operating and maintenance personnel as specified in compliance with this Section.
 3. Conduct inspection to establish basis for request that Work is substantially complete. Create comprehensive list (initial punch list) indicating items to be completed or corrected, value of incomplete or nonconforming Work, reason for being incomplete, and date of anticipated completion for each item. Include copy of list with request for Certificate of Substantial Completion.
 4. Obtain and submit releases enabling Owner's full, unrestricted use of Project and access to services and utilities. Include certificate of occupancy, operating certificates, and similar releases from authorities having jurisdiction and utility companies.
 5. Deliver tools, spare parts, extra stocks of material, and similar physical items to Owner.
 6. Make final change-over of locks eliminating construction master-key system and transmit keys directly to Owner. Advise Owner's personnel of change-over in security provisions.
 7. Discontinue or change over and remove temporary facilities and services from Project Site, along with construction tools, mockups, and similar elements.
 8. Perform final cleaning according to this Section.

- B. Substantial Completion Inspection:
1. When Contractor considers Work to be substantially complete, submit to Engineer:
 - a. Written certificate that Work, or designated portion, is substantially complete.
 - b. List of items to be completed or corrected (initial punch list).
 2. Within seven days after receipt of request for Substantial Completion, Engineer will make inspection to determine whether Work or designated portion is substantially complete.
 3. Should Engineer determine that Work is not substantially complete:
 - a. Engineer will promptly notify Contractor in writing, stating reasons for its opinion.
 - b. Contractor shall remedy deficiencies in Work and send second written request for Substantial Completion to Engineer.
 - c. Engineer will reinspect Work.
 - d. Redo and Inspection of Deficient Work: Repeated until Work passes Engineer's inspection.
 4. When Engineer finds that Work is substantially complete, Engineer will:
 - a. Prepare Certificate of Substantial Completion on EJCDC C-625 - Certificate of Substantial Completion, accompanied by Contractor's list of items to be completed or corrected as verified and amended by Engineer and Owner (final punch list).
 - b. Submit Certificate to Owner and Contractor for their written acceptance of responsibilities assigned to them in Certificate.
 5. After Work is substantially complete, Contractor shall:
 - a. Allow Owner occupancy of Project under provisions stated in Certificate of Substantial Completion.
 - b. Complete Work listed for completion or correction within time period stipulated.
- C. Prerequisites for Final Completion: Complete following items before requesting final acceptance and final payment.
1. When Contractor considers Work to be complete, submit written certification that:
 - a. Contract Documents have been reviewed.
 - b. Work has been examined for compliance with Contract Documents.
 - c. Work has been completed according to Contract Documents.
 - d. Work is completed and ready for final inspection.
 2. Submittals: Submit following:
 - a. Final punch list indicating all items have been completed or corrected.
 - b. Final payment request with final releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
 - c. Specified warranties, workmanship/maintenance bonds, maintenance agreements, and other similar documents.
 - d. Accounting statement for final changes to Contract Sum.
 - e. Contractor's affidavit of payment of debts and claims on AIA G706 - Contractor's Affidavit of Payment of Debts and Claims.
 - f. Contractor affidavit of release of liens on AIA G706A - Contractor's Affidavit of Release of Liens.
 - g. Consent of surety to final payment on AIA G707 - Consent of Surety to Final Payment Form.
 3. Perform final cleaning for Contractor-soiled areas according to this Section.

- D. Final Completion Inspection:
 - 1. Within seven days after receipt of request for final inspection, Engineer will make inspection to determine whether Work or designated portion is complete.
 - 2. Should Engineer consider Work to be incomplete or defective:
 - a. Engineer will promptly notify Contractor in writing, listing incomplete or defective Work.
 - b. Contractor shall remedy stated deficiencies and send second written request to Engineer that Work is complete.
 - c. Engineer will reinspect Work.
 - d. Redo and Inspection of Deficient Work: Repeated until Work passes Engineer's inspection.

1.4 PROJECT RECORD DOCUMENTS

- A. Maintain on Site one set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed Shop Drawings, product data, and Samples.
 - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress, not less than weekly.
- E. Specifications: Legibly mark and record, at each product Section, description of actual products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates used.
 - 3. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction as follows:
 - 1. Include Contract modifications such as Addenda, supplementary instructions, change directives, field orders, minor changes in the Work, and change orders.
 - 2. Include locations of concealed elements of the Work.
 - 3. Identify depth of buried utility lines and provide dimensions showing distances from permanent facility components that are parallel to utilities.
 - 4. Dimension ends, corners, and junctions of buried utilities to permanent facility components using triangulation.
 - 5. Identify and locate existing buried or concealed items encountered during Project.
 - 6. Measured depths of foundations in relation to finish first floor datum.
 - 7. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

8. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
9. Field changes of dimension and detail.
10. Details not on original Drawings.

G. Submit marked-up paper copy documents to Engineer before Substantial Completion.

H. Submit PDF electronic files of marked-up documents to Engineer before Substantial Completion.

1.5 PRODUCT WARRANTIES AND PRODUCT BONDS

A. Obtain warranties and bonds executed in duplicate by responsible Subcontractors, suppliers, and manufacturers within ten days after completion of applicable item of Work.

B. Warranty all work for a period of one (1) year from the date of the final progress payment.

C. Execute and assemble transferable warranty documents and bonds from Subcontractors, suppliers, and manufacturers.

D. Verify documents are in proper form, contain full information, and are notarized.

E. Co-execute submittals when required.

F. Include table of contents and assemble in three D side ring binder with durable plastic cover.

G. Submit prior to final Application for Payment.

H. Time of Submittals:

1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after acceptance.
2. Make other submittals within ten days after date of Substantial Completion, prior to final Application for Payment.
3. For items of Work for which acceptance is delayed beyond Substantial Completion, submit within ten days after acceptance, listing date of acceptance as beginning of warranty or bond period.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that existing Site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.

- C. Examine and verify specific conditions described in individual Specification Sections.
- D. Verify that utility services are available with correct characteristics and in correct locations.

3.2 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance according to manufacturer's instructions.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer-required or -recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

3.3 EXECUTION

- A. Comply with manufacturer's installation instructions, performing each step in sequence. Maintain one set of manufacturer's installation instructions at Project Site during installation and until completion of construction.
- B. When manufacturer's installation instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- C. Verify that field measurements are as indicated on approved Shop Drawings or as instructed by manufacturer.
- D. Climatic Conditions and Project Status: Install each unit of Work under conditions to ensure best possible results in coordination with entire Project.
 - 1. Isolate each unit of Work from incompatible Work as necessary to prevent deterioration.
 - 2. Coordinate enclosure of Work with required inspections and tests to minimize necessity of uncovering Work for those purposes.
- E. Clean and perform maintenance on installed Work as frequently as necessary through remainder of construction period.

3.4 PROTECTING INSTALLED CONSTRUCTION

- A. Protect installed Work and provide special protection where specified in individual Specification Sections.
- B. Provide temporary and removable protection for installed products. Control activity in immediate Work area to prevent damage.
- C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- D. Use durable sheet materials to protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects.

- E. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- F. Prohibit traffic from landscaped areas.

3.5 FINAL CLEANING

- A. Execute final cleaning prior to final Project assessment.
 - 1. Employ experienced personnel or professional cleaning firm.
- B. Clean Site; sweep paved areas, rake clean landscaped surfaces.
- C. Remove waste and surplus materials, rubbish, and construction facilities from Site.
- D. Perform final cleaning of all installed/constructed storm sewers, manholes, catchbasins, and detention basins.

END OF SECTION

SECTION 03 10 00

CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Formwork for cast-in place concrete.
 - 2. Shoring, bracing, and anchorage.
 - 3. Form accessories.
 - 4. Form stripping.
- B. Related Sections:
 - 1. Section 03 30 00 - Cast-In-Place Concrete.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Formwork:
 - 1. Basis of Measurement: Included in the unit price bid for utility installation.
 - 2. Basis of Payment: Includes form materials, placement, placing accessories, stripping.

1.3 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
 - 2. ACI 301 - Specifications for Structural Concrete.
 - 3. ACI 318 - Building Code Requirements for Structural Concrete.
 - 4. ACI 347 - Guide to Formwork for Concrete.
- B. American Forest and Paper Association:
 - 1. AF&PA - National Design Specifications for Wood Construction.
- C. The Engineered Wood Association:
 - 1. APA/EWA PS 1 - Voluntary Product Standard for Construction and Industrial Plywood.
- D. ASTM International:
 - 1. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 - 2. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials.
- E. West Coast Lumber Inspection Bureau:
 - 1. WCLIB - Standard Grading Rules for West Coast Lumber.
 - 2. Michigan Department of Transportation 2012 Standard Specifications for Construction.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 347.
- B. For wood products furnished for work of this Section, comply with AF&PA.
- C. Perform Work in accordance with State of Michigan Department of Transportation standard construction specifications 2012.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Products storage and handling requirements.
- B. Deliver void forms and installation instructions in manufacturer's packaging.
- C. Store off ground in ventilated and protected manner to prevent deterioration from moisture.

1.6 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate this Section with other sections of work, requiring attachment of components to formwork.

PART 2 - PRODUCTS

2.1 WOOD FORM MATERIALS

- A. Plywood: Douglas Fir 5 ply species; solid one side grade; sound undamaged sheets with clean, true edges.
- B. Lumber Forms:
 - 1. Application: Use for edge forms and unexposed finish concrete.
 - 2. Boards: 6 inches or 8 inches in width, shiplapped or tongue and groove, "Pine species no. 2 grade with grade stamps clearly visible.
- C. Plywood Forms:
 - 1. Application: Use for exposed finish concrete.
 - 2. Forms: Conform to PS 1; full size 4 x 8 feet panels; each panel labeled with grade trademark of APA/EWA.
 - 3. Plywood for Surfaces to Receive Membrane Waterproofing: Minimum of 5/8 inch thick; APA/EWA "B-B Plyform Structural I Exterior" grade.
 - 4. Plywood where "Smooth Finish" is required, as indicated on Drawings: APA/EWA "HD Overlay Plyform Structural I Exterior" grade, minimum of 3/4 inch thick.

2.2 PREFABRICATED FORMS

- A. Furnish materials in accordance with State of Michigan Department of Transportation standard construction specifications 2012.
- B. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.
- C. Tubular Column Type: Round, spirally wound laminated fiber material, surface treated with release agent, non-reusable, sizes as indicated on Drawings.
- D. Steel Forms: Sheet steel, suitably reinforced, and designed for particular use indicated on Drawings.
- E. Form Liners: Smooth, durable, grainless and non-staining hardboard, unless otherwise indicated on Drawings.
- F. Framing, Studding and Bracing: Stud or No. 3 structural light framing grade.

2.3 FORMWORK ACCESSORIES

- A. Form Release Agent: Colorless material which will not stain concrete, absorb moisture or impair natural bonding or color characteristics of coating intended for use on concrete; manufactured by W.R. Meadows, or equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify lines, levels, and centers before proceeding with formwork. Verify dimensions agree with Drawings.
- C. When formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement before proceeding, request instructions from Architect/Engineer.

3.2 INSTALLATION

- A. Earth Forms:
 - 1. Trench earth forms neatly, accurately, and at least 2 inches wider than standard detail widths indicated on Drawings.
 - 2. Trim sides and bottom of earth forms.
 - 3. Construct wood edge strips at top of each side of trench to secure reinforcing and prevent trench from sloughing.
 - 4. Form sides of footings where earth sloughs.

5. Tamp earth forms firm and clean forms of debris and loose material before depositing concrete.

B. Formwork - General:

1. Provide top form for sloped surfaces steeper than 1.5 horizontal to 1 vertical to hold shape of concrete during placement, unless it can be demonstrated that top forms can be omitted.
2. Construct forms to correct shape and dimensions, mortar-tight, braced, and of sufficient strength to maintain shape and position under imposed loads from construction operations.
3. Camber forms where necessary to produce level finished soffits unless otherwise shown on Drawings.
4. Carefully verify horizontal and vertical positions of forms. Correct misaligned or misplaced forms before placing concrete.
5. Complete wedging and bracing before placing concrete.

C. Forms for Smooth Finish Concrete:

1. Use steel, plywood or lined board forms.
2. Use clean and smooth plywood and form liners, uniform in size, and free from surface and edge damage capable of affecting resulting concrete finish.
3. Install form lining with close-fitting square joints between separate sheets without springing into place.
4. Use full size sheets of form lines and plywood wherever possible.
5. Tape joints to prevent protrusions in concrete.
6. Use care in forming and stripping wood forms to protect corners and edges.
7. Level and continue horizontal joints.
8. Keep wood forms wet until stripped.

D. Framing, Studding and Bracing:

1. Space studs at 16 inches on center maximum for boards and 12 inches on center maximum for plywood.
2. Size framing, bracing, centering, and supporting members with sufficient strength to maintain shape and position under imposed loads from construction operations.
3. Construct beam soffits of material minimum of 2 inches thick.
4. Distribute bracing loads over base area on which bracing is erected.
5. When placed on ground, protect against undermining, settlement or accidental impact.

E. Erect formwork, shoring, and bracing to achieve design requirements, in accordance with requirements of ACI 301 and MDOT Standard Construction Specifications.

F. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.

G. Obtain Architect/Engineer's approval before framing openings in structural members not indicated on Drawings.

H. Install void forms in accordance with manufacturer's recommendations.

3.3 APPLICATION - FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces are indicated to receive special finishes that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.
- D. Reuse and Coating of Forms: Thoroughly clean forms and reapply form coating before each reuse. For exposed work, do not reuse forms with damaged faces or edges. Apply form coating to forms in accordance with manufacturer's specifications. Do not coat forms for concrete indicated to receive "scored finish". Apply form coatings before placing reinforcing steel.

3.4 INSTALLATION - INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Install formed openings for items to be embedded in or passing through concrete work.
- B. Locate and set in place items required to be cast directly into concrete.
- C. Coordinate with Work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.
- D. Install accessories straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- E. Install water stops continuous without displacing reinforcement.
- F. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- G. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.
- H. Form Ties:
 - 1. Use sufficient strength and sufficient quantity to prevent spreading of forms.
 - 2. Place ties at least 1 inch away from finished surface of concrete.
 - 3. Leave inner rods in concrete when forms are stripped.
 - 4. Space form ties equidistant, symmetrical and aligned vertically and horizontally unless otherwise shown on Drawings.
- I. Arrangement: Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete.
- J. Construction Joints:
 - 1. Install surfaced pouring strip where construction joints intersect exposed surfaces to provide straight line at joints.
 - 2. Just prior to subsequent concrete placement, remove strip and tighten forms to conceal shrinkage.
 - 3. Show no overlapping of construction joints. Construct joints to present same appearance as butted plywood joints.
 - 4. Arrange joints in continuous line straight, true and sharp.

- K. Embedded Items:
 - 1. Make provisions for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, water stops, and other features.
 - 2. Do not embed wood or uncoated aluminum in concrete.
 - 3. Obtain installation and setting information for embedded items furnished under other Specification sections.
 - 4. Securely anchor embedded items in correct location and alignment prior to placing concrete.
 - 5. Verify conduits and pipes, including those made of coated aluminum, meet requirements of ACI 318 for size and location limitations.

- L. Openings for Items Passing Through Concrete:
 - 1. Frame openings in concrete where indicated on Drawings. Establish exact locations, sizes, and other conditions required for openings and attachment of work specified under other sections.
 - 2. Coordinate work to avoid cutting and patching of concrete after placement.
 - 3. Perform cutting and repairing of concrete required as result of failure to provide required openings.

- M. Screeds:
 - 1. Set screeds and establish levels for tops of concrete slabs and levels for finish on slabs.
 - 2. Slope slabs to drain where required or as shown on Drawings.
 - 3. Before depositing concrete, remove debris from space to be occupied by concrete and thoroughly wet forms. Remove freestanding water.

- N. Screenshot Supports:
 - 1. For concrete over waterproof membranes and vapor retarder membranes, use cradle, pad or base type screed supports which will not puncture membrane.
 - 2. Staking through membrane is not be permitted.

- O. Cleanouts and Access Panels:
 - 1. Provide removable cleanout sections or access panels at bottoms of forms to permit inspection and effective cleaning of loose dirt, debris and waste material.
 - 2. Clean forms and surfaces against which concrete is to be placed. Remove chips, saw dust and other debris. Thoroughly blow out forms with compressed air just before concrete is placed.

3.5 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
- D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.6 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads and removal has been approved by Engineer.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.
- D. Leave forms in place for minimum number of days as specified in ACI 347.

3.7 ERECTION TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI 301 and MDOT Standard Construction Specifications.
- B. Tolerances: Construct formwork to produce completed concrete surfaces within construction tolerances specified in ACI 117.

3.8 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements and 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.
- C. Notify Architect/Engineer after placement of reinforcing steel in forms, but prior to placing concrete.
- D. Schedule concrete placement to permit formwork inspection before placing concrete.

END OF SECTION

SECTION 03 20 00
CONCRETE REINFORCING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Reinforcing bars.
 - 2. Welded wire fabric.
 - 3. Reinforcement accessories.
- B. Related Requirements:
 - 1. Section 03 10 00 - Concrete Forming and Accessories: Form materials, waterstops, and accessories required to form cast-in-place concrete.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Bar Reinforcement:
 - 1. Basis of Measurement: Included in the unit price bid for concrete items requiring reinforcement.
 - 2. Basis of Payment: Includes reinforcement, placement, and accessories.

1.3 REFERENCE STANDARDS

- A. American Concrete Institute:
 - 1. ACI 301 - Specifications for Structural Concrete.
- B. American Welding Society:
 - 1. AWS D1.4 - Structural Welding Code - Reinforcing Steel.ASTM International:
 - 2. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.ASTM A706 - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement.ASTM A775 - Standard Specification for Epoxy-Coated Steel Reinforcing Bars.ASTM A934 - Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars.Concrete Reinforcing Steel Institute:
 - 3. CRSI 10-MSP - Manual of Standard Practice.
 - 4. CRSI 10PLACE - Placing Reinforcing Bars.

1.4 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate Work of this Section with placement of formwork, formed openings, and other Work.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Certify products meet or exceed specified requirements for MDOT Standard Specifications for Construction.

1.6 QUALITY ASSURANCE

- A. Perform Work according to MDOT Standard Specifications for Construction.
- B. Prepare Shop Drawings according to ACI SP-66.
- C. Maintain one copy of each standard affecting Work of this Section on Site.

1.7 QUALIFICATIONS

- A. Welders: AWS qualified within previous 12 months for employed weld types.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Store materials according to manufacturer instructions.
- D. Protection:
 - 1. Protect materials from moisture by storing in clean, dry location remote from construction operations areas.
 - 2. Provide additional protection according to manufacturer instructions.

1.9 EXISTING CONDITIONS

- A. Field Measurements:
 - 1. Verify field measurements prior to fabrication.
 - 2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 REINFORCEMENT

- A. Reinforcing Steel:
 - 1. Comply with ASTM A615.
 - 2. Yield Strength: In accordance to the requirements of MDOT Standard Specifications for Construction.

3. Billet Bars: In accordance to the requirements of MDOT Standard Specifications for Construction
 4. Finish: In accordance to the requirements of MDOT Standard Specifications for Construction
 5. All reinforcing steel bars and mesh shall comply with American Iron and Steel requirements.
- B. Deformed and Plain Reinforcement:
1. Material: Steel bars.
 2. Comply with ASTM A706.
 3. Yield Strength: In accordance to the requirements of MDOT Standard Specifications for Construction
 4. Finish: In accordance to the requirements of MDOT Standard Specifications for Construction

2.2 FABRICATION

- A. Fabricate concrete reinforcement according to MDOT Standard Specifications for Construction.
- B. Form standard hooks according to MDOT Standard Specifications for Construction.
- C. Form reinforcement bends with minimum diameters according to MDOT Standard Specifications for Construction.
- D. Fabricate column reinforcement with offset bends at reinforcement splices.
- E. Form spiral column reinforcement from minimum 3/8-inch-diameter continuous deformed bar or wire.
- F. Form ties and stirrups from following:
 1. Bars No. 10 and Smaller: In accordance to MDOT Standard Specifications for Construction.
 2. Bars No. 11 (36) and Larger: In accordance to MDOT Standard Specifications for Construction.
 3. Weld reinforcement: In accordance to MDOT Standard Specifications for Construction.
- G. Reinforcement: Clean surfaces, weld, and re-protect welded joint according to MDOT Standard Specifications for Construction.
- H. Splicing:
 1. If not indicated on Drawings, locate reinforcement splices at point of minimum stress.

2.3 SHOP FINISHING

- A. Epoxy-Coated Finish for Steel Bars: Comply with ASTM A775 A934 and MDOT Standard Specifications for Construction.

2.4 ACCESSORY MATERIALS

- A. Tie Wire: In accordance to MDOT Standard Specifications for Construction.

- B. Chairs, Bolsters, Bar Supports, and Spacers:
 - 1. Size and Shape: To strengthen and support reinforcement during concrete placement conditions.
- C. Special Chairs, Bolsters, Bar Supports, and Spacers Adjacent to Weather-Exposed Concrete Surfaces:
 - 1. Material: In accordance to MDOT Standard Specifications for Construction.
 - 2. Size and Shape: To meet Project conditions.
- D. Reinforcing Splicing Devices:
 - 1. Type: Exothermic welding type; In accordance to MDOT Standard Specifications for Construction.
- E. Epoxy Coating Patching Material: Type as recommended by coating manufacturer.

2.5 SOURCE QUALITY CONTROL

- A. Provide shop inspection and testing of completed assembly.
- B. Section 01 40 00 - Quality Requirements: Requirements for testing, inspection, and analysis.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Place, support, and secure reinforcement against displacement.
- B. Do not deviate from required position beyond specified tolerance.
- C. Do not weld crossing reinforcement bars for assembly engineer.
- D. Do not displace or damage vapor retarder.
- E. Accommodate placement of formed openings.
- F. Spacing:
 - 1. Space reinforcement bars with minimum clear spacing in accordance with MDOT Standard Specifications for Construction.
 - 2. If bars are indicated in multiple layers, place upper bars directly above lower bars.
- G. Maintain concrete cover around reinforcement according to MDOT Standard Specifications for Construction

3.2 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Requirements for tolerances.
- B. Install reinforcement in accordance with MDOT Standard Specifications for Construction.

C. Foundation Walls: In accordance with MDOT Standard Specifications for Construction.

3.3 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Requirements for inspecting and testing.

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Comply with ACI 305R when pouring concrete during hot weather.
- B. Comply with ACI 306.1 when pouring concrete during cold weather.
- C. Acquire cement and aggregate from one source for Work.
- D. Perform Work according to State of Michigan MDOT Standard Specifications for Construction, current addition.

PRODUCTS

1.2 PERFORMANCE AND DESIGN CRITERIA

- A. Vapor Retarder Permeance: Maximum 1 perm when tested according to ASTM E96, water method.
- B. MATERIALS Section Includes Cast-in-Place Concrete for Following Items:
 - 1. Retaining walls.
 - 2. Foundation walls.
 - 3. Footings.
 - 4. Thrust blocks.
 - 5. Manholes.
- C. Related Requirements:
 - 1. Section 31 23 23 - Fill.
 - 2. Section 32 13 13 - Concrete Paving
 - 3. Section 03 60 00 - Grouting

1.3 REFERENCE STANDARDS

- A. American Concrete Institute:
 - 1. ACI 301 - Specifications for Structural Concrete.
 - 2. ACI 305R - Guide to Hot Weather Concreting.
 - 3. ACI 306.1 - Standard Specification for Cold Weather Concreting.
 - 4. ACI 308.1 - Specification for Curing Concrete.
 - 5. ACI 318 - Building Code Requirements for Structural Concrete.
 - 6. MDOT Standard Specifications for Construction, current addition.

B. ASTM International:

1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
2. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
3. ASTM C33 - Standard Specification for Concrete Aggregates.
4. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
5. ASTM C42 - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
6. ASTM C94 - Standard Specification for Ready-Mixed Concrete.
7. ASTM C143 - Standard Test Method for Slump of Hydraulic-Cement Concrete.
8. ASTM C150 - Standard Specification for Portland Cement.
9. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
10. ASTM C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
11. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
12. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
13. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.
14. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.
15. ASTM C595 - Standard Specification for Blended Hydraulic Cements.
16. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
17. ASTM C685 - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing.
18. ASTM C845 - Standard Specification for Expansive Hydraulic Cement.
19. ASTM C989 - Standard Specification for Slag Cement for Use in Concrete and Mortars.
20. ASTM C1017 - Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
21. ASTM C1064 - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
22. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
23. ASTM C1116 - Standard Specification for Fiber-Reinforced Concrete.
24. ASTM C1157 - Standard Performance Specification for Hydraulic Cement.
25. ASTM C1218 - Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.
26. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures.
27. ASTM D994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
28. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
29. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
30. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
31. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
32. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

33. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
34. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

1.4 UNIT PRICE – MEASUREMENT AND PAYMENT

- A. Cast-In-Place-Concrete:
 1. Basis of Measurement: Included in other Work items of this Project.
 2. Basis of Payment: Includes all labor, materials, and equipment to install concrete, grout, and appurtenances as shown on the contract documents and as stated in the specifications.

1.5 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

1.6 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data on joint devices, attachment accessories, admixtures.
- C. Design Data:
 1. Submit concrete mix design for each concrete strength.
 2. Submit separate mix designs if admixtures are required for following:
 - a. Hot and cold weather concrete Work.
 - b. Air entrained concrete Work.
 3. Identify mix ingredients and proportions, including admixtures.
 4. Identify chloride content of admixtures and whether or not chlorides were added during manufacture.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturer Instructions: Submit installation procedures and interfacing required with adjacent Work.
- F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

1.7 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations of embedded utilities and components concealed from view in finished construction.

1.8 QUALITY ASSURANCE

- A. Perform Work according to ACI 318.
- B. Perform Work according to State of Michigan MDOT Standard Specifications for Construction, current addition.

1.9 MATERIALS

- A. Concrete:
 - 1. Cement:
 - a. Comply with ASTM C150, Type I - Normal.
 - b. Type: Portland.
 - 2. Normal Weight Aggregates:
 - a. Comply with ASTM C33.
 - b. Coarse Aggregate Maximum Size: According to ACI 318.
 - 3. Water:
 - a. Comply with ACI 318.
 - b. Potable, without deleterious amounts of chloride ions.
- B. Admixtures:
 - 1. Furnish materials according to State of Michigan MDOT Standard Specifications for Construction, current addition.
 - a. Air Entrainment: Comply with ASTM C260.
 - 2. Chemical:
 - a. Comply with ASTM C494.
 - b. Type A - Water Reducing.
 - c. Type B - Retarding.
 - d. Type C - Accelerating.
 - e. Type D - Water Reducing and Retarding.
 - f. Type E - Water Reducing and Accelerating.
 - g. Type F - Water Reducing, High Range.
 - h. Type G - Water Reducing, High Range, and Retarding.
 - 3. Fly Ash: Comply with ASTM C618, Class F or C.
 - 4. Silica Fume: Comply with ASTM C1240.
 - 5. Slag:
 - a. Description: Ground-granulated blast-furnace slag.
 - b. Comply with ASTM C989.
 - c. Grade 100 or 120.
 - 6. Plasticizing:
 - a. Comply with ASTM C1017.
 - b. Type II, plasticizing and retarding.
- C. Joint Devices and Filler:
 - 1. Joint Filler, Type A:
 - a. Description: Asphalt-impregnated fiberboard or felt.
 - b. Comply with ASTM D1751.
 - c. Thickness: 1/4 inch.

- d. Profile: Tongue-and-groove.
- 2. Construction Joint Devices:
 - a. Material: Integral extruded plastic.
 - b. Profile: Tongue-and-groove with removable top strip exposing sealant trough and knockout holes spaced at 6 inches o.c.
 - c. Furnish ribbed steel spikes with tongue to fit top screed edge.
- 3. Expansion and Contraction Joint Devices:
 - a. Comply with ASTM B221.]
 - b. Material: Extruded aluminum.
 - c. Filler Strip: Resilient elastomeric with Shore A hardness of 80.
 - d. Cover Plate: Extruded aluminum, of longest manufactured length at each location, and flush mounted.
 - e. Color: As selected by Owner.
- 4. Sealant:
 - a. Comply with ASTM D6690.
 - b. Type: I.

1.10 CONCRETE MIX

- A. Select proportions for normal weight concrete according to ACI 301, Method 1.
- B. Concrete mixtures, general
 - 1. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both.
 - 2. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:
 - a. Fly Ash: 25%
 - b. Ground Granulated Blast-Furance Slag: 50%
 - c. Combined Fly Ash and Ground Granulated Blast-Furanvce Slag: 50% Portland cement minimum, with fly ash not exceeding 25%
 - 3. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 % by weight of cement.
 - 4. Admixtures: Use admixtures according to manufacturer's written instructions.
 - a. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - b. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
Use air-entraining admixture in exterior exposed concrete unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having a total air content with a tolerance of plus or minus 1-1/2 percent within the following limits:
 - (1) Concrete structures and slabs exposed to freezing and thawing, deicer chemicals, or hydraulic pressure: 4.5 percent.
 - (2) Other concrete not exposed to freezing, thawing, or hydraulic pressure, or to receive a surface hardener: 2 to 4 percent.

- C. Concrete mixtures for structural elements:
 - 1. Footings, Foundation walls, building frame members, junction chambers, valve vaults and building walls
 - a. Minimum Compressive Strength: 4000 psi at 28 days.
 - b. Maximum Water-Cementitious Materials Ratio: 0.45.
 - c. Slump Limit: 4 inches to 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
 - d. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch nominal maximum aggregate size.
 - 2. Slabs-On-Grade, sidewalks and Suspended Slabs: Proportion normal-weight concrete mixture as follows:
 - a. Minimum Compressive Strength: 4000 psi at 28 days.
 - b. Minimum Cementitious Materials Content: 540 lb/cu. yd..
 - c. Slump Limit: 4 inches, plus or minus 1 inch.
 - d. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
- D. Admixtures:
 - 1. Include admixture types and quantities indicated in concrete mix designs only if approved by Engineer.
 - 2. Cold Weather:
 - a. Use accelerating admixtures in cold weather.
 - b. Use of admixtures will not relax cold-weather placement requirements.
 - 3. Hot Weather: Use set-retarding admixtures.
 - 4. Use calcium chloride only if approved by Engineer.
- E. Average Compressive Strength Reduction: Not permitted.
- F. Ready-Mixed Concrete: Mix and deliver concrete according to ASTM C685.
- G. Site-Mixed Concrete: Mix concrete according to ACI 318.

1.11 ACCESSORIES

- A. Bonding Agent:
 - 1. ASTM C/1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene:
 - 2. Description: Polymer resin emulsion.
- B. Vapor Retarder:
 - 1. ASTM E 1745 Class C, not less than 10 mils thick clear polyethylene film; type recommended for below grade application. Furnish joint tape recommended by manufacturer.
 - 2. Description: Clear polyethylene film.
 - 3. Comply with ASTM E1745, Class C.
 - 4. Thickness: 10 mils.
 - 5. Type: As recommended for below-grade application.
 - 6. Joint Tape: As recommended by manufacturer.

- C. Non-shrink Grout:
 - 1. Description: Premixed compound consisting of non-metallic aggregate, cement, and water-reducing and plasticizing agents.
 - 2. Comply with ASTM C1107.
 - 3. Minimum Compressive Strength: 2,400 psi in 48 hours and 7,000 psi in 28 days.

- D. Concrete Reinforcing Fibers:
 - 1. Description: High-strength industrial-grade fibers specifically engineered for secondary reinforcement of concrete.
 - 2. Comply with ASTM C1116.
 - 3. Tensile Strength: 130 ksi.
 - 4. Toughness: 15 ksi.
 - 5. Fiber Length: 3/4 inch.
 - 6. Fiber Count: 34 million/lb.

PART 2 - EXECUTION

2.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.

- B. Verify requirements for concrete cover over reinforcement.

- C. Verify that anchors, seats, plates, reinforcement, and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with placing concrete.

2.2 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.

- B. Previously Placed Concrete:
 - 1. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent.
 - 2. Remove laitance, coatings, and unsound materials.

- C. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels, and pack solid with Hilti-HY 200 Injectable Mortar.

- D. Remove debris and ice from formwork, reinforcement, and concrete substrates.

- E. Remove water from areas receiving concrete before concrete is placed.

2.3 INSTALLATION

- A. Placing Concrete:
 - 1. Place concrete according to ACI 318.

2. Notify testing laboratory and Engineer minimum 24 hours prior to commencement of operations.
 3. Ensure that reinforcement, inserts, embedded parts, formed expansion and contraction joints are not disturbed during concrete placement.
 4. Install vapor retarder under interior slabs on grade according to ASTM E1643.
 5. Lap joints minimum 6 inches and seal watertight by taping edges and ends.
 6. Repairs:
 - a. Repair vapor retarder damaged during placement of concrete reinforcement.
 - b. Using vapor retarder material, lap over damaged areas minimum 6 inches and seal watertight.
 7. Joint Filler:
 - a. Separate slabs on grade from vertical surfaces with joint filler.
 - b. Place joint filler in floor slab pattern placement sequence; set top to required elevations; secure to resist movement by wet concrete.
 - c. Extend joint filler from bottom of slab to within 1/2 inch of finished slab surface.
 8. Joint Devices:
 - a. Coordination: Install construction joint devices in coordination with floor slab pattern placement sequence; set top to required elevations; secure to resist movement by wet concrete.
 - b. Install joint device anchors, maintaining correct position to allow joint cover to be flush with floor and wall finish.
 - c. Install joint covers in longest practical length when adjacent construction activity is complete.
 9. Deposit concrete at final position, preventing segregation of mix.
 10. Place concrete in continuous operation for each panel or section as determined by predetermined joints.
 11. Consolidate concrete.
 12. Maintain records of concrete placement, including date, location, quantity, air temperature, and test samples taken.
 13. Place concrete continuously between predetermined expansion, control, and construction joints.
 14. Do not interrupt successive placement and do not permit cold joints to occur.
 15. Place floor slabs in indicated checkerboard or saw-cut pattern.
 16. Saw-Cut Joints:
 - a. Saw-cut joints within 12 hours after placing.
 - b. Use 3/16-inch-thick blade.
 - c. Cut into 1/4 depth of slab thickness.
 17. Screeding:
 - a. Screed floors and slabs on grade level.
 - b. Surface Flatness: maximum 1/4 inch in 10 feet.
- B. Separate Floor Toppings:
1. Prior to placing floor topping, remove deleterious material, roughen substrate concrete surface, and broom and vacuum clean.
 2. Place required dividers and other items to be cast in concrete.
 3. Apply bonding agent to substrate.

- C. Curing and Protection:
 - 1. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
 - 2. Protect concrete footings from freezing for minimum of five days.
 - 3. Maintain concrete with minimal moisture loss at relatively constant temperature for period as necessary for hydration of cement and hardening of concrete.
 - 4. Cure concrete floor surfaces as specified in Section 03 39 00 - Concrete Curing.

2.4 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Requirements for inspecting and testing.
- B. Inspection and Testing: Performed by Owner's testing laboratory according to ACI 318 and MDOT Standard Specifications for Construction, current addition.
- C. Provide unrestricted access to Work and cooperate with appointed testing and inspection firm.
- D. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of Work.
- E. Concrete Inspections:
 - 1. Continuous Placement Inspection: Inspect for proper installation procedures.
 - 2. Periodic Curing Inspection: Inspect for specified curing temperature and procedures.
- F. Strength Test Samples:
 - 1. Sampling Procedures: Comply with ASTM C172.
 - 2. Cylinder Molding and Curing Procedures:
 - a. Comply with ASTM C31.
 - b. Cylinder Specimens: Standard cured.
 - 3. Sample concrete and make one set of three cylinders for every 75 cu. yd. or less of each class of concrete placed each day, and for every 5,000 sq. ft. of surface area for slabs and walls.
 - 4. If volume of concrete for a class of concrete would provide less than five sets of cylinders, take samples from five randomly selected batches, or from every batch if less than five batches are used.
 - 5. Make one additional cylinder during cold weather concreting and field cure.
- G. Field Testing:
 - 1. Slump Test Method: Comply with ASTM C143.
 - 2. Air Content Test Method: Comply with ASTM C173.
 - 3. Temperature Test Method: Comply with ASTM C1064.
 - 4. Compressive Strength Concrete:
 - a. Measure slump and temperature for each sample.
 - b. Measure air content in air-entrained concrete for each sample.
- H. Cylinder Compressive Strength Testing:
 - 1. Test Method: Comply with ASTM C39.
 - 2. Test Acceptance: According to ACI 318.

3. Test one cylinder at seven days.
4. Test one cylinder at 28 days.
5. Retain one cylinder for 30 days for testing when requested by Engineer.
6. Dispose of remaining cylinders if testing is not required.

I. Core Compressive Strength Testing:

1. Sampling and Testing Procedures: Comply with ASTM C42.
2. Test Acceptance: According to ACI 318.
3. Drill three cores for each failed strength test from failed concrete.

END OF SECTION

SECTION 31 05 13
SOILS FOR EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Subsoil materials.
 - 2. Topsoil materials.

- B. Related Sections:
 - 1. Section 31 05 16 - Aggregates for Earthwork.
 - 2. Section 31 22 13 - Rough Grading.
 - 3. Section 31 23 17 - Trenching.
 - 4. Section 31 23 23 - Fill.
 - 5. Section 32 91 19 - Landscape Grading.
 - 6. Section 32 92 19 - Seeding and Soil Supplements.
 - 7. Section 33 46 00 - Subdrainage: Filter aggregate.
 - 8. Section 31 25 00 - Erosion and Sedimentation Controls: Slope protection and erosion control.

1.2 REFERENCES

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

- B. ASTM International:
 - 1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m^{3 - 2. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m^{3 - 3. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).}}

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

- B. Samples: May be requested for submittal by the Engineer for testing. Submit, in air-tight containers, 10 lb. sample of each type of fill to testing laboratory.

- C. Materials Source: Submit name of imported materials source.

- D. Manufacturer's Certificate: Certify soils meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Furnish each subsoil and topsoil material from single source throughout the Work. A second source maybe requested for approval by the Engineer.
- B. Perform Work in accordance with MDOT Standard Specifications for Construction.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Type B Fill: MDOT Class II granular material – for dry excavation, compacted to 95 percent of maximum density.
- B. Type D Fill: Acceptable Native Subsoil: Reused, free of gravel larger than 3 inch size, and debris, compacted to 95 percent of maximum density.
- C. Topsoil: Material conforming to MDOT Standard Specifications for Construction.
- D. Native Topsoil:
 - 1. Graded.
 - 2. Free of roots, rocks larger than 1/2 inch, subsoil, debris, large weeds and foreign matter.
 - a. Screening: Double screened.

2.2 SOURCE QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Testing and Inspection Services Testing and analysis of soil material.
- B. Testing and Analysis of Subsoil Material: Perform in accordance with AASHTO T180.
- C. Testing and Analysis of Topsoil Material: Perform in accordance with AASHTO T180.
- D. When tests indicate materials do not meet specified requirements, change material and retest.
- E. Furnish materials of each type from same source throughout the Work.

PART 3 - EXECUTION

3.1 EXCAVATION

- A. Excavate subsoil and topsoil as required for utility and/or road installation. Strip topsoil to full depth of topsoil for complete installation.
- B. Stockpile excavated material meeting requirements for subsoil materials and topsoil materials.
- C. Remove excess excavated materials subsoil and topsoil not intended for reuse, from site.

- D. Remove excavated materials not meeting requirements for subsoil materials and topsoil materials from site.

3.2 STOCKPILING

- A. Stockpile materials on site at locations approved by the Engineer.
- B. Stockpile in sufficient quantities to meet Project schedule and requirements.
- C. Separate differing materials with dividers or stockpile apart to prevent mixing.
- D. Stockpile topsoil 8 feet high maximum.
- E. Prevent intermixing of soil types or contamination.
- F. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.
- G. Stockpile unsuitable or hazardous materials on impervious material and cover to prevent erosion and leaching, until disposed of.

3.3 STOCKPILE CLEANUP

- A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

END OF SECTION

SECTION 31 10 00

SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Removing surface debris.
 - a. Site Clearing
 - b. Channel Clearing, Grubbing, and Snagging
 - c. Site Demolition and Removal
 - d. Remove Existing Vegetation
 - e. Tree Removal
2. Removing designated pavement and curbs.
3. Removing designated trees, shrubs, and other plant life.
4. Removing abandoned utilities.
5. Excavating topsoil.

B. Related Sections:

1. Section 31 22 13 - Rough Grading.
2. Section 31 25 00 - Erosion and Sedimentation Controls.
3. Section 31 23 16 - Excavation.
4. Section 32 91 19 - Landscape Grading.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Site Clearing and Debris Management:

1. Basis of Measurement: Included in the lump sum price bid as stated in the proposal.
2. Basis of Payment: Clearing site, loading and removing waste materials from site, removing and disposing of miscellaneous pavements, removing existing storm sewer and catch basins, foundations and block piers, removal and stock piling of fences and landscaping, removal of trees, brush and shrubbery within the drain right-of-way, temporary removal of street and traffic signage, and removal and temporary relocation of mailboxes.

B. Curb and Gutter Rem:

1. Basis of Measurement: Included in the unit price bid for Curb and Gutter, Remove and Replace, Det F2.
2. Basis of Payment: Includes all labor, materials, equipment, saw-cutting, removal, hauling, and disposal of existing curb and gutter as shown on the plans.

- C. Pavt, Rem (M-46):
 - 1. Basis of Measurement: Included in the unit price bid per square yard as stated in the proposal.
 - 2. Basis of Payment: Includes all associated labor, materials, equipment, saw-cutting, removal, hauling, and disposal of existing pavement scheduled for replacement as indicated on the plans.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data for herbicide. Indicate compliance with applicable codes for environmental protection.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Herbicide:
 - 1. Garlon 3A or approved equal shall be used on brush having diameter of 1 inch or less.
 - 2. 25 percent Garlon 4 or approved equal and 75 percent Ax-it shall be used on all cut stumps and brush greater than 1 inch per manufacturer's specifications.
 - 3. All herbicides shall contain a dye additive so that sprayed areas can be visually identified.
 - 4. Applicator shall be certified.
 - 5. Herbicide use shall conform to all environmental restrictions and the manufacturer's recommendations for the specific area treated.
 - 6. Use only in locations approved by Engineer and with materials approved by Engineer and Owner.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify existing plant life designated to remain is tagged or identified.

3.2 PREPARATION

- A. Verify that existing plant life designated to remain is tagged or identified.
- B. The Contractor shall investigate for himself/herself what trees, brush, etc. must be removed and verify with the Engineer.
- C. Call Local Utility Line Information service not less than three working days before performing Work.

1. Request underground utilities to be located and marked within and surrounding construction areas.

3.3 PROTECTION

- A. Locate, identify, and protect utilities indicated to remain, from damage.
- B. Protect trees, plant growth, and features designated to remain, as final landscaping. The Contractor will be charged for any damage that occurs to trees not marked for removal. Costs are as follows:

Tree Diameter	Cost
1 inch – 3 inch	\$120
3 inch – 6 inch	\$150
6 inch – 9 inch	\$240
9 inch – 12 inch	\$300

1. The Owner and Engineer will determine if the damage that occurs to any trees will necessitate payment.
 2. All protection measures must be approved by the Engineer.
- C. Protect benchmarks, survey control points, and existing structures from damage or displacement. Protect survey stakes and survey monuments. If monuments, stakes or benchmarks are damaged or destroyed, the Contractor will be responsible for replacements costs.
 - D. All trees outside of right-of-way and those trees within right-of-way specified by Owner shall be protected.

3.4 CLEARING

- A. Clear areas required for access to site and execution of Work as approved by Engineer.
- B. Remove trees and tree stumps within excavated areas and project limits as specified on the drawings and as necessary for construction. Haul all material and dispose of offsite.
- C. Remove existing storm sewer, headworks, manholes, and catch basins as described on the drawings and within the influence of construction. Any structure or piping shown on the drawing to be affected by the proposed work shall be removed completely.
- D. Clear all undergrowth, debris and downfalls with minimum disturbance to soil. Seed all disturbed areas according to Seeding Specification.

E. Apply herbicide to remaining stumps to inhibit growth.

3.5 REMOVAL

- A. Remove debris, rock, and extracted plant life from site.
 - 1. Clear areas required for access to site and execution of work unless otherwise indicated on the plans or in the specifications.
- B. Remove pavement, curbs, and debris as indicated on the plans.
- C. Continuously clean-up and remove waste materials from site. Do not allow materials to accumulate on site.
- D. Do not burn or bury materials on site. Leave site in clean condition.

3.6 TOPSOIL EXCAVATION

- A. Excavate topsoil from areas to be further excavated, re-landscaped, or re-graded without mixing with foreign materials for use in finish grading.
- B. Do not excavate wet topsoil.
- C. Stockpile in area designated on site to depth not exceeding 8 feet and protect from erosion.
- D. Do not remove topsoil from site.

3.7 DEBRIS MANAGEMENT

- A. Debris shall be disposed of as indicated on the plans and as directed by the Engineer.
- B. All other debris shall be removed from the site and disposed of in accordance with local and state regulations.
- C. Coordinate debris management with Engineer prior to construction.

3.8 FENCES AND/OR OTHER PRIVATE PROPERTY

- A. Contractor shall notify Landowners and Engineer of conflicts and provide reasonable cooperation and assistance.
- B. Contractor shall carefully remove, salvage, and replace existing fence as directed by the Engineer. Care shall be taken not to damage materials during disassembly. Damaged materials shall be replaced at the Contractor's expense.
- C. Contractor shall correct all damage outside of right-of-way at own expense.

END OF SECTION

SECTION 31 22 13

ROUGH GRADING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating topsoil.
 - a. Strip and stockpile topsoil.
 - b. Strip and remove wetland topsoil.
2. Excavating subsoil.
 - a. Surficial sand excavation.
3. Cutting, grading, filling, rough contouring, compacting, rough grading, and shaping the site for site structures, building pads, embankment construction, residential lot, roadway embankment and cut, clay liner, scarify, blend, and compact subgrade, and spoil deposition.

B. Related Sections:

1. Section 31 10 00 - Site Clearing: Excavating topsoil.
2. Section 31 23 16 - Excavation: Building excavation.
3. Section 31 23 17 - Trenching: Trenching and backfilling for utilities.
4. Section 31 23 23 - Fill: General building area backfilling.
5. Section 32 91 19 - Landscape Grading: Finish grading with topsoil to contours.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Strip and Stockpile Topsoil:

1. Basis of Measurement: Included in the unit price bid of the item being installed.
2. Basis of Payment: Includes all labor and equipment required for stripping organic topsoil and stockpiling as shown on the drawings and as directed by the Engineer.

1.3 REFERENCES

A. American Association of State Highway and Transportation Officials:

1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. ASTM International:

1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
3. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
4. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).

5. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
6. ASTM D2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
7. ASTM D2434 - Standard Test Method for Permeability of Granular Soils (Constant Head).
8. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
9. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

C. Michigan Department of Transportation (MDOT)

1. MDOT Density Control Handbook, current addition.
2. MDOT Standard Specifications for Construction, current addition.
3. Test Method for Density of Soil in Place with loss by wash less than 15 percent - One Point Michigan Cone Test.
4. Test Methods for Density of Soil with loss by wash greater than 15 percent - One Point T-99 Test.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Samples: Submit, in air-tight containers, 10 lb. sample of each type of fill to testing laboratory.
- C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

1.6 QUALITY ASSURANCE

- A. MDOT Density Control Handbook, current edition.
- B. MDOT Standard Specifications for Construction, current edition.
- C. Test Method for Density of Soil in Place with loss by wash less than 15 percent – One Point Michigan Cone Test.
- D. Test Method for Density of Soil with loss by wash greater than 15 percent – One Point T-99 Test.
- E. ASTM D2922 – Test Methods of Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

PART 2 - PRODUCTS

2.1 MATERIALS

- A. See Section 31 23 23 Fill

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting Work.
- B. Verify survey bench mark and intended elevations for the Work are as indicated on Drawings.
- C. Verify that fill materials to be used are acceptable.

3.2 PREPARATION

- A. Call Miss Dig service not less than three Working days before performing Work.
 - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum.
- C. Notify utility company to remove and relocate utilities.
- D. Protect utilities indicated to remain from damage.
- E. Protect plant life, lawns, rock outcropping and other features remaining as portion of final landscaping.
- F. Protect bench marks, survey control point, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

3.3 TOPSOIL EXCAVATION

- A. Excavate topsoil from areas to be further excavated, relandscaped, or regraded, without mixing with foreign materials for use in finish grading.
- B. Do not excavate wet topsoil.
- C. Stockpile in area designated on site to depth not exceeding 8 feet and protect from erosion.
- D. Do not remove topsoil from site.

3.4 SUBSOIL EXCAVATION

- A. Excavate subsoil from areas to be further excavated, relandscaped, or regraded.

- B. Do not excavate wet subsoil or excavate and process wet material to obtain optimum moisture content.
- C. When excavating through roots, perform Work by hand and cut roots with sharp axe.
- D. Stockpile excavated material in area designated on site in accordance with the drawings.
- E. Benching Slopes: Horizontally bench existing slopes greater than 1: 4 to key placed fill material to slope to provide firm bearing.
- F. Stability: Replace damaged or displaced subsoil as specified for fill.
- G. Spoil leveling shall be done in accordance with Section 31 23 16 – Excavation.

3.5 FILLING

- A. Fill areas to contours and elevations with unfrozen materials.
- B. Place fill material in continuous layers and compact.
- C. Place material in continuous layers as follows:
 1. Subsoil Fill: Maximum 12 inches compacted depth.
 2. Structural Fill: Maximum 8 inches compacted depth.
 3. Granular Fill: Maximum 8 inches compacted depth.
- D. Maintain optimum moisture content of fill materials to attain required compaction density.
- E. Slope grade away from building minimum 5 percent slope for minimum distance of 10 ft, unless noted otherwise.
- F. Make grade changes gradual. Blend slope into level areas.
- G. Repair or replace items indicated to remain damaged by excavation or filling.

3.6 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Top Surface of Subgrade: Plus or minus 1/10 foot from required elevation.

3.7 FIELD QUALITY CONTROL

- A. Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Perform laboratory material tests in accordance with AASHTO T180.
- C. Perform in place compaction tests in accordance with the following:
 1. Density Tests: ASTM D1556 or ASTM D2922.

2. Moisture Tests: ASTM D3017.

D. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
1. Remove Work, replace and retest at no cost to Owner.

E. Frequency of Tests: As required to ensure installation meets specifications.

3.8 SCHEDULES

A. Fill under Grass Areas: Subsoil Type D fill, to 6 inches below finish grade.

B. Fill Under Asphalt Paving: Type B fill, to subgrade elevation.

C. Fill Under Concrete Building Pads, Concrete Pads, Concrete Curb and Gutter and Sidewalks:
1. Type B fill, to within 4" of underside of concrete slab.

D. Backfill for Utility Trenches:

1. Bedding as specified in individual utility specification section.
2. Backfill material as specified in Section 31 23 17 - Trenching and as defined here in for typed fill.

E. Fill for Subgrade and Undercutting:

1. Type B fill to proposed subgrade elevation, in dry areas.
2. Type A in wet areas and for undercutting backfill, unless otherwise directed by the Engineer.

END OF SECTION

SECTION 31 23 16

EXCAVATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Soil densification.
2. Excavating for building foundations.
3. Excavating for paving, roads, and parking areas.
4. Excavating for slabs-on-grade.
5. Excavating for site structures.
6. Excavating for landscaping.
7. Excavating for Open Channel, Earth Excavation, Spoil Leveling, Spoil Hauling, Subgrade Undercutting and Backfilling, Subgrade Undercutting and TopSoil Fill, Stream Channel Restoration Grading.
8. Excavation for water main and appurtenances.

B. Related Sections:

1. Section 01 20 00 – Price and Payment Procedures.
2. Section 01 50 00 - Construction Facilities.
3. Section 31 10 00 - Site Clearing.
4. Section 31 22 13 - Rough Grading: Topsoil and subsoil removal from site surface.
5. Section 31 23 17 - Trenching: Excavating for utility trenches.
6. Section 31 23 23 - Fill.
7. Section 33 11 13 – Public Water Utility Distribution.
8. Section 33 12 13 – Water Service Connections.
9. Section 33 12 16 – Water Utility Distribution Valve.
10. Section 33 12 19 – Water Distribution Fire Hydrants.
11. Section 33 31 13 – Public Sanitary Sewerage Piping.
12. Section 33 42 13 – Public Pipe Culverts.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Excavation for piping and structures:

1. Basis of Measurement: Included in the unit price bid for utility being installed.
2. Basis of Payment: Includes all excavation, fill, labor, material, and equipment, sheeting, shoring, dewatering, grading to require contours, removal or leveling of spoils if necessary, disposal of existing utilities and fugitive dust control plan.

B. Machine Grading, Modified (M-46):

1. Basis of Measurement: Included in the unit price bid per Station as stated in the proposal.
2. Basis of Payment: Includes stripping, salvaging and stockpiling topsoil, all excavation, the utilization of all suitable material in constructing the adjacent fills and the furnishing, hauling, and placing of borrow and grading to achieve the typical cross sections shown on the plans and for the proposed intersections, driveway approaches, and approach replacements as shown on the plans. Additional items included with the Pay Item of Machine Grading, Modified include the removal and disposal of trees and stumps less than three inches in diameter, removal of hedges, shrubs, and bushes. Machine Grading, Modified will be measured in place by the 100' station as measured along the main road centerline where work is to be performed which

shall include both sides of the road from right-of-way to right-of-way which shall be payment in full for all work specified herein. Work at intersections will not be paid separately but shall be considered included with the payment for Machine Grading, modified as measured along the main road centerline. All items included under Machine Grading, modified shall be in accordance with Section 205 of MDOT 2012 Standard Specifications for Construction.

C. Sub-Grade Undercut:

1. Basis of Measurement: Included in the unit price bid per the cubic yard as stated in the proposal.
2. Basis of Payment: Includes all excavation, fill, labor, material, compaction, and equipment required for sub-grade undercutting to remove soft, unstable areas of the grade. The fill material shall be similar to the existing grade material and compacted to 95% of maximum density.

D. Contaminated Soil Testing and Tipping Fee Allowance:

1. Basis of Measurement: At the lump sum price bid as stated in the proposal.
2. Basis of Payment: Includes payment to qualified third party testing facility to determine if existing soils within the trench on M-46 Hwy are contaminated, and payment for tipping fees that may be required for disposal of any contaminated soils. Payment will be made based on invoices provided by the Contractor from the testing facility and landfill accepting the contaminated soils. **No payment from the allowance will be paid for the trucking of soils. The Contractor will only be paid for authorized invoices. Any remainder of the allowance will not be paid to the Contractor.**

1.3 REFERENCES

- A. Local utility standards when working within 24-inches of utility lines.

1.4 SUBMITTALS

- A. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan.
- B. Shop Drawings: Indicate soil densification grid for each size and configuration footing requiring soils densification.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with MDOT Standard Specifications for Construction, current edition.

1.6 QUALIFICATIONS

- A. Prepare excavation protection plan under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Michigan.

PART 2 - PRODUCTS

2.1 Not Used.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Call Miss Dig service not less than three working days before performing Work.
 - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum.
- C. Notify utility company to remove and relocate utilities.
- D. Protect utilities indicated to remain from damage.
- E. Protect plant life, lawns, rock outcroppings and other features remaining as portion of final landscaping.
- F. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- G. Protect grade and slope stakes.

3.2 EXCAVATION

- A. Underpin adjacent structures which may be damaged by excavation work.
- B. Excavate subsoil to accommodate building foundations, slabs-on-grade, paving, site structures, and construction operations.
- C. Excavate to working elevation for piling work.
- D. Compact disturbed load bearing soil in direct contact with foundations to original bearing capacity; perform compaction in accordance with Section 31 23 23 and Section 31 23 17.
- E. Slope banks with machine to angle of repose or less until shored.
- F. Do not interfere with 45 degree bearing splay of foundations.
- G. Grade top perimeter of excavation to prevent surface water from draining into excavation.
- H. Trim excavation. Remove loose matter.
- I. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd. measured by volume. Remove larger material as specified in Section 31 23 23.
- J. Notify Engineer of unexpected subsurface conditions.

- K. Correct areas over excavated areas as directed by Engineer.
- L. Remove excess and unsuitable material from site.
- M. Stockpile subsoil in area designated on site to depth not exceeding 8 feet and protect from erosion.
- N. Repair or replace items indicated to remain damaged by excavation.
- O. Open Channel Work
 - 1. Clear site in accordance with Section 31 10 00 - Site Clearing.
 - 2. Excavate drain to the dimensions and cross sections specified on drawings.
 - 3. Contractor shall check flow line elevations every 100feet (Engineer will provide grade stakes). Undercutting of 0.3 feet or greater will be filled with Type A Fill – to the proposed flow line as incidental cost to the Contractor.
 - 4. Contractor shall remove all sediment from existing culverts.
 - 5. Underpin, brace, or shore adjacent structures, which may be damaged by excavation work, including utilities and pipe chases.
 - 6. Machine slope banks to required slopes.
 - 7. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume Work.
 - 8. Correct unauthorized excavation at no extra cost to Owner.
 - 9. Seed disturbed areas daily in accordance with Section 32 92 19 - Seeding.
 - 10. Repair and replace field tile outlets as directed by Engineer.
 - 11. Match existing side slopes in reaches identified channel cleanout.
 - 12. Excess spoils on roadsides and lawn areas are to be hauled away.
 - 13. When excavating one side slope of drain, the opposite ditch bank shall be cleared in accordance with Section 31 10 00 - Site Clearing. Grass vegetation should not be removed on opposite side slopes when excavation of opposite side slope is not needed.
 - 14. In muck areas construct pilot channels to dewater spoils based on field conditions. Cost included in open channel excavation.
- P. Earth Excavation
 - 1. Clear site in accordance with Section 31 10 00 - Site Clearing.
 - 2. Excavate detention areas to the subgrade elevations, dimensions and cross sections specified on drawings.
 - 3. Underpin, brace, or shore adjacent structures, which may be damaged by excavation work, including utilities and pipe chases.
 - 4. Machine slope banks to required slopes.
 - 5. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume Work.
 - 6. Correct unauthorized excavation at no cost of Owner.
 - 7. Remove and haul material from site or dispose of materials on Site as specified on the drawings. Payment for these items is included in the Earth Excavation pay item.
 - 8. Dewater excavations as necessary for construction. Payment for dewatering shall be included in the Earth Excavation pay item.
 - 9. Grade top perimeter of excavation to prevent surface water from draining into excavation.
 - 10. Provide, operate and maintain pumping equipment to keep excavation free of water.
 - 11. Remove lumped subsoil, boulders, and rock.
 - 12. Correct areas over excavated by error in accordance with Section 31 23 23 – Fill.
- Q. Spoil Leveling
 - 1. Spoils in all areas shall be placed according to the plan details.

2. Seed spoils in accordance with Section 32 92 19 - Seeding.
3. Spoils are to be leveled in drain right-of-way or on Site, as shown on drawings, unless Contractor receives written permission from Landowner to stockpile utilizing Landowner Agreement Form.
4. Spoils placed on tillable land shall be spread evenly as shown on drawings.
5. Spoils are to be kept a minimum 3 feet from excavation area.
6. No excavated materials shall be placed on roads without written permission of the authorities having jurisdiction of said road.
7. Spoils excavated in areas adjacent to residential or lawn areas are to be removed from the area unless directed by the Engineer, shown on drawings, or Contractor receives written permission from Landowner to level in area.
8. No spoils are to be placed in any watercourse or drain.
9. Side grade outs for watercourse and ditches shall be done at the time of open drain excavation or channel cleanout.
10. Non-combustible items (i.e. roots and stumps), brush, or debris shall not be mixed with leveled spoil material.
11. Shape leveled spoils to prevent the ponding of water behind spoil piles.
12. Level spoils on the same side of the drain which excavation occurs. If excavation occurs from both sides of drain then make even spoil piles on both sides of drain unless otherwise directed by the Engineer.
13. In agricultural, lawn, landscaped, or otherwise developed areas, root rake and hand pick sticks and rocks so that all foreign debris is disposed of.
14. Prior to completion, spoil piles must be raked to remove wood and rocks.
15. Topsoil must be placed on spoil piles in which the native excavated material is not suitable for establishing vegetation as determined by the Engineer.

R. Spoil Hauling

1. Contractor is responsible for identifying and disposing of spoils in acceptable locations in accordance with all local, state and or federal requirements.
2. Spoils must be hauled from lawn and landscaped areas and as indicated in the drawings. No extra payment will be made for spoil hauling in areas not indicated to be hauled; however, for ease of construction, Contractor may choose to haul spoils.

S. Subgrade Undercutting and Backfilling

1. In areas that are suspect and may require subgrade undercutting, notify Engineer immediately. Do not proceed until it is agreed subgrade undercutting is required and quantities can be documented.
2. Remove the subgrade undercut quantity of material as determined adequate by Engineer.
3. Backfill with Type A fill for Work under structures, crossings, etc. Backfill with Embankment Material for embankment construction. All Work shall be according to the drawings and directed by the Engineer.
4. Compact fill material as specified in Section 31 23 23 - Fill.

3.3 FIELD QUALITY CONTROL

- A. Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Request visual inspection of bearing surfaces by Architect/Engineer before installing subsequent work.

- C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to the Owner.
- D. Frequency of Tests: As directed by the Engineer.

3.4 PROTECTION

- A. Prevent displacement or loose soil from falling into excavation; maintain soil stability.
- B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.
- C. Protect structures, utilities and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth operations.
- D. Protect landscape areas, mailboxes, trees, fences, lawns, etc. Any damage to these areas are the responsibility of the Contractor.

END OF SECTION

SECTION 31 23 17

TRENCHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating trenches for utilities from 5 feet outside building to utility service.
2. Compacted fill from top of utility bedding to subgrade elevations.
3. Backfilling and compaction.
4. Trenching for Storm Sewer, water main and appurtenances, sanitary sewer.

B. Related Sections:

1. Section 03 30 00 - Cast-In-Place Concrete: Concrete materials.
2. Section 31 22 13 - Rough Grading: Topsoil and subsoil removal from site surface.
3. Section 31 23 16 - Excavation: General building excavation.
4. Section 31 23 23 - Fill: General Backfilling.
5. Section 31 37 00 - Riprap.
6. Section 32 91 19 - Landscape Grading: Filling of topsoil over backfilled trenches to finish grade elevation.

1.2 UNIT PRICE – MEASUREMENT AND PAYMENT

A. Trenching

1. Basis of Measurement: Included in the unit price bid for utility being installed.
2. Basis of Payment: Includes all trenching, disposal of excess spoils, shoring, dewatering, labor, fill material and equipment required for trenching on this project.

B. Bentonite Clay Trench Barrier

1. Basis of Measurement: At the unit price bid per each as stated in the proposal.
2. Basis of Payment: Includes labor, material and equipment to excavate and install the bentonite clay trench barrier as detailed on the plans.

1.3 REFERENCES

A. American Association of State Highway and Transportation Officials:

1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. ASTM International:

1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
2. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
4. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
5. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
6. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
7. ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
8. ASTM C12 - Standard Practice for Installing Vitrified Clay Pipe Lines.
9. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Gravity - Flow Applications.

1.4 DEFINITIONS

- A. Utility: Any buried pipe, duct, conduit, or cable.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan.
- C. Product Data: Submit data for geotextile fabric indicating fabric and construction.
- D. Samples: Submit, in air-tight containers, 10 lb. sample of each type of fill to testing laboratory.
- E. Materials Source: Submit name of imported fill materials suppliers.
- F. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with MDOT Standard Specifications for Construction, current edition.

1.7 QUALIFICATIONS

- A. Prepare excavation protection plan under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Michigan.

1.8 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.
 1. Verify that survey benchmarks and intended elevations for the Work are as shown on the drawings.

1.9 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

PART 2 - PRODUCTS

2.1 Bentonite – ENVIROPLUG MEDIUM or approved equal.

- A. Milan Supply
7125 E. Pickard St.
Mt. Pleasant Michigan
989-773-9938

2.2 FILL MATERIALS

SEE SECTION 31 23 23

PART 3 - EXECUTION

3.1 LINES AND GRADES

- A. Lay pipes to lines and grades indicated on Drawings.
 - 1. Architect/Engineer reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.
- B. Use laser-beam instrument with qualified operator to establish lines and grades when required by Engineer.
- C. Maintain grade alignment of pipe using string line parallel with grade line and vertically above centerline of pipe.
 - 1. Establish string line on level batter boards at intervals of not more than 25 feet.
 - 2. Install batter boards spanning trench, rigidly anchored to posts driven into ground on both sides of trench.
 - 3. Set three adjacent batter boards before laying pipe to verify grades and line.
 - 4. Determine elevation and position of string line from elevation and position of offset points or stakes located along pipe route.
 - 5. Do not locate pipe using side lines for line or grade.

3.2 PREPARATION

- A. Call Miss Dig service not less than three working days before performing Work.
 - 1. Request underground utilities to be located and marked within and surrounding construction areas.

- B. Identify required lines, levels, contours, and datum locations.
- C. Protect plant life, lawns, rock outcropping and other features remaining as portion of final landscaping.
- D. Protect benchmarks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
 - 1. Protect grade and slope stakes.
- E. Maintain and protect above and below grade utilities indicated to remain.
- F. Establish temporary traffic control and detours when trenching is performed in public right-of-way. Relocate controls and reroute traffic as required during progress of Work.

3.3 TRENCHING

- A. Excavate subsoil required for utilities to utility service.
- B. Remove lumped subsoil, boulders, and rock up to 1/6 cubic yard, measured by volume.
 - 1. Remove lumped subsoil, boulders, and rock 6 inches below bottom of pipe.
 - 2. Where soil in the bottom of the trench is unsuitable in the opinion of the Engineer, excavate below the trench bottom and place Type A fill, as directed by the Engineer. See Section 31 23 16 – Excavation, Subgrade Undercutting and Section 31 23 23 – Fill.
- C. Perform excavation within 24 inches of existing utility service in accordance with utility’s requirements.
- D. Do not advance open trench more than 200 feet ahead of installed pipe.
- E. Cut trenches sufficiently wide to enable installation and allow inspection. Remove water or materials that interfere with Work.
 - 1. Excavate on the required line to the depth required below the pipe grade for bedding thickness required.
 - 2. Grade top perimeter of excavation to prevent surface water from draining into excavation.
 - 3. Notify Owner's representative of unexpected subsurface conditions and discontinue affected Work in area until notified to resume Work.
 - 4. Protect excavation by methods required to prevent cave-in or loose soil from falling into excavation.
 - 5. Provide, operate, and maintain pumping equipment to keep trench free of water.
- F. Trenches for pipe shall be excavated to the following minimum of and maximum widths measured at the top of the pipe:

<u>Pipe Size</u>	<u>Trench Width</u>	
	<u>Minimum</u>	<u>Maximum</u>
6" and smaller	18"	24"
8" & 10"	24"	30"
12" & 15"	30"	36"
18"	34"	40"

21"	38"	42"
24"	42"	46"
27"	45"	49"
30"	49"	53"
36"	56"	60"
Larger than 36"	I.D. + 20"	I.D. + 24"

1. Where trench widths exceed the maximum specified above, the Owner's representative may require special bedding or the use of extra strength pipe at the Contractor's expense.
 2. Minimum trench width is 18 inches.
- G. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material, pipe, and utilities.
1. Place and compact bedding below the pipe to the depth specified on the drawings.
 2. Support pipe and conduit during placement and compaction of bedding fill.
- H. Do not interfere with 45 degree bearing splay of foundations.
- I. When Project conditions permit, slope side walls of excavation starting 2 feet above top of pipe. When side walls cannot be sloped, provide sheeting and shoring to protect excavation as specified in this section.
- J. When subsurface materials at bottom of trench are loose or soft, excavate to greater depth as directed by Architect/Engineer until suitable material is encountered. Notify Architect/Engineer prior to completing Undercut and Backfill Operations and request instructions.
- K. Cut out soft areas of subgrade not capable of compaction in place. Backfill with Fill Type A and compact to density equal to or greater than requirements for subsequent backfill material.
- L. Trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.
- M. Correct areas over excavated areas with compacted backfill as specified for authorized excavation or replace with fill concrete as directed by Architect/Engineer.
1. Correct unauthorized excavation at no cost to Owner.
 2. Correct overexcavated by error with Type A fill in accordance with Section 31 23 23 Fill.
- N. Stockpile subsoil in area designated on site to depth not exceeding 8 feet and protect from erosion.
- O. Stockpile excavated material in area designated on site.
- P. Level subsoil in the right-of-way on site except in yard areas.

3.4 SHEETING AND SHORING

- A. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.

- B. Support trenches more than 5 feet deep excavated through unstable, loose, or soft material. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation.
- C. Design sheeting and shoring to be removed at completion of excavation work.
 - 1. Use trench boxes or other form of temporary protection when required by OSHA and MIOSHA Standards or when protection of existing utilities is necessary.
- D. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.
- E. Repair damage to new and existing Work from settlement, water or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing.

3.5 BACKFILLING

- A. Backfill trenches to contours and elevations with unfrozen fill materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.
- C. Place geotextile fabric over Fill Type A prior to placing subsequent fill materials.
- D. Place fill material in continuous layers and compact.
 - 1. See Section 31 23 23 – Fill.
 - 2. Place 4 inches tamped Type B fill along the side of the pipe, filling any void space under the pipe. Execute tamping with a T bar or other tamping device approved by the Engineer.
 - 3. Place additional tamped Type B fill alongside the pipe to a height equal to the top of the pipe.
 - 4. Place and compact Type B fill material to 12 inches above the top of the pipe unless shown otherwise on the Project drawings.
- E. Place material in continuous layers as follows:
 - 1. Subsoil Fill: Maximum 12 inches compacted depth.
 - 2. Structural Fill: Maximum 8 inches compacted depth.
 - 3. Granular Fill: Maximum 8 inches compacted depth.
- F. Employ placement method that does not disturb or damage foundation perimeter drainage or utilities in trench.
- G. Maintain optimum moisture content of fill materials to attain required compaction density.
- H. Do not leave more than 30 feet of trench open at end of working day.
- I. Protect open trench to prevent danger to the public.

3.6 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.

- B. Top Surface of Backfilling Under Paved Areas: Plus or minus 1/2 inch from required elevations.
- C. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

3.7 FIELD QUALITY CONTROL

- A. Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. MDOT Standard Specifications for Construction, current edition.
- C. Perform in place compaction tests in accordance with the following:
 - 1. Density Tests: ASTM D1556, or ASTM D2922.
 - 2. Moisture Tests: ASTM D3017.
- D. When tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest at no cost to the Owner.
- E. Frequency of Tests: As directed by the Engineer.
- F. Proof roll compacted fill surfaces under pavement. See Section 31 23 23 – Fill.

3.8 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished work.
- B. Reshape and re-compact fills subjected to vehicular traffic during construction.

END OF SECTION

SECTION 31 23 19

DEWATERING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Dewatering system.
2. Surface water control system.
3. Monitoring wells.
4. System operation and maintenance.
5. Water disposal.

B. Related Sections:

1. Section 31 05 16 - Aggregates for Earthwork: Filter sand.
2. Section 31 23 16 - Excavation: Excavation for structures below ground water table.
3. Section 31 23 17 - Trenching: Trenching for utilities below ground water table.
4. Section 31 25 00 - Erosion and Sedimentation Controls: Surface water runoff control.
5. Section 31 22 13 - Rough Grading.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Dewatering:

1. Basis of Measurement: Included in the unit price bid for utility being installed.
2. Basis of Payment: Includes dewatering system design, material, equipment and labor necessary for dewatering as necessary for construction and/or determined by the Engineer.

1.3 REFERENCES

A. ASTM International:

1. ASTM C33 - Standard Specification for Concrete Aggregates.

1.4 DEFINITIONS

A. Dewatering includes the following:

1. Lowering of ground water table and intercepting horizontal water seepage to prevent ground water from entering excavations or trenches.
2. Reducing piezometric pressure within strata to prevent failure or heaving of excavations or trenches.
3. Disposing of removed water.

B. Surface Water Control: Removal of surface water within open excavations.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Signed and sealed by Professional Engineer.
 - 1. Indicate dewatering system layout, well depths, well screen lengths, dewatering pump locations, pipe sizes and capacities, grades, filter sand gradations, surface water control devices, valves, and water disposal method and location.
 - 2. Indicate primary and standby power system location and capacity.
 - 3. Indicate layout and depth of monitoring wells, piezometers and flow measuring devices for system performance measurement.
 - 4. Include detailed description of dewatering and monitoring system installation procedures and maintenance of equipment.
 - 5. Include description of emergency procedures to follow when problems arise.
- C. Product Data: Submit data for each of the following:
 - 1. Dewatering Pumps: Indicate sizes, capacities, priming method, motor characteristics.
 - 2. Pumping equipment for control of surface water within excavation.
- D. Design Data: Signed and sealed by Professional Engineer.
 - 1. Indicate design values, analyses, and calculations to support design.
 - 2. Include description and profile of geology, soil, and groundwater conditions.
- E. Field Reports: Test and monitoring reports as specified in Field Quality Control article.

1.6 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations and depths of capped wells and piping abandoned in place.

1.7 QUALITY ASSURANCE

- A. Comply with authorities having jurisdiction for the following:
 - 1. Drilling and abandoning of wells used for dewatering systems.
 - 2. Water discharge and disposal from pumping operations.
- B. Obtain permit from EPA under National Pollutant Discharge Elimination System (NPDES), for storm water discharge from construction sites.
- C. Perform Work in accordance with Michigan department of Transportation standard.
- D. Maintain one copy of each document on site.

1.8 QUALIFICATIONS

- A. Installer: Company specializing in performing Work of this section with minimum 5 years documented experience and responsible for design, operation, and maintenance of dewatering system.
 - 1. Assume sole responsibility for dewatering and surface water control systems and for loss or damage resulting from partial or complete failure of protective measures and settlement or resultant damage caused by ground water control operations.
- B. Design, install, and monitor operation of dewatering under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Michigan.

1.9 SEQUENCING

- A. Section 01 10 00 - Summary: Requirements for sequencing.
- B. Sequence work to obtain required permits before start of dewatering operations.
- C. Sequence work to install and test monitoring systems minimum 7 days before testing and operating dewatering systems.
- D. Sequence work to install and test dewatering and surface water control systems minimum 7 days before starting excavation and trenching.

1.10 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate work to permit the following construction operations to be completed on dry stable substrate.
 - 1. Excavation for structures specified in Section 31 23 16.
 - 2. Trenching for utilities specified in Section 31 23 17.
 - 3. Drilled piers and shafts specified in Section 31 63 29.

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Conduct additional borings and investigations to supplement subsurface investigations identified in Section 00 31 00 as required to complete dewatering system design.

- C. Check MISS DIG at 1-800-482-7171 and Call Local Utility Line Information service not less than three working days before performing Work.
 - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- D. Contractor shall be aware of and conform to the requirements of the State of Michigan in all dewatering operations. The Contractor shall also be responsible for the rules set down under the Ground Water Quality Control Section of the Well Construction Code.
- E. The Contractor shall provide and maintain adequate dewatering equipment to remove and dispose of all surface and ground water from all excavations and trenches or other parts of Work.
- F. Excavation shall be kept dry during the preparation of the subgrade and continually thereafter until Work within that excavation etc. is complete as approved by the Engineer.
- G. Contractor shall repair all Work damaged due to failure of dewatering operation as determined by Engineer.
- H. All excavations for concrete structures or trenches, which extend down to or below the static ground water elevations, shall be dewatered by lowering the ground water surface a minimum of 24 inches below the bottom of the excavation as approved by the Engineer.
- I. Surface water shall be diverted or prevented from entering the excavations without leaving the Project Site.

3.2 PREPARATION

- A. Protect existing adjacent buildings, structures, and improvements from damage caused by dewatering operations.

3.3 MONITORING WELLS

- A. Install monitoring wells at locations indicated on shop drawings as specified for dewatering wells.
- B. Test each monitoring well point to verify installation is performing properly.
- C. Install piezometers, calibrate, and test for proper operation.
- D. Protect monitoring well standpipes from damage by construction operations.
- E. Maintain accessibility to monitoring wells continuously during construction operations.
- F. Maintain monitoring wells until groundwater is allowed to return to normal level.

3.4 DEWATERING SYSTEM

- A. Install Work in accordance with Michigan Department of Transportation standards.

3.5 SURFACE WATER CONTROL SYSTEM

- A. Provide ditches, berms, and other devices to divert and drain surface water from excavation area as directed by Engineer.
- B. Divert surface water and seepage water within excavation areas into sumps and pump water into drainage channels and storm drains in accordance with requirements of agencies having jurisdiction.
- C. Control and remove unanticipated water seepage into excavation.

3.6 WATER DISPOSAL

- A. Discharge water into existing storm sewer system or drainage channels as directed by Engineer.

3.7 SYSTEM REMOVAL

- A. Remove dewatering and surface water control systems after dewatering operations are discontinued.
- B. Remove piezometers and monitoring wells.

END OF SECTION

SECTION 31 23 23

FILL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Backfilling building perimeter to subgrade elevations.
2. Backfilling site structures to subgrade elevations.
3. Fill under slabs-on-grade.
4. Fill under paving.
5. Fill for over-excavation.
6. Consolidation and Compaction.
7. Fill Under Roadways, Driveways, Sidewalks, Parking Lots, and Other Traveled Surfaces.
8. Utility Trench Backfilling.
9. Backfill for Drain Crossing and Traveled Surfaces.
10. Fill Materials.
11. Building Pads Filling to Subgrade Elevations.
12. Site Berming.
13. Fill Under Slabs-on-Grade Pads.
14. Fill Subgrade Undercutting.

B. Related Sections:

1. Section 31 22 13 - Rough Grading: Site filling.
2. Section 31 23 16 - Excavation.
3. Section 31 23 17 - Trenching: Backfilling of utility trenches.
4. Section 31 37 00 - Riprap.
5. Section 32 91 19 - Landscape Grading: Filling of topsoil to finish grade elevation.
6. Section 33 36 00 – Utility Septic Tanks.
7. Section 33 41 13 - Public Storm Utility Drainage Piping.
8. Section 33 46 00 – Subdrainage.
9. Section 31 35 23.23 – Articulated Concrete Mat.
10. Section 03 30 00 - Cast-in-Place Concrete.
11. Section 33 31 13 – Sanitary Sewerage System.
12. Section 33 12 13 – Water Service Connections.
13. Section 33 12 16 – Water Utility Distribution Valves.
14. Section 33 12 19 – Water Utility Distribution Fire Hydrants.
15. Section 33 13 00 – Disinfecting of Water Utility Distribution.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Backfill Materials:

1. Basis of Measurement: Included in unit price bid for the pay item being installed unless otherwise stated.
2. Basis of Payment: Includes material, labor, and equipment necessary to backfill and compact to proposed subgrade as specified for this Project.

- B. Embankment, CIP:
 - 1. Basis of Measurement: Included in the unit price bid for machine grading, modified.
 - 2. Basis of Payment: Includes furnishing, hauling, placing, grading, and compacting of fill in accordance with the specifications at the required locations.
 - 3. No allowance will be made for possible increase in quantity of fill material required due to normal consolidation of the natural ground under the embankment. When surplus or unsuitable material is disposed of outside the plan cross sections, it will not be measured as Embankment, CIP.

- C. 12-Inch Class II Granular Base, CIP:
 - 1. Basis of Measurement: At the unit price bid per cubic yard as stated in the proposal.
 - 2. Basis of Payment: Includes supplying fill material, stockpiling, scarifying substrate surface, labor, material, equipment, placing where required, and compacting

1.3 REFERENCES

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

- B. ASTM International:
 - 1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - 2. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
 - 3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
 - 4. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
 - 5. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 - 6. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

- C. Michigan Department of Transportation (MDOT)
 - 1. MDOT Standard Specification for Construction, current edition.
 - 2. MDOT Density Control Handbook, current edition.

- D. ANSI/ASTM
 - 1. ANSI/ASTM C136 or MTM 108 & 109 - Method for Sieve Analysis of Fine and Coarse Aggregates.
 - 2. ANSI/ASTM C117 or MTM 108 - Test method for materials finer than 15mm (No. 200 Sieve) in mineral aggregates by washing.

1.4 SUBMITTALS

- A. Product Data: Submit data for geotextile fabric indicating fabric and construction.

- B. Samples: Submit, in air-tight containers, 10 lb sample of each type of fill to testing laboratory.

- C. Materials Source: Submit name of imported fill materials suppliers.

- D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with MDOT Standard Specifications for Construction, current edition.

PART 2 - PRODUCTS

2.1 FILL MATERIALS

- A. Type A - Coarse Stone Fill: MDOT 6A -Compacted crushed limestone, 100% crushed - for wet excavation, excavation within open drain, backfill for subgrade undercutting for poor soil or in pipe trench, compacted to a minimum of 95 percent of the materials maximum dry density, in layers not to exceed 12 inches loose depth, unless otherwise specified. A ballast type crushed limestone free of shale, clay, friable material, sand, and debris graded in accordance with ANSI/ASTM C136.
- B. Type B - Granular Fill and Subbase: MDOT Class II - for dry excavation, pipe bedding to 12” above pipe, and trench backfill within roadway influence or dry excavation. Compacted to a minimum of 95 percent of the materials maximum dry density as determined by Michigan one point cone method in layers not to exceed 12 inches loose depth. Substitute with Type A MDOT 6A coarse stone for wet excavation. Use MDOT Class III A: Conforming to State of Michigan Department of Transportation standard specification for construction (used for sanitary sewer backfill – 1’ over top of pipe only).
- C. Type C - Structural Fill: MDOT Class I - for lower area of excess excavation over 24", compacted to a minimum of 95 percent of the materials maximum dry density as determined by Michigan one point cone method in layers not to exceed 12 inches loose depth.
- D. Type D - Native Subsoil: Site soils reused, free of gravel larger than 3 inch size, organic material, and debris, backfill above bedding of pipe to subgrade in greenbelt area. Compacted to a minimum of 90 percent of the materials maximum dry density, in layers not to exceed 12 inches loose depth, unless otherwise specified or as approved by the Engineer.
- E. Type E - Dense Aggregate: MDOT 22A for base course under Hot Mix Asphalt surfaces and Class I shoulders and approaches, compacted to 98% of the maximum unit weight at no greater than optimum moisture content. MDOT 23A for Class II shoulders and approaches, and temporary and permanent gravel surfaces, compacted to 95% of the maximum unit weight at no greater than optimum moisture content, compacted in layers not to exceed 12 inches loose depth.
- F. Type F – MDOT Standard Flowable Fill (Fill Class C concrete) – for headwall, sheet piling repair, and culvert storm sewer backfilling.
- G. Type G - Clay Embankment: Silty or sandy clay soils meeting the criteria for the designation of “CL” in accordance with the United Soil Classification System – for clay embankment construction, compacted to a minimum of 90% of its maximum dry density and at a moisture content ranging from 0 to 3 percent above of the optimum moisture as determined by the modified proctor method in layers not to exceed 12 inches loose depth. The Contractor shall provide samples of the proposed clay embankment material to the Geotechnical Engineer for visual examination and possible laboratory testing/analysis to confirm the material meets the

criteria for the designation of “CL.” Approved material shall be excavated from the borrow area free from frozen soil, organics, or other deleterious materials.

- H. Type H - Granular Embankment: MDOT Class I, Class II, or Class III – for granular embankment construction, compacted to a minimum of 95% of its maximum dry density as determined by the Michigan one point cone method in layers not to exceed 12 inches loose depth. The Contractor shall provide samples of the proposed sand embankment material to the Geotechnical Engineer for visual examination and possible laboratory testing/analysis to confirm the material meets the specified material type. Approved material shall be excavated from the borrow area free from frozen soil, organics, or other deleterious materials.

2.2 ACCESSORIES

- A. Filter Fabric: Section 31 32 21 – Filter Fabric

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and Project conditions.
- B. Verify subdrainage, damp proofing, or waterproofing installation has been inspected.
- C. Verify underground tanks are anchored to their own foundations to avoid flotation after backfilling.
- D. Verify structural ability of unsupported walls to support loads imposed by fill.
- E. Verify that all fill materials to be used are acceptable.
- F. Verify foundation and/or perimeter drainage installation has been inspected.

3.2 PREPARATION

- A. Compact subgrade to density requirements for subsequent backfill materials.
- B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with structural fill and compact to density equal to or greater than requirements for subsequent fill material.
 - 1. In areas that are suspect and may require subgrade undercutting, notify Engineer immediately. Do not proceed until it is agreed subgrade undercutting is required and quantities can be documented. See Section 31 23 16 - Excavation.
- C. Scarify subgrade surface to depth of 6 inch.
- D. Proof roll to identify soft spots; fill and compact to density equal to or greater than requirements for subsequent fill material.
 - 1. Thoroughly proof-roll all areas of building pads, slabs-on-grade, bituminous pavement, concrete curb and gutter and sidewalks with a fully loaded tandem-axle truck, or its equivalent.
 - 2. Loose or soft areas revealed during the proof-rolling operations are to be compacted or removed and replaced according to See Section 31 23 16 - Excavation.

3.3 BACKFILLING

- A. Backfill areas to contours and elevations with unfrozen materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
- C. Place geotextile fabric over Type A fill prior to placing next lift of fill.
- D. Place material in continuous layers as follows:
 - 1. Subsoil Fill: Maximum 12 inches compacted depth.
 - 2. Structural Fill: Maximum 8 inches compacted depth.
 - 3. Granular Fill: Maximum 8 inches compacted depth.
- E. Employ placement method that does not disturb or damage other Work or foundation perimeter drainage conduit in trenches.
- F. Maintain optimum moisture content of backfill materials to attain required compaction density.
- G. Backfill against supported foundation walls. Do not backfill against unsupported foundation walls.
- H. Slope grade away from building minimum 2 percent slope for minimum distance of 10 ft, unless noted otherwise.
- I. Make gradual grade changes. Blend slope into level areas.
- J. Remove surplus backfill materials from site.
- K. Leave fill material stockpile areas free of excess fill materials.
- L. Type B – Granular Fill: Place and compact materials as specified in Part 2 of this Section.
- M. Type D – Native Subsoil: Place on compact materials as specified in Part 2 of this Section.
- N. Machine compact under springline of pipe with T-bar or Engineer approved equivalent.
- O. Backfill simultaneously on all side of utility structures, manholes, and catchbasins.
- P. Type F – Flowable Fill: Place in locations indicated on drawings. Protect from freezing temperatures for 24 hours after placement.
- Q. Backfill wet excavation and subgrade undercutting according to Section 31 23 16 - Excavation.
- R. Backfill subgrade undercutting in open drain according to See Section 31 23 16 - Excavation.

3.4 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Top Surface of Backfilling Within Building Areas: Plus or minus 1 inch from required elevations.

- C. Top Surface of Backfilling Under Paved Areas: Plus or minus 0.10 foot, inch from required elevations.
- D. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

3.5 FIELD QUALITY CONTROL

- A. Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Perform laboratory material tests in accordance with AASHTO T180.
- C. Perform in place compaction tests in accordance with the following:
 - 1. Density Tests: ASTM D1556 or ASTM D2922.
 - 2. Moisture Tests: ASTM D3017.
- D. When tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.
- E. Tests and analysis of fill material will be performed in accordance with One Point Michigan Cone Test.
- F. Compaction testing will be performed in accordance with MDOT standard requirements.
- G. Frequency of tests: At the discretion of the Engineer.
- H. Proof roll compacted fill surfaces under slabs-on-grade.

3.6 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished Work.
- B. Reshape and re-compact fills subjected to vehicular traffic.

END OF SECTION

SECTION 31 25 00

EROSION AND SEDIMENTATION CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. System Description.
 - 2. Quality Assurance.
 - 3. Regulatory Requirements.
 - 4. Method of Payment.

- B. Related Sections:
 - 1. Section 03 10 00 - Concrete Forming and Accessories.
 - 2. Section 03 20 00 - Concrete Reinforcing.
 - 3. Section 03 30 00 - Cast-In-Place Concrete.
 - 4. Section 31 10 00 - Site Clearing.
 - 5. Section 31 23 16 - Excavation.
 - 6. Section 31 23 23 - Fill.
 - 7. Section 32 91 19 - Landscape Grading.
 - 8. Section 32 92 19 - Seeding.

1.2 SYSTEM DESCRIPTION

- A. Methods of control are identified on drawings by numbers corresponding to the keying system found in the Michigan Association of County Drain Commissioner's Soil Erosion and Sedimentation Control Authorized Public Agency Procedures Manual.

- B. The notation "T" or "P" following the number (as shown on the Drawings) indicates whether the control measure is temporary or permanent.

- C. Additional control measures shall be employed as required by the site conditions and applicable enforcing agency having project jurisdiction.

1.3 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Soil Erosion Prevention and Sedimentation Control:
 - 1. Basis of Measurement: Included in the unit bid price for miscellaneous plain riprap, plain riprap toe of slope protection, storm sewer, seeding cleanup and restoration.
 - 2. Basis of Payment: Includes all material, equipment, labor, setup, relocation, and all other aspects to accomplish this work.

B. Catch Basin Inlet Protection

1. Basis of Measurement: At the unit price bid per each as stated in the proposal
2. Basis of Payment: Includes materials, labor and equipment for the installation and maintenance of catch basin inlet protection as shown on the plans and as indicated in the proposal.

1.4 REGULATORY REQUIREMENTS

- A. Submit installation time schedule for temporary and permanent soil erosion prevention and sedimentation control measures to applicable enforcing agency having jurisdiction, as well as to Engineer. Make submittals prior to start of construction.
- B. Part 91, Soil Erosion and Sedimentation Control of the Natural Resources and Environmental Protection Act 1994 PA 451, as Amended:
 1. The Contractor is responsible for compliance to Part 91 Soil Erosion and Sedimentation Control of the Natural Resources and Environmental Protection Act 1994 PA 451, as Amended and is responsible for compliance in accordance with the Michigan Association of County Drain Commissioner's (MACDC) Soil Erosion and Sedimentation Control (SESC) Authorized Public Agency (APA) procedures manual. If for any reason, the Owner is found to be in violation of Act 91 due to the Contractor found in non-compliance, the Contractor will be fully responsible for any fines and costs incurred by Owner, including legal defense and any and all costs associated with a violation.
 2. The Contractor acknowledges that the procedures manual is available at www.macdc.net and has reviewed and understands the manual.
 3. The Contractor acknowledges the Owner's right to enter on to the project and install or repair any soil erosion control measures at Contractor's expense after notice to Contractor allowing time for the repair or installation to be made by Contractor. Such repair or installation may be made by Owner or by a third party Contactor of Owner.
- C. Contractor shall obtain all permits and pay all fees for plan review and inspection as required by applicable enforcing agency having jurisdiction.

1.5 SUBMITTALS

- A. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.6 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.

1.7 QUALITY ASSURANCE

- A. Perform Work in accordance with the Soil Erosion and Sedimentation Control, Part 91 of Act 451 of 1994.

1.8 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

- B. Convene minimum one week prior to commencing work of this section.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Do not place grout when air temperature is below freezing.
- C. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. In accordance with applicable Section for specified materials.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Field locate known utility locations. Notify Engineer of conflicts and attain removal or relocation instructions prior to continuing installation activities.
- C. Maintain and protect existing utilities to remain.

3.2 PROTECTION OF ADJACENT WORK

- A. Protect adjacent structures and property which may be damaged by execution of work.
- B. Protect existing trees, shrubs, landscaping and lawn areas designated to remain.

3.3 INSTALLATION AND MAINTENANCE

- A. Construct soil erosion prevention and sedimentation control measures in accordance with the plans and manufacture's recommendations.
- B. Schedule planned control measures with construction operation to limit the area of any disturbed land to the shortest possible period of exposure.
- C. Conduct all earth changes so as to effectively reduce accelerated soil erosion and resulting sedimentation.
- D. Remove all sediment from runoff water before it leaves the site.

- E. Inspect, maintain, and repair temporary control measures until permanent control measures are implemented. Remove all temporary control measures once permanent protection is established.
- F. Maintain permanent control measures until final acceptance by Owner.
- G. Protect all installed and existing catchbasin inlets. Remove protection after final inspection of the project.
- H. Execute work by methods to minimize raising dust from construction operations.
- I. Do not deposit trash, debris, or sediment in tile or open drains.
- J. Immediately repair trenches located within the traveled surface or roadways.
- K. Landscape construction areas as soon as practical after work is completed.

END OF SECTION

SECTION 31 32 21

FILTER FABRIC

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Filter Fabric for Groundwater Infiltration Applications.
 - 2. Filter Fabric for Cobblestone Applications.
 - 3. Filter Fabric for Plain Riprap Applications and Concrete Box Culvert Joints.
 - 4. Filter Fabric for Heavy Riprap Applications.
 - 5. Filter Fabric for Articulated Concrete Mat Applications.

- B. Related Sections:
 - 1. Section 31 22 13 – Rough Grading
 - 2. Section 31 35 21 – Slope Protection and Erosion Control

1.2 UNIT PRICE – MEASUREMENT AND PAYMENT

- A. Filter Fabric:
 - 1. Basis of Measurement: Included in unit price for plain riprap, plain riprap spillway, cobblestone streambed protection, field tile outlets, surface outlet tubes, storm sewer systems, or other Work item being accomplished, whichever applies.
 - 2. Basis of Payment: Includes material, labor, and equipment for installation according to plans, specifications, and manufacturer's instructions.

1.3 REFERENCES

- A. ASTM D-4632 - Test method for Tensile Strength and Elongation
- B. ASTM D-3786 - Test method for Mullen Burst.
- C. ASTM D-4533 - Test method for Trapezoidal Tear Strength.
- D. ASTM D-3787 - Test method for Puncture Strength.
- E. ASTM D-4751 - Test method for Apparent Opening Size.
- F. ASTM D-4491 - Test method for Coefficient of Permeability

1.4 COORDINATION

- A. Section 01 30 00 – Administrative Requirements specifies requirements for coordination.
- B. Coordinate Work of this Section with Section 31 37 00 – Riprap.

1.5 SUBMITTALS

- A. Submit shop drawings and product data for all items to be installed and/or constructed within this Section.
- B. Submit manufacturer's instructions for all product data.
- C. Submit manufacturer's certificate, which shall show actual test values obtained for the physical properties as tested for compliance with the specifications, for all product data.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Mechanically bonded, non-woven, long-chain polymeric fibers or yarns. The edges of the fabric shall be finished to prevent the outer fiber from pulling away from the fabric.
 - 1. Filter fabric for groundwater infiltration applications (french drains, trench drains, pipe joint wrap, etc.) and embankment filter fabric is to have, at minimum, the following properties:

Tensile Strength	100 lbs
Tensile Elongation (max)	100 %
Mullen Burst	210 psi
Trapezoidal Tear Strength	40 lbs
Puncture Strength	65 lbs
Apparent Opening Size (max)	70 sieve
Flow Rate	140 gal/min/ft ²

- 2. Filter fabric for plain riprap applications (riprap, riprap spillways, etc.) and concrete box culvert joints are to have, at minimum, the following properties:

Tensile Strength	155 lbs
Tensile Elongation (max)	100 %
Mullen Burst	315 psi
Trapezoidal Tear Strength	65 lbs
Puncture Strength	95 lbs
Apparent Opening Size (max)	70 sieve
Flow Rate	110 gal/min/ft

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements specifies requirements for installation examination.
- B. Verify the correct fabric is specified for the specific use.

- C. At the time of installation, the filter fabric may be rejected at the discretion of the Engineer if it has been removed from its protective cover for over 72 hours or has defects, tears, punctures, flow deterioration, or damage incurred during manufacture, transportation or storage.
- D. No torn, punctured, or otherwise damaged fabric shall be installed.

3.2 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements specifies requirements for installation preparation.
- B. Remove large stones or other debris, which could damage the filter fabric.
- C. Adjacent Surfaces: Protect adjacent surfaces.

3.3 STORAGE

- A. During all periods of shipment and storage, the filter fabric shall be protected from abrasion, direct sunlight, ultraviolet rays, and temperatures greater than 140 degrees Fahrenheit (or as directed by the manufacturer). To the extent possible, the fabric shall be maintained wrapped in its protective covering.

3.4 INSTALLATION

- A. All joints/overlaps in material shall be a minimum of 2 feet.
- B. Any damaged material shall be repaired by placing a piece of fabric that is sufficiently large to cover the damaged area plus 2 feet of adjacent undamaged geotextile in all directions.
- C. Finish according to specific use requirements.
- D. Edges of filter fabric shall be toed in 12 inches unless specified otherwise. Work will not pass inspection if filter fabric is not "toed in."

3.5 PROTECTION

- A. Section 01 70 00 - Execution and Closeout Requirements specifies requirements for protecting finished Work.
- B. Do not permit Traffic over unprotected surface.
- C. Take care placing material over filter fabric so as not to damage the material.

END OF SECTION

SECTION 31 50 13

EXCAVATION SUPPORT SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Sheeting, Shoring, and Bracing.
- B. Related Sections:
 - 1. Section 31 22 13 – Rough Grading.
 - 2. Section 31 23 16 – Excavation.
 - 3. Section 31 23 17 – Trenching.
 - 4. Section 33 05 23 – Trenchless Utility Installation.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Excavation Support Systems:
 - 1. Basis of Measurement: Included in the unit bid price for storm sewer and other pay items being installed as stated in proposal.
 - 2. Basis of Payment: Includes material, equipment and labor necessary to install temporary excavation support to construct proposed Project. This includes, but is not limited to sheet piling, cofferdams, trench boxes, tiebacks, and any other items to support trenching and excavations. All excavation support shall be designed and sealed by the Contractor's registered professional engineer and submitted to the Owner's Engineer for review. Design costs to be paid for by the Contractor.

1.3 REFERENCE STANDARDS

- A. Standards:
 - 1. ASTM A-328 - Standard Specifications for Sheet Piling.
 - 2. ASTM A-572 - Grades 50, High Strength.
 - 3. ASTM A-690 - High Strength, Corrosion Resistant.
- B. Conform to applicable OSHA regulations.

1.4 PREINSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements specifies requirements for preinstallation meeting.
- B. Convene minimum one week prior to commencing Work of this Section.

1.5 SUBMITTALS

- A. Submit shop drawings and product data for all items to be installed and/or constructed within this Section.
- B. Submit manufacturer's instructions for all product data.
- C. Shop drawings shall include sheeting, shoring, and bracing design and calculations prepared and sealed by a registered professional engineer.
- D. Product shall include component sizes, dimensions, and finishes.

1.6 QUALITY ASSURANCE

- A. Perform Work according to Michigan Department of Transportation Standard Specifications for Construction, current edition.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.
- B. Fabricator: Company specializing in fabricating products specified in this Section with minimum three years' documented experience.
- C. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience and approved by manufacturer.
- D. Licensed Professional: Professional engineer experienced in design of specified Work and licensed in State of Michigan.

1.8 EXISTING CONDITIONS

- A. Field Measurements: Verify field measurements prior to fabrication. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Timber and lumber for shoring and bracing shall be new, merchantable pine, Douglas Fir or spruce, unless otherwise shown or specified. Secondhand timber or lumber shall not be used where strength and/or appearance are important considerations.
- B. Steel for sheeting, shoring, and bracing shall be as per the referenced ASTM specifications.

- C. Temporary Sheeting: Select section modulus, embedment depth and bracing required to complete the work unless noted on the drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation Standards: Install Work according to OSHA standards.
- B. The Contractor is responsible for the design and location of all sheeting, shoring, and bracing.
- C. Where required to properly support the surfaces of excavations and to protect the construction Work and workmen, sheeting, bracing and shoring shall be provided.
- D. If the Engineer is of the opinion that at any point sufficient or proper supports have not been provided, he may order additional supports at the expense of the Contractor, but neither the placing of such additional supports by the order of the Engineer nor the failure of the Engineer to order such additional supports placed shall release the Contractor from his responsibility for the sufficiency of such supports and the integrity of the Work.
- E. Damage to new or existing structures occurring through settlements due to failure or lack of sheeting or bracing shall be repaired by the Contractor at his own expense.
- F. Conflict of opinion as to whether the settlement is due to the Work of the Contractor or to any other cause will be determined by the Engineer.
- G. In general, the sheeting and bracing shall be removed, as the trench or excavation is refilled, in such a manner as to avoid the caving in of the Work.
- H. Fill voids left by the withdrawal of the sheeting by ramming, or otherwise as directed.
- I. Obtain permission of the Engineer prior to the removal of any shoring, sheeting or bracing.
- J. When sheeting and bracing is removed, the Contractor shall assume full responsibility for injury to structures or to other property or persons arising from failure to leave in place such sheeting or bracing.
- K. For the purpose of preventing injury to the structures, or to other property or to persons, the Contractor shall leave in place any sheeting or bracing shown on the drawings or ordered in writing by the Engineer.
- L. Cut off sheeting left in place at the elevation ordered but not less than 24" below the final ground surface.
- M. Bracing remaining in place shall be driven up tight.
- N. Measurements and payment for sheeting and bracing ordered by Engineer left in place will be made as extra work, unless noted otherwise.

- O. The right of the Engineer to order sheeting and bracing left in place shall not be construed as creating any obligation on his part to issue such orders.

END OF SECTION

SECTION 32 01 16.70

COLD MILLING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Cold milling machine.
 - 2. Bituminous Removal.

- B. Related Sections:
 - 1. Section 31 23 16 – Excavation
 - 2. Section 31 23 23 – Fill
 - 3. Section 32 14 53 – Pavement Repair

1.2 UNIT PRICE – MEASUREMENT AND PAYMENT

- A. Cold Milling Bituminous Road:
 - 1. Basis of Measurement: Included in the unit price bid for Pavt, Rem.
 - 2. Basis of Payment: Includes all equipment and labor to complete cold milling for this project at the depth and grade as shown on drawings.

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 COLD MILLING MACHINE

- A. Have continuously variable depth control adjustments and be capable of removing 4 inches of bituminous in a single pass.
- B. Capable of reducing pavement to a maximum thickness of 2 inches.
- C. Possess enclosed cutting drums and have a sprinkling system for pollution control.
- D. Must have an effective means for removing excess material from the surface and for preventing dust from the operation from escaping into the air.

3.2 BITUMINOUS REMOVAL

- A. Remove bituminous surface to the depth, width, grade and cross-section as shown on the drawings, or as directed by the engineer.

- B. Where material is removed below the grade specified, due poor cold milling practices, replace the resultant holes or depressions by hand patching in accordance with MDOT Standards, at no cost to the Owner.
- C. Clean surface immediately after cold milling.

END OF SECTION

SECTION 32 11 23

AGGREGATE BASE COURSES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Aggregate subbase.
 - 2. Aggregate base course.

- B. Related Sections:
 - 1. Section 31 22 13 - Rough Grading: Preparation of site for base course.
 - 2. Section 31 23 17 - Trenching: Compacted fill under base course.
 - 3. Section 31 23 23 - Fill: Compacted fill under base course.
 - 4. Section 32 14 53 – Pavement Repair.
 - 5. Section 32 91 19 - Landscape Grading: Topsoil fill at areas adjacent to aggregate base course.
 - 6. Section 33 05 13 - Manholes and Structures: Manholes including frames.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. 6- Inch Aggregate Base, 21AA CIP:
 - 1. Basis of Measurement: At the unit price bid per square yard, as stated in the Proposal.
 - 2. Basis of Payment: Includes providing and placing 21AA crushed limestone, grading, shaping, compacting, and all labor, material and equipment to prepare the base course for hot mix asphalt paving in roadway, and hot mix asphalt drive approaches.

- B. Shoulder, Class I, 4-Inch:
 - 1. Basis of Measurement: At the unit price bid per square yard, as stated in the Proposal.
 - 2. Basis of Payment: Includes providing and placing 22A crushed limestone, grading, shaping, compacting, and all labor, material and equipment to prepare the shoulder surface along roadway.

- C. Maintenance Gravel:
 - 1. Basis of Measurement: At the unit price bid per ton, as stated in the Proposal.
 - 2. Basis of Payment: Includes labor, material, and equipment to place, grade, and compact 23A crushed limestone for temporary driving surfaces as needed and directed by Engineer to maintain local traffic during construction. Also includes removal and disposal of temporary gravel once it is no longer needed to maintain traffic.

D. Gravel Driveway Restoration:

1. Basis of Measurement: At the unit price bid per square yard as stated in the proposal.
2. Basis of Payment: Includes excavation, removal of existing materials, gradation certification, supplying to the site, backfill, grading, compaction, and testing of materials for a complete installation. Gravel shall be 22A compacted crushed limestone as shown on the plans.

1.3 REFERENCES

A. American Association of State Highway and Transportation Officials:

1. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
2. AASHTO M147-65 – Materials for Aggregates and Soil-Aggregate.

B. ASTM International:

1. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
2. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
3. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
4. ASTM D2940 - Standard Specification for Graded Aggregate Material For Bases or Subbases for Highways or Airports.
5. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
6. ASTM D4313 – Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
7. ASTM C136 – Sieve Analysis of Fine and Coarse Aggregates.

C. MDOT Standard Specifications for Construction, current edition.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product Data:

1. Submit data for geotextile fabric.

C. Samples: Submit, in air-tight containers, 10 lb. sample of each type of aggregate fill to testing laboratory.

1. As directed by the Engineer.

D. Materials Source: Submit name of aggregate materials suppliers.

- E. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. Furnish each aggregate material from single source throughout the Work.
- B. Perform Work in accordance with Michigan Department of Transportation Standard Specifications for Construction, current edition.

PART 2 - PRODUCTS

2.1 AGGREGATE MATERIALS

- A. Type E – Dense Aggregate: MDOT 22A for base course under Hot Mix Asphalt surfaces and Class I shoulders and approaches, compacted to 98% of the maximum unit weight at no greater than optimum moisture content. MDOT 23A for Class II shoulders and approaches, and temporary and permanent gravel surfaces, compacted to 95% of the maximum unit weight at no greater than optimum moisture content, compacted in layers not to exceed 12 inches loose depth.

2.2 ACCESSORIES

- A. Geotextile Fabric: AASHTO M288; non-woven, polypropylene.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify compacted substrate is dry and ready to support paving and imposed loads.
 - 1. Proof roll substrate with minimum two passes to identify soft spots.
 - 2. Remove soft substrate and replace with compacted fill as specified in Section 31 23 23.
- C. Verify substrate has been inspected, gradients and elevations are correct.

3.2 PREPARATION

- A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.
- B. Do not place fill on soft, muddy, or frozen surfaces.

3.3 AGGREGATE PLACEMENT

- A. Install geotextile fabric over subgrade in accordance with manufacturer's instructions.
 - 1. Lap ends and edges minimum 6 inches.

2. Anchor fabric to subgrade when required to prevent displacement until aggregate is installed.
- B. Spread aggregate over prepared substrate to total compacted thickness indicated on Drawings.
- C. Roller compact aggregate to 95 percent maximum density.
 1. As determined by Michigan one point cone method.
- D. Level and contour surfaces to elevations, profiles, and gradients indicated.
- E. Add small quantities of fine aggregate to coarse aggregate when required to assist compaction.
- F. Maintain optimum moisture content of fill materials to attain specified compaction density.
 1. If excess water is apparent, remove aggregate and aerate to reduce moisture content.
- G. Use mechanical tamping equipment in areas inaccessible to compaction equipment.
- H. Place aggregate to the width as shown on the drawings and compact as specified for the aggregate material being placed according to the Michigan one point cone method.

3.4 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation From Flat Surface: 3/8 inch measured with 10 foot straight edge.
- C. Maximum Variation From Thickness: 1/4 inch.
- D. Maximum Variation From Elevation: 1/2 inch.

3.5 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements and 017000 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Compaction testing will be performed in accordance with MDOT standard requirements.
- C. When tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to the Owner.
- D. Frequency of tests: as directed by the Engineer.
- E. Graduation of Aggregate: In accordance with ASTM C136.
- F. Furnish material certification from Supplier as required by the Engineer.

END OF SECTION

SECTION 32 12 16

ASPHALT PAVING

1.1 SUMMARY

A. Section Includes:

1. Asphalt materials.
2. Asphalt paving base course, binder course, and wearing course.
3. Asphalt paving overlay for existing paving.

B. Related Requirement:

1. Section 31 22 13 - Rough Grading: Preparation of site for paving and base.
2. Section 31 23 17 – Trenching.
3. Section 32 11 23 - Aggregate Base Courses: Compacted subbase for paving.
4. Section 33 05 13 - Manholes and Structures: Manholes including frames.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. HMA Leveling Course 13A or LVSP:

1. Basis of Measurement: At the unit price bid per ton as stated in the Proposal.
2. Basis of Payment: Includes mix design, supplying to site, preparing base, tack coating surfaces, placing, compacting and rolling, testing for mainline and approach paving.

B. HMA Wearing Course, 4E3HS:

1. Basis of Measurement: At the unit price bid per ton as stated in the Proposal.
2. Basis of Payment: Includes mix design, supplying to site, preparing base, tack coating surfaces, placing, compacting and rolling, testing for mainline and approach paving on M-46.

C. HMA Base Course 3E3:

1. Basis of Measurement: At the unit price bid per ton as stated in the Proposal.
2. Basis of Payment: Includes mix design, supplying to site, preparing base, tack coating surfaces, placing, compacting and rolling, testing for mainline and approach paving on M-46.

D. HMA Wearing Course 13A or LVSP:

1. Basis of Measurement: At the unit price bid per ton as stated in the Proposal.
2. Basis of Payment: Includes mix design, supplying to site, preparing base, tack coating surfaces, placing, compacting and rolling, testing for mainline and approach paving.

E. HMA Wearing Course, 5E3HS:

1. Basis of Measurement: At the unit price bid per ton as stated in the Proposal.
2. Basis of Payment: Includes mix design, supplying to site, preparing base, tack coating surfaces, placing, compacting and rolling, testing for mainline and approach paving on M-46.

F. HMA Approach, LVSP:

1. Basis of Measurement: At the unit price bid per square yard as stated in the Proposal.
2. Basis of Payment: Includes mix design, supplying to site, preparing base, tack coating surfaces, placing, compacting and rolling, testing for all HMA driveway approach paving.

G. Hand Patching:

1. Basis of Measurement: At the unit price bid per ton as stated in the Proposal.
2. Basis of Payment: Includes all labor, material, and equipment to construct HMA, 3E3 patch over trench on a road or road lane that is not specified for repaving on the plans.

H. Existing Water Box Adjust to Grade

1. Basis of Measurement: At the unit price bid per each as stated in the proposal.
2. Basis of Payment: Includes all associated labor, materials, and equipment necessary to adjust the existing water boxes to grade of the proposed pavement surface for a complete installation.

I. Existing Structure Adjust:

1. Basis of Measurement: At the unit price bid per each as stated in the proposal.
2. Basis of Payment: Includes all associated labor, materials, and equipment to adjust existing structures to the grade of the proposed pavement. Adjustment will be defined as a change in elevation of six (6) inches or less.

1.3 REFERENCE STANDARDS

A. American Association of State Highway and Transportation Officials:

1. AASHTO M17 - Standard Specification for Mineral Filler for Bituminous Paving Mixtures.
2. AASHTO M29 - Standard Specification for Fine Aggregate for Bituminous Paving Mixtures.
3. AASHTO M140 - Standard Specification for Emulsified Asphalt.
4. AASHTO M208 - Standard Specification for Cationic Emulsified Asphalt.
5. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
6. AASHTO M320 - Standard Specification for Performance-Graded Asphalt Binder.

7. AASHTO M324 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
8. AASHTO MP1a - Standard Specification for Performance-Graded Asphalt Binder.

B. Asphalt Institute:

1. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot- Mix Types.
2. AI MS-19 - Basic Asphalt Emulsion Manual.
3. AI SP-2 - Superpave Mix Design.

C. ASTM International:

1. ASTM C1371 - Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers.
2. ASTM C1549 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.
3. ASTM D242 - Standard Specification for Mineral Filler For Bituminous Paving Mixtures.
4. ASTM D692 - Standard Specification for Coarse Aggregate for Bituminous Paving Mixtures.
5. ASTM D946 - Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction.
6. ASTM D977 - Standard Specification for Emulsified Asphalt.
7. ASTM D1073 - Standard Specification for Fine Aggregate for Bituminous Paving Mixtures.
8. ASTM D1188 - Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples
9. ASTM D2027 - Standard Specification for Cutback Asphalt (Medium-Curing Type).
10. ASTM D2397 - Standard Specification for Cationic Emulsified Asphalt.
11. ASTM D2726 - Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures.
12. ASTM D2950 - Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods.
13. ASTM D3381 - Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction.
14. ASTM D3515 - Standard Specification for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
15. ASTM D3549 - Standard Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens.
16. ASTM D3910 - Standard Practices for Design, Testing, and Construction of Slurry Seal.
17. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
18. ASTM E408 - Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques.
19. ASTM E903 - Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres.
20. ASTM E1918 - Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field.
21. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.

22. MDOT Standard Specifications for Construction.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product Data:

1. Submit product information for asphalt and aggregate materials.
2. Submit mix design with laboratory test results supporting design.

C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements for MDOT Standard Specifications for Construction.

1.5 QUALITY ASSURANCE

A. Mixing Plant: Conform to MDOT Standard Specifications for Construction.

B. Obtain materials from same source throughout.

C. Perform Work in accordance with MDOT Standard Specifications for Construction.

D. Maintain one copy of each document on site.

1.6 REGULATORY REQUIREMENTS

A. Conform to applicable local codes for paving work.

1.7 QUALIFICATIONS

A. Installer: Company specializing in performing work of this section with minimum 3 years documented experience.

1.8 AMBIENT CONDITIONS

A. Section 01 50 00 - Temporary Facilities and Controls: Ambient conditions control facilities for product storage and installation.

B. Do not place asphalt mixture when ambient air or base surface temperature is less than 40 degrees F, or surface is wet or frozen.

C. Place asphalt mixture when temperature is not more than 15 degrees F less than initial mixing temperature.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Asphalt Cement: In accordance with MDOT Standard Specifications for Construction.

- B. Aggregate for Leveling Course Mix: In accordance with MDOT Standard Specifications for Construction.
- C. Aggregate for Wearing Course Mix: In accordance with MDOT Standard Specifications for Construction.
- D. Fine Aggregate: In accordance with MDOT Standard Specifications for Construction.
- E. Mineral Filler: In accordance with MDOT Standard Specifications for Construction.

2.2 ACCESSORIES

- A. Primer: Homogeneous, medium curing, liquid asphalt in accordance with MDOT Standard Specifications for Construction.
- B. Tack Coat: Homogeneous, medium curing, liquid asphalt in accordance with MDOT Standard Specifications for Construction.

2.3 ASPHALT PAVING MIX

- A. Use dry material to avoid foaming. Mix uniformly.
- B. Base Course: Provide mix in accordance with MDOT uniformity tolerances for bituminous mixtures.
- C. Leveling Course: provide mix in accordance with MDOT uniformity tolerances for bituminous mixtures.
- D. Wearing Course: provide mix in accordance with MDOT uniformity tolerances for bituminous mixtures.

2.4 SOURCE QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Testing, inspection and analysis requirements.
- B. Submit proposed mix design of each class of mix for review prior to beginning of Work.
- C. Submit MDOT approved job mix formula (JMF) of each mix for review 14 days prior to commencement of work.
- D. Test samples in accordance with AI MS-2 and MDOT Standard Specifications for Construction.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.

- B. Verify utilities indicated under paving are installed with excavations and trenches backfilled and compacted.
- C. Verify compacted subgrade and subbase is dry and ready to support paving and imposed loads.
 - 1. Proof roll subbase with a minimum of two passes to identify soft spots.
 - 2. Remove soft subbase and replace with compacted fill as specified in Section 31 11 23.
- D. Verify gradients and elevations of base are correct.
- E. Verify drainage structure frames and casting, and valve boxes are installed in correct position and elevation.

3.2 PREPARATION

- A. Prepare subbase in accordance with MDOT Standard Specifications for Construction.

3.3 DEMOLITION

- A. Saw cut and notch existing paving, saw cutting shall be paid for as part of pavement removal.
- B. Clean existing paving to remove foreign material, excess joint sealant and crack filler from paving surface.
- C. Repair surface defects in existing paving to provide uniform surface to receive new paving.

3.4 INSTALLATION

A. Subbase:

- 1. Aggregate Subbase: Install as specified in Section 32 11 23.

B. Primer:

- 1. Apply primer in accordance with AI MS-2. MDOT Standard Specifications for Construction.
- 2. Use clean sand to blot excess primer.

C. Tack Coat:

- 1. Apply bond coat on existing, abutting asphalt and concrete surfaces according to manufacturer's instructions and MDOT Standard Specifications for Construction.
- 2. Apply bond coat to contact surfaces of curbs, gutters, building walls and sidewalks. Prevent overspray from reaching adjacent surfaces.
- 3. Coat surfaces of manhole and catch basin frames with oil to prevent bond with asphalt pavement. Do not bond coat these surfaces.
- 4. Use clean sand to blot excess primer.

D. Single Course Asphalt Paving:

- 1. Install Work in accordance with MDOT Standard Specifications for Construction.

2. Place asphalt within 24 hours of applying primer or tack coat.
3. Place asphalt wearing course to compacted thickness as indicated on the drawings and stated in the proposal.
4. Compact paving by rolling to specified density. Do not displace or extrude paving from position. Hand compact in areas inaccessible to rolling equipment.
5. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.

E. Double Course Asphalt Paving:

1. Place asphalt binder course within 24 hours of applying primer or tack coat.
2. Place binder course to compacted thickness indicated on drawings and as stated in the proposal.
3. Place wearing course within 24 hours of placing and compacting binder course. When binder course is placed more than 24 hours before placing wearing course, clean surface and apply tack coat before placing wearing course.
4. Place wearing course to compacted thickness indicated on drawings and as stated in the proposal.
5. Install drainage structures and frames, manhole frames, valve and monument boxes in correct position and elevation.
6. Compact each course by rolling to specified density. Do not displace or extrude paving from position. Hand compact in areas inaccessible to rolling equipment.
7. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.

3.5 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.
- C. Scheduled Compacted Thickness: Within 1/4 inch.
- D. Variation from Indicated Elevation: Within 1/4 inch.

3.6 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Requirements for inspecting, testing.
- B. Take samples and perform tests in accordance with MDOT Standard Specifications for Construction.
- C. Asphalt Paving Mix Temperature: Measure temperature at time of placement.
- D. Asphalt Paving Thickness: ASTM D3549; test one core sample from every 1000 square yards compacted paving.
- E. Asphalt Paving Density: ASTM D2950 nuclear method; density testing shall be performed at the discretion of the Engineer.

3.7 PROTECTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Immediately after placement, protect paving from mechanical injury for 3 days.

END OF SECTION

SECTION 32 13 13

CONCRETE PAVING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Concrete paving for:
 - a. Concrete sidewalks.
 - b. Concrete curbs and gutters.
 - c. Concrete parking areas and roads.
- B. Related Requirements:
 - 1. Section 31 22 13 - Rough Grading: Preparation of site for paving and base.
 - 2. Section 32 11 23 - Aggregate Base Courses.
 - 3. Section 31 91 19 – Landscape Grading: Preparation of subsoil at pavement perimeter.
 - 4. Section 33 05 13 – Manholes and Structures: Manholes including frames.

1.2 PRICE AND PAYMENT PROCEDURES

- A. Section 01 20 00 - Price and Payment Procedures Contract Sum/Price
- B. Curb and Gutter, Remove and Replace, Det F2:
 - 1. Basis of Measurement: At the unit price bid per linear foot as stated in the proposal.
 - 2. Basis of Payment: Includes all associated material, labor and equipment, saw cutting, removing, hauling and disposing of existing curb and gutter, providing and preparing base, placing concrete and accessories, joints, expansion joint fillers, joint seals or sealants, floating and finishing, curing, and driveway openings and curb cuts for sidewalk ramps. Owner and/or Engineer will mark sections in the field to be removed and replaced.
- C. Driveway, Nonreinf Conc, ____ Inch
 - 1. Basis of Measurement: At the unit price bid per square yard as stated in the proposal.
 - 2. Basis of Payment: Includes all associated material, labor and equipment, providing and preparing base, placing concrete and accessories, transverse and longitudinal joints, expansion joint fillers, joint seals or sealants, sawing, forming and cleaning the joints, providing and applying bond breaker is required, providing and placing joint sealant, concrete accelerators if approved by Engineer, floating, finishing, and curing as shown on the plans.
- D. Driveway Opening, Concrete, Detail M:
 - 1. Basis of Measurement: Included in the unit price bid per linear foot as stated in the proposal.
 - 2.
 - 3. Basis of Payment: Includes all labor, equipment, and material to construct a concrete driveway opening in accordance with MDOT specifications for a Detail M opening.

1.3 REFERENCE STANDARDS

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO M324 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
- B. American Concrete Institute:
 - 1. ACI 301 - Specifications for Structural Concrete.
 - 2. ACI 304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete.
- C. ASTM International:
 - 1. ASTM A184/A184M - Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
 - 2. ASTM A185/A185M - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
 - 3. ASTM A497/A497M - Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
 - 4. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - 5. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
 - 6. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
 - 7. ASTM A775/A775M - S Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
 - 8. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement.
 - 9. ASTM A934/A934M - Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars.
 - 10. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - 11. ASTM C33 - Standard Specification for Concrete Aggregates.
 - 12. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - 13. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
 - 14. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
 - 15. ASTM C150 - Standard Specification for Portland Cement.
 - 16. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
 - 17. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
 - 18. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
 - 19. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
 - 20. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - 21. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
 - 22. ASTM C595 - Standard Specification for Blended Hydraulic Cements.
 - 23. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
 - 24. ASTM C979 - Standard Specification for Pigments for Integrally Colored Concrete.
 - 25. ASTM C989 - Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.

26. ASTM C1017/C1017M - Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
27. ASTM C1064/C1064M - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
28. ASTM C1116 - Standard Specification for Fiber-Reinforced Concrete and Shotcrete.
29. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
30. ASTM C1371 - Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emisometers.
31. ASTM C1549 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.
32. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
33. ASTM D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
34. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
35. ASTM E408 - Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques.
36. ASTM E903 - Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres.
37. ASTM E1918 - Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field.
38. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data:
 1. Submit data on concrete materials, joint filler and admixtures curing compounds.
- C. Design Data:
 1. Submit concrete mix design for each concrete strength. Submit separate mix designs when admixtures are required for the following:
 - a. Hot and cold weather concrete work.
 2. Identify mix ingredients and proportions, including admixtures.
 3. Identify chloride content of admixtures and whether or not chloride was added during manufacture.
- D. Source Quality Control Submittals: Indicate results of shop tests and inspections.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301.
- B. Obtain cementitious materials from same source throughout.
- C. Perform Work in accordance with MDOT Standard Specifications for Construction.
- D. Maintain one copy of each document on site.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum 3 years documented experience.

1.7 AMBIENT CONDITIONS

- A. Section 01 50 00 - Temporary Facilities and Controls: Ambient conditions control facilities for product storage and installation.
- B. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

PART 2 PRODUCTS

2.1 AGGREGATE BASE COURSE

- A. Aggregate Base Course: As specified in Section 32 11 23.

2.2 CONCRETE PAVING

- A. Performance / Design Criteria:
 - 1. In accordance with Municipal, State, and Federal standards.
- B. Form Materials:
 - 1. Form Materials: As specified in Section 03 10 00.
 - 2. Wood or Steel form material, profiled to suit conditions.
 - 3. Joint Filler: ASTM D1751; Asphalt impregnated fiberboard or felt, 1/2 inch thick.
 - 4. ANSI/ASTM D1751, performed type; 1/2 inch thick, full depth of concrete manufactured by ACD International, W.R. Meadows or equal.
- C. Reinforcement:
 - 1. Reinforcing Steel and Wire Fabric: Conform to Municipal, State and Federal Standards. All reinforcement steel shall be epoxy coated.
- D. Concrete Materials:
 - 1. Concrete Materials: As specified in Section 03 30 00.

2.3 MIXES

- A. Concrete Mix - By Performance Criteria:
 - 1. Mix concrete in accordance with ACI 304. Deliver concrete in accordance with ASTM C94/C94M.
 - 2. Select proportions for normal weight concrete in accordance with ACI 301 Method 2.
 - 3. Provide concrete to the following criteria:
 - a. As specified in 03 30 00 Concrete Cast in Place.
 - 4. Limit the following cementitious materials to maximum percentage by mass of all cementitious materials:

- a. As specified in 03 30 00.
- 5. Use accelerating admixtures in cold weather only when approved by the Architect/Engineer in writing. Use of admixtures will not relax cold weather placement requirements.
- 6. Use set retarding admixtures during hot weather only when approved by the Engineer in writing.

2.4 FINISHES

- A. Shop Finishing - Reinforcement:
 - 1. Galvanized Finish for Steel Bars: ASTM A767/A767M, Class I, hot dip galvanized after fabrication.
 - 2. Epoxy Coated Finish for Steel Bars: ASTM A775/A775M.
- B. Epoxy Coated Finish for Steel Wire: ASTM A884/A884M; Class A, using ASTM A775/A775M.

2.5 ACCESSORIES

- A. Curing Compound: ASTM C309, Type 1, FS TT-C-800, 30 percent solids manufactured by ACD International or equal.
- B. Liquid Surface Sealer: Son-No-Mar manufactured by Sonneborn Building Products or equal.
- C. Joint Sealers: Type II or Type III; hot applied type.

2.6 SOURCE QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Testing and Inspection Services.
- B. Submit proposed mix design of each class of concrete to appointed firm for review prior to commencement of work. Engineer will then submit to MDOT in accordance with Section 01 30 00.
- C. Tests on cement, aggregates, and mixes will be performed to ensure conformance with specified requirements.
- D. Test samples in accordance with ACI 301.
- E. Provide certification that materials conform with specified requirements.

2.7 DETECTABLE WARNING SURFACES

- A. Manufacturers: From the MDOT Material Source Guide Qualified Product list.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.

- B. Verify compacted subgrade and granular subbase is dry and ready to support paving and imposed loads.
 - 1. Remove soft subbase and replace with compacted fill as specified in Section 32 11 23.
- C. Verify gradients and elevations of base are correct.

3.2 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.
- B. Moisten substrate to minimize absorption of water from fresh concrete.
- C. Coat surfaces of manhole and catch basin frames with oil to prevent bond with concrete paving.
- D. Verify correct line and grade of base.
- E. Firmly stake forms to the required line and grade and provide for a finish transverse slope of 1/4 inch per foot towards the center of the road.
- F. Notify Engineer minimum 48 hours prior to commencement of concreting operations.
- G. Form sub-grade by excavating or filling with approved granular material, Type G or H as directed by Engineer to the required line and grade for bottom of concrete.
- H. Remove unstable material from sub-grade and replace with approved granular material, Type G or H as directed by Engineer.
- I. Compact sub-grade to insure stability.

3.3 INSTALLATION

- A. Subbase:
 - 1. Aggregate Subbase: Install as specified in Section 32 11 23.
- B. Forms:
 - 1. Place and secure forms and screeds to correct location, dimension, profile, and gradient.
 - 2. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Removal:
 - 1. Provide curb cut by saw-cutting and removing the full curb section and gutter pan at locations where the proposed sidewalk adjoins existing curb and gutter at roadways and drives.
 - 2. Remove concrete curb full depth as shown on the drawings.
 - 3. Remove rubble, place compacted granular fill to correct line and grade.
 - 4. Leave existing reinforcement to extend 6 inches into proposed gutter pan.
- D. Reinforcement:
 - 1. Place two #4 bars the entire length of the proposed gutter pan, lapped and tied to the existing reinforcement.

2. Dowel proposed #4 bars 12 inches into existing gutter pan where existing bars were cut off or are absent.
3. Place reinforcing at mid-height of paving.
4. Interrupt reinforcing at contraction expansion joints.
5. Place dowels to achieve paving and curb alignment as detailed.
6. Provide doweled joints as specified in MDOT Standard Specifications for Construction.
7. Repair damaged galvanizing or epoxy coating to match shop finish.

E. Placing Concrete:

1. Place concrete using slip form technique.
2. Ensure reinforcing, inserts, embedded parts, and formed joints are not disturbed during concrete placement.
3. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.
4. Thickness:
 - a. Sidewalks: 4 inches normal and 6 inches at driveways, ramps, and parking areas.
 - b. Curb cut and Gutter: Match existing.
5. Width:
 - a. Sidewalks: Match existing (minimum of 4’).
 - b. Cut curb and Gutter: As shown on the drawings.
6. Place concrete in accordance with the Township and MDOT current Standards for Construction.

F. Joints

1. Place joint filler between paving components and building or other appurtenances.
2. Place expansion joints between abutting buildings, sidewalk approaches, back of curb or gutter, or edge of pavement with the top flush with the finished surface of the sidewalk.
3. Contraction Joints: Divide sidewalk into square unit areas of not more than 36 square feet nor less than 16 square feet.
4. Construct joint groove in expansion joints according to MDOT Standard Plans for joint construction.
5. Flush loose concrete and slurry from the groove and the immediate area.
6. If the required seal is not installed within seven days of final sawing, temporarily seal the joint groove with approved material or device to prevent the infiltration of foreign material.
7. Install either permanent seal or temporary seal before allowing vehicles to travel over the full width joint grooves.
8. Saw joints in two stages, in accordance with the following:
 - a. Place relief cut directly over the center of the load transfer assembly or over the preformed joint filler. Make the relief cut after the concrete hardens and will not excessively ravel or spall, but before random cracks develop in the concrete pavement. Immediately stop sawing if sawing operation causes excessive raveling or spalling, and continue to monitor the concrete hardness before resuming sawing operations. Do not allow traffic cover the expansion joint relief cuts.
 - b. Center the joint groove over the relief cut. Adjust the groove width to compensate for change in the relief cut due to pavement contraction. Immediately stop sawing if sawing operation causes excessive raveling or spalling, and continue to monitor the concrete hardness before resuming sawing operations. Maintain the curing of the concrete near the joint, and if required, install the permanent joint sealant or place temporary cover material. Give second stage sawing of expansion joints priority over second stage contraction joint sawing, if higher pavement temperatures are forecast.

9. If proposing an alternative method for sawing, submit a plan to the Engineer for approval.
10. The Engineer will not allow spalling, raveling, and random cracks in the concrete pavement. Repair raveling or spalling in accordance with MDOT Standard Specifications for Construction. Remove and replace random cracked panels as directed by the Engineer.
11. Locations of transverse joints in the pavement, shoulder, curb and gutter, valley gutter and base course shall be in accordance with MDOT Standard Plans.
12. Place load transfer assemblies if required by MDOT Standard Plans.
13. Place expansion joint filler in accordance with MDOT Standard Plans.

G. Finishing:

1. After concrete has been struck off to finish grade, float surface with a steel float to produce a smooth surface.
2. Area Paving: Light broom.
3. Sidewalk Paving: Light broom.
4. Median Barrier: Light broom.
5. Curbs and Gutters: Light broom.
6. Direction of Texturing: Lightly broom transversely (except curb & gutter) across the surface to create a slightly rough surface. Round edges and joint to a radius of 1/4 inch with an approved finishing tool.
7. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

H. Curing and Protection

1. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
2. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
3. During cold weather, protect concrete from freezing for a period of 3 days.
4. Protect concrete from traffic for a minimum of 7 days.

I. Finish Grading

1. Place surplus excavation in outlawn and level to existing contours.
2. Remove excess excavation unable to be used in outlawn.
3. Spread 4 inches minimum topsoil over entire disturbed area.
4. Furnish and install embankment in accordance with MDOT Standard Specifications for Construction, Section 2.08.11.

J. Detectable Warning Surface:

1. Install in accordance with Manufacturer's specifications and MDOT Standard Plan R-28 Series.

3.4 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation of Surface Flatness: 1/4 inch in 10 ft.
- C. Maximum Variation From True Position: 1/4 inch.

3.5 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Requirements for inspecting, testing.
- B. Engineer will take cylinders and perform slump and air entrainment tests in accordance with ACI 301. The frequency the tests are taken, shall be at the Engineer's discretion.
- C. Strength Test Samples:
 - 1. Sampling Procedures: ASTM C172.
 - 2. Cylinder Molding and Curing Procedures: ASTM C31/C31M, cylinder specimens, standard cured.
 - 3. Sample concrete and make one set of three cylinders for every 75 cu yds or less of each class of concrete placed each day.
 - 4. Make one additional cylinder during cold weather concreting, and field cure.
- D. Field Testing:
 - 1. Slump Test Method: ASTM C143/C143M.
 - 2. Air Content Test Method: ASTM C173/C173M.
 - 3. Temperature Test Method: ASTM C1064/C1064M.
 - 4. Measure slump and temperature for each compressive strength concrete sample.
 - 5. Measure air content in air entrained concrete for each compressive strength concrete sample.
- E. Cylinder Compressive Strength Testing:
 - 1. Test Method: ASTM C39/C39M.
 - 2. Test Acceptance: In accordance with MDOT Standards.
 - 3. Test one cylinder at 7 days.
 - 4. Test two cylinders at 28 days.
 - 5. Dispose remaining cylinders when testing is not required.
- F. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.6 PROTECTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Immediately after placement, protect paving from premature drying, excessive hot or cold temperatures, and mechanical injury.
- C. Do not permit pedestrian vehicular traffic over paving for 7 days minimum after finishing.

END OF SECTION

SECTION 32 14 53

PAVEMENT REPAIR

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Bituminous Driveway Restoration.
 - 2. Bituminous Driveway Restoration.
 - 3. Concrete Driveway Restoration.

- B. Related Sections:
 - 1. Section 31 23 16 - Excavation.
 - 2. Section 31 23 23 - Fill.
 - 3. Section 31 23 17 - Trenching.
 - 4. Section 32 11 23 - Aggregate Base Course.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Bituminous Driveway Restoration (Residential):
 - 1. Basis of Measurement: At the unit price bid per square yard as stated in the proposal.
 - 2. Basis of Payment: Includes all equipment, material, and labor required to saw-cut excavate or fill to subgrade, supply, place and compact, granular subbase and aggregate base, certifications, and placing and compacting paving materials to the required depths as indicated on the plans.

- B. Concrete Driveway Restoration (Residential):
 - 1. Basis of Measurement: At the unit price bid per square yard as stated in the proposal.
 - 2. Basis of Payment: Includes equipment, material and labor to remove and dispose of existing pavement, excavation, placement and compact fill material, set forms, place reinforcing steel, place concrete, float, finish, and test Class A concrete.

- C. Gravel Driveway Restoration
 - 1. Basis of Measurement: At the unit price bid per square yard as stated in the proposal.
 - 2. Basis of Payment: Includes equipment, material and labor to remove and dispose of existing pavement, excavation, and placement and compaction of fill materials to the required depths as indicated on the plans.

1.3 REFERENCES

- A. Michigan Department of Transportation Standard Specifications for Construction, current edition.

- B. Saginaw County Road Commission Standards, current edition.

- C. MS-2 - Mix design methods for Asphalt Concrete and Other Hot Mix Types - The Asphalt Institute (AI).
- D. ASTM D946 - Penetration - Graded Asphalt Cement for Use in Pavement Construction.

1.4 REGULATORY REQUIREMENTS

- A. Perform construction within public road right-of-way to meet the requirements of the authority having jurisdiction.
- B. Obtain construction permits as required by the authority having jurisdiction over the Work in the public right-of-way. Notify the authority 48 hours prior to working within the road right-of-way.
- C. Maintain traffic control as required by the authority having jurisdiction.

1.5 COORDINATION

- A. Section 01 30 00 - Administrative Requirements specifies requirements for coordination.

1.6 QUALITY ASSURANCE

- A. Perform Work according to Michigan Department of Transportation Standard Specifications for Construction, current edition.
- B. Maintain one copy of each standard affecting the Work of this Section on Site.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.
- B. Fabricator: Company specializing in fabricating products specified in this Section with minimum three years' documented experience.
- C. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience and approved by manufacturer.
- D. Licensed Professional: Professional engineer experienced in design of specified Work and licensed in State of Michigan.

1.8 EXISTING CONDITIONS

- A. Field Measurements: Verify field measurements prior to fabrication. Indicate field measurements on Shop Drawings.

1.9 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements specifies requirements for warranties.

- B. Furnish five-year manufacturer's warranty.

PART 2 - PRODUCTS

2.1 MIXES / MATERIALS AND MIX - PAVEMENTS

- A. MDOT 22A Dense Graded Aggregate – for bituminous pavement aggregate
- B. MDOT 23A Dense Graded Aggregate – for gravel road surface course, road shoulder, and gravel driveway surface course.
- C. Cold patch for temporary patches.
- D. Asphalt: Conform to MDOT Standards.
 - 1. As specified on the plans.
- E. Paint: Regular dry paint for pavement markings shall conform to MDOT Standards in accordance with the MDOT Standard Specifications for Construction current edition.
- F. Asphalt Bond Coat: MDOT Standards.
- G. All concrete shall meet the following:
 - 1. Compressive strength: 2400 psi / 2600 psi @ 7 days
 - 2. Compressive strength: 3500 psi / 4000 psi @ 28 days
 - 3. Slump: 2 to 4 inches.
 - 4. Air Entrained: 3.5 to 6.5 percent.

2.2 ACCESSORIES

- A. Asphalt Primer to be homogenous, medium curing, liquid asphalt in accordance with MDOT Standards and approved by Engineer.
- B. Asphalt Tack Coat to be homogenous, medium curing, liquid asphalt in accordance with MDOT Standards and approved by the Engineer.

2.3 SOURCE QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements specifies testing, inspection, and analysis requirements.
- B. Submit proposed mix design of each class of concrete to appointed firm for review prior to commencement of Work.
- C. Submit certification for cement and aggregates to ensure conformance with specified requirements as required by the Engineer.
- D. Certificate of Compliance: When fabricator is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.

1. Specified shop tests are not required for Work performed by approved fabricator.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify base conditions under provisions of Sections 31 23 23 - Fill and 31 23 17 - Trenching.
- B. Verify that compacted subgrade, granular base or aggregate base is dry and ready to support paving and imposed loads.
- C. Verify gradients and elevations of base are correct.

3.2 PREPARATION

- A. Adjust manholes, catch basins, valve boxes, and monument boxes to grade.
- B. Sawcut and remove existing pavement a minimum of 2 feet back from top edge of undisturbed soil on both sides of trench.
- C. Sawcut to a minimum of 1 1/2 inch depth on straight line perpendicular to the roadway.
- D. Remove pavement to an existing joint when a joint lies within 5 feet of the top edge of undisturbed soil.
- E. Notify Engineer minimum 2 working days prior to placing paving mix.
- F. Coat surfaces of manhole and catch basin frames and valve and monument boxes with oil to prevent bond with paving mix.
- G. Asphalt:
 1. Apply bond coat in accordance with manufacturer's instructions and MDOT standard requirements.
 2. Apply bond coat to contact surfaces of curbs and existing pavement.
- H. Prepare other areas damaged during construction as determined by the Engineer according to these guidelines.
- I. Road surface shall be prepared in accordance with MDOT standards to accept pavement markings.
- J. Concrete: Moisten base to minimize absorption of fresh water from concrete.

3.3 INSTALLATION OF TEMPORARY PATCHES

- A. Permanent or acceptable temporary repairs of all driveways and roadways shall be made immediately after the utility is installed.

- B. Bituminous and/or concrete drives to be repaired shall be sawcut straight. The driveway shall be replaced to an existing joint if located within 5 feet of the utility trench. The minimum replacement width shall be the trench width plus 4 feet.
- C. All drives shall be completely backfilled with sand compacted to 95 percent of its maximum dry density as determined by modified proctor method.
- D. Maintain temporary patches until final patch can be installed. Mark areas with appropriate signs to provide motorists with adequate warning.

3.4 PLACEMENT

- A. Thickness:
 - 1. Asphalt Road: As noted in the drawings or match existing thickness, whichever is greater.
 - 2. Gravel: 8 inches minimum or match existing thickness whichever is greater.
- B. Compact asphalt pavement by rolling with a minimum 5-ton roller unless otherwise directed by Engineer. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.
- C. Develop rolling with consecutive passes to achieve even and smooth finish, without roller marks for asphalt paving.
- D. Materials, construction and methods of placement to conform to MDOT Standard Specifications for Construction. Curb and gutter shall match the current Michigan Department of Transportation standard drawings.
- E. Replace curb and gutter where required, matching section and details of existing, including joints, reinforcement and ties. See Section 32 12 16 – Asphalt Paving.
- F. Concrete: Refer to Section 32 12 16 – Asphalt Paving.
- G. Gravel Road Shoulder: Place 4 inch gravel road shoulder to the width as shown on the drawings and compact to a minimum of 98 percent of the materials maximum dry density according to the modified proctor method.
- H. Grade surfaces to match existing elevations and for drainage.
- I. Finish surfaces to meet texture of adjacent pavement.
- J. Include all dowels, lane ties, reinforcement, joints and related accessories as required.
- K. Apply pavement markings in compliance with MDOT Standards.

3.5 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements specifies requirements for inspecting and testing.

- B. Three concrete test cylinders will be taken for every 100 or less cubic yards of each class of concrete placed each day.
- C. One additional test cylinder will be taken during cold weather and cured on site under same conditions as concrete it represents.
- D. One slump test will be taken for each set of test cylinders taken.
- E. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.
- F. Provide copies of invoice tickets to inspector in field to monitor yield quality, mix type, haul type, etc.

3.6 PROTECTION

- A. Section 01 70 00 - Execution and Closeout Requirements specifies requirements for protecting finished Work.
- B. Do not permit traffic over unprotected surfaces.

END OF SECTION

SECTION 32 15 41

PULVERIZING

PART 1 - GENERAL

1.1 SECTION INCLUDES:

- A. Pulverizing the existing bituminous surface, remixing approximately 2" of placed aggregate with the pulverized bituminous materials where indicated on the plans.
- B. Re-grading the mixture to the proposed grade, section thickness, and compaction of the mixture to the required density.

1.2 RELATED SECTIONS:

- 1. Section 01 40 00 - Quality Requirements.
- 2. Section 32 11 23 – Aggregate Base Courses.

1.3 REFERENCES:

- A. Michigan Department of Transportation (MDOT) 2012 Standard Specifications and Drawings.

1.4 UNIT PRICE - MEASUREMENT AND PAYMENT

A. HMA Base Crushing and Shaping:

- 1. Basis of Measurement: By the unit price bid per square yard for HMA base crushing and shaping of bituminous surface to be pulverized, shaped, watered, and compacted to full depth, as indicated in the proposal and on the plans.
- 2. Basis of Payment: Includes labor and equipment to pulverize the existing bituminous pavement, re-mix 2" of 22A aggregate with the pulverized materials, grade the mixture to the proposed grade and section thickness, watering, compacting the mixture to the required density, and saw-cutting butt joints.

PART 2 - PRODUCTS

2.1 Liquid Calcium Chloride:

- A. The liquid calcium chloride shall meet the following specification and certification of the material as well as weight slips indicating the weight of material will be provided by the driver at the time of delivery for acceptance of material. No payment will be made without certification of the material and approved weight slips from the supplier.

Calcium Chloride, (%)	38
Potassium Chloride, (%)	1.02
Sodium Chloride, (%)	0.69
Other Impurities, (%)	0.14

Density, (lbs/gal)	11.57
Freeze Point,(deg F)	48

PART 3 - EXECUTION

3.1 EQUIPMENT

- A. The crushing equipment shall be an approved rotary reduction machine having positive depth control which is continually adjustable. The machine shall be of a type designed by the manufacturer specifically for the reduction of pavement material, in place, and be capable of reducing the pavement material to the specified size. The cutting drums shall be enclosed and shall use a sprinkling system around the reduction chamber for pollution control. The rate of forward speed must be positively controlled in order to ensure consistent size of reduced material. The machine must be equipped with an accurate tachometer which is mounted in full view of the operator. The crushing equipment shall meet the approval of the Engineer. The rolling equipment shall include both a rubber tired roller and a steel drum roller. The rubber tired roller shall be loaded to 20 ton. The steel drum roller shall be loaded to 20 ton. Verify that prepared soil base is ready to receive the Work of this section and that the necessary excavation Work has been completed. See Section 32 91 19 - Landscape Grading and Section 31 23 16 – Excavation
- B. An approved bituminous paving machine or grader equipped with an automated slope control device capable of providing finished grade with a uniform cross slope of 2% to the width and depth specified.

3.2 CONSTRUCTION METHODS

The existing roadway shall be pulverized in accordance with Section 305 of the 2003 Michigan Standard Specifications for Construction.

- A. The material shall be uniformly pulverized to a maximum size of 1.5 inches, except 5 percent of the material may be oversized, provided that the oversized material in not so large as to adversely affect the stability and structural integrity of the mixture to hamper the shaping operations.
- B. After pulverizing the existing bituminous surface a 2" layer of 22A crushed limestone aggregate shall be spread uniformly over the existing roadway where indicated on the plans. The 2" layer of 22A aggregate will be paid for using pay item "2" MDOT 22A Crushed Limestone Aggregate Base".
- C. Liquid Calcium Chloride shall be sprayed over the material at a rate of 0.4 gallons per square yard.
- D. The aggregate and previously pulverized material shall then be remixed utilizing the same pulverizing method as described here in.

END OF SECTION

SECTION 32 17 23

PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Traffic lines and markings.
 - 2. Legends.
 - 3. Paint.
 - 4. Glass beads.
- B. Related Requirements:
 - 1. Section 32 12 16 - Asphalt Paving.
 - 2. Section 32 13 13 - Concrete Paving.

1.2 PRICE AND PAYMENT PROCEDURES

- A. Section 01 20 00 - Price and Payment Procedures Contract Sum/Price
- B. Pavement Marking, Ovly Cold Plastic, 6 inch, Crosswalk:
 - 1. Basis of Measurement: By the unit price bid per linear foot as stated in the Proposal.
 - 2. Basis of Payment: Includes furnishing, installing, inspecting and maintaining 6 inch Crosswalk pavement marking, in accordance with MDOT Standard Specifications and Michigan Manual of Uniform Traffic Control Devices.
- C. Pavement Marking, Ovly Cold Plastic, 24 inch, Stop Bar:
 - 1. Basis of Measurement: By the unit price bid per linear foot as stated in the Proposal.
 - 2. Basis of Payment: Includes furnishing, installing, inspecting and maintaining 24 inch Stop Bar pavement marking, in accordance with MDOT Standard Specifications and Michigan Manual of Uniform Traffic Control Devices.
- D. Pavement Marking, Ovly Cold Plastic, Lt Arrow Sym:
 - 1. Basis of Measurement: By the unit price bid per each as stated in the Proposal.
 - 2. Basis of Payment: Includes furnishing, installing, inspecting and maintaining Left Arrow Symbol pavement marking, in accordance with MDOT Standard Specifications and Michigan Manual of Uniform Traffic Control Devices.
- E. Pavement Marking, Ovly Cold Plastic, Only:
 - 1. Basis of Measurement: By the unit price bid per each as stated in the Proposal.
 - 2. Basis of Payment: Includes furnishing, installing, inspecting and maintaining "Only" pavement marking, in accordance with MDOT Standard Specifications and Michigan Manual of Uniform Traffic Control Devices.
- F. Pavement Marking, Ovly Cold Plastic, Railroad Sym:
 - 1. Basis of Measurement: By the unit price bid per each as stated in the Proposal.

2. Basis of Payment: Includes furnishing, installing, inspecting and maintaining Railroad Symbol pavement marking, in accordance with MDOT Standard Specifications and Michigan Manual of Uniform Traffic Control Devices.
- G. Pavement Marking, Waterborne, 4 inch, White:
1. Basis of Measurement: By the unit price bid per linear foot as stated in the Proposal.
 2. Basis of Payment: Includes furnishing, installing, inspecting and maintaining pavement markings, first application, in accordance with MDOT Standard Specifications and Michigan Manual of Uniform Traffic Control Devices.
- H. Pavement Marking, Waterborne, 4 inch, Yellow:
1. Basis of Measurement: By the unit price bid per linear foot as stated in the Proposal.
 2. Basis of Payment: Includes furnishing, installing, inspecting and maintaining pavement markings, first application, in accordance with MDOT Standard Specifications and Michigan Manual of Uniform Traffic Control Devices.
- I. Pavement Marking, Waterborne, 2nd Application, 4 inch, White:
1. Basis of Measurement: By the unit price bid per linear foot as stated in the Proposal.
 2. Basis of Payment: Includes furnishing, installing, inspecting and maintaining pavement markings, second application, in accordance with MDOT Standard Specifications and Michigan Manual of Uniform Traffic Control Devices.
- J. Pavement Marking, Waterborne, 2nd Application, 4 inch, Yellow:
1. Basis of Measurement: By the unit price bid per linear foot as stated in the Proposal.
 2. Basis of Payment: Includes furnishing, installing, inspecting and maintaining pavement markings, second application, in accordance with MDOT Standard Specifications and Michigan Manual of Uniform Traffic Control Devices.

1.3 REFERENCE STANDARDS

- A. American Association of State Highway and Transportation Officials:
1. AASHTO M247 - Standard Specification for Glass Beads Used in Traffic Paint.
- B. ASTM International:
1. ASTM D34 - Standard Guide for Chemical Analysis of White Pigments.
 2. ASTM D126 - Standard Test Methods for Analysis of Yellow, Orange, and Green Pigments Containing Lead Chromate and Chromium Oxide Green.
 3. ASTM D562 - Standard Test Method for Consistency of Paints Measuring Krebs Unit (KU) Viscosity Using a Stormer-Type Viscometer.
 4. ASTM D711 - Standard Test Method for No-Pick-Up Time of Traffic Paint.
 5. ASTM D713 - Standard Practice for Conducting Road Service Tests on Fluid Traffic Marking Materials.
 6. ASTM D969 - Standard Test Method for Laboratory Determination of Degree of Bleeding of Traffic Paint.
 7. ASTM D1301 - Standard Test Methods for Chemical Analysis of White Lead Pigments.
 8. ASTM D1394 - Standard Test Methods for Chemical Analysis of White Titanium Pigments.
 9. ASTM D1475 - Standard test Method for Density of Liquid Coatings, Inks, and Related Products.

10. ASTM D1640 - Standard Test Methods for Drying, Curing, or Film Formation of Organic Coatings at Room Temperature.
11. ASTM D2202 - Standard Test Method for Slump of Sealants.
12. ASTM D2371 - Standard Test Method for Pigment Content of Solvent-Reducible Paints.
13. ASTM D2621 - Standard Test Method for Infrared Identification of Vehicle Solids From Solvent-Reducible Paints.
14. ASTM D2743 - Standard Practices for Uniformity of Traffic Paint Vehicle Solids by Spectroscopy and Gas Chromatography.

C. MDOT Standard Specifications for Construction

D. Michigan Manual of Uniform Traffic Control Devices.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with MDOT Standard Specifications for Construction.

B. Maintain one copy of each document on site.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Invert containers several days prior to use when paint has been stored more than 2 months. Minimize exposure to air when transferring paint. Seal drums and tanks when not in use.

C. Glass Beads. Store glass beads in cool, dry place. Protect from contamination by foreign substances.

1.6 AMBIENT CONDITIONS

A. Section 01 50 00 - Temporary Facilities and Controls: Ambient conditions control facilities for product storage and installation.

B. Do not apply materials when surface and ambient temperatures are outside temperature ranges required by paint product manufacturer.

C. Do not apply exterior coatings during rain or snow when relative humidity is outside humidity ranges, or moisture content of surfaces exceed those required by paint product manufacturer.

D. Do not apply paint when temperatures are expected to fall below 50 degrees F for 24 hours after application.

E. Volatile Organic Content (VOC). Do not exceed State or Environmental Protection Agency maximum VOC on traffic paint.

1.7 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties.
- B. Furnish year manufacturer's warranty for traffic paints in accordance with MDOT Standard Specifications for Construction.

PART 2 - PRODUCTS

2.1 PAVEMENT MARKINGS

- A. Manufacturers: From the MDOT Material Source Guide Qualified Product list.
- B. Furnish materials in accordance with MDOT Standard Specifications for Construction.
- C. Symbols and Crosswalks: In accordance with MDOT Standard Specifications for Construction for Overlay Cold Plastic.
- D. Lane lines: In accordance with MDOT Standard Specifications for Construction for Waterborne.
- E. Glass Beads: In accordance with MDOT Standard Specifications for Construction.

2.2 PERMANENT SIGNING

- 1. Permanent signs and sign posts shall conform to MDOT Standards, Michigan Manual of Uniform Traffic Control Devices and MDOT Standard Highway Sign Manual.

2.3 EQUIPMENT

- A. Continuous Longitudinal Line Application Machine: Use application equipment with following capabilities.
 - 1. Dual nozzle paint gun to simultaneously apply parallel lines of indicated width in solid or broken patterns or various combinations of those patterns.
 - 2. Pressurized bead-gun to automatically dispense glass beads onto painted surface, at required application rate.
 - 3. Measuring device to automatically and continuously measure length of each line placed, to nearest foot.
 - 4. Device to heat paint to the required temperature for fast dry applications.
- B. Machine Calibration:
 - 1. Paint Line Measuring Device: Calibrate automatic line length gauges to maintain tolerance of plus or minus 25 feet per mile.
 - 2. Cycle Length/Paint Line Length Timer: Calibrate cycle length to maintain tolerance of plus or minus 6 inches per 40 feet; calibrate paint line length to maintain tolerance to plus or minus 3 inches per 10 feet.
 - 3. Paint Guns: Calibrate to simultaneously apply paint binder at uniform rates as specified with an allowable tolerance of plus or minus 1 mil.

4. Bead Guns: Calibrate to dispense glass beads simultaneously at specified rate. Check guns by dispensing glass beads into gallon container for predetermined fixed period of time. Verify weight of glass beads.

C. Other Equipment:

1. For application of crosswalks, intersections, stop lines, legends and other miscellaneous items by walk behind strippers, hand spray or stencil trucks, apply with equipment meeting requirements of this section. Do not use hand brushes or rollers. Optionally apply glass beads by hand.

2.4 SOURCE QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Testing, inspection and analysis requirements.
- B. Test and analyze traffic paints in accordance with MDOT Standard Specifications for Construction.
- C. Make paints and glass beads available for inspection at manufacturer's factory prior to packaging for shipment. Notify Engineer at least seven days before inspection is allowed.
- D. Allow witnessing of factory inspections and test at manufacturer's test facility. Notify Engineer at least seven days before inspections and tests are scheduled.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Do not apply paint to concrete surfaces until concrete has cured for 28 days.

3.2 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.
- B. Maintenance and Protection of Traffic:
 1. Provide short term traffic control in accordance with Section 01 50 00 - Temporary Facilities and Controls.
 2. Prevent interference with marking operations and to prevent traffic on newly applied markings before markings dry.
 3. Maintain travel lanes between 7:00 AM to 9:00 AM, and between 4:00 PM and 6:00 PM.
 4. Maintain access to existing businesses, and other properties requiring access.
- C. Surface Preparation.
 1. Clean and dry paved surface prior to painting.
 2. Blow or sweep surface free of dirt, debris, oil, grease or gasoline.

3. Spot location of final pavement markings as specified and as indicated on Drawings by applying pavement spots 25 feet on center.
4. Notify Architect/Engineer after placing pavement spots and minimum 3 days prior to applying traffic lines.

3.3 DEMOLITION

- A. Remove existing markings in an acceptable manner. Do not remove existing pavement markings by painting over with blank paint. Remove by methods that will cause least damage to pavement structure or pavement surface. Satisfactorily repair any pavement or surface damage caused by removal methods.
- B. Clean and repair existing remaining lines and legends.

3.4 APPLICATION

- A. Install Work in accordance with MDOT Standard Specifications for Construction.

3.5 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation from Wet Film Thickness: 1 mil.
- C. Maximum Variation from Wet Paint Line Width: Plus or minus 1/8 inch.
- D. Maintain cycle length for skip lines at tolerance of plus or minus 6 inches per 40 feet and line length of plus or minus 3 inches per 10 feet.
- E. Maximum Variation from Specified Application Temperature: Plus or minus 5 degrees F.

3.6 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Requirements for inspecting, testing.

3.7 PROTECTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Protect painted pavement markings from vehicular and pedestrian traffic until paint is dry and track free. Follow manufacturer's recommendations or use minimum of 30 minutes. Consider barrier cones as satisfactory protection for materials requiring more than 2 minutes dry time.

3.8 MAINTENANCE

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for maintenance service.

- B. Furnish service and maintenance of traffic paints for three years from Date of Substantial Completion.

END OF SECTION

SECTION 32 31 13

CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Fence framework, fabric, and accessories.
 2. Manual gates and related hardware.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Fence Modifications and Repairs:
1. Basis of Measurement: At the unit price bid per lineal foot as stated in the proposal.
 2. Basis of Payment: Includes all labor, equipment, and material to remove and replace the existing fence as shown on the drawings. Includes fence, gates, all required posts, top rail, tension wire, privacy slats, concrete footings, etc. for a complete installation.

1.3 REFERENCES

- A. ASTM International:
1. ASTM A121 - Standard Specification for Metallic-Coated Carbon Steel Barbed Wire.
 2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 3. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 4. ASTM A491 - Standard Specification for Aluminum-Coated Steel Chain-Link Fence Fabric.
 5. ASTM A817 - Standard Specification for Metallic-Coated Steel Wire for Chain-Link Fence Fabric and Marcellled Tension Wire.
 6. A1011/A1011M-07 Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
 7. ASTM B429/B429M - Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
 8. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
 9. ASTM F552 - Standard Terminology relating to Chain Link Fencing.
 10. ASTM F567 - Standard Practice for Installation of Chain-Link Fence.
 11. ASTM F626 - Standard Specification for Fence Fittings.
 12. ASTM F900 - Standard Specification for Industrial and Commercial Swing Gates.
 13. ASTM F1083 - Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.
 14. ASTM F1345 - Standard Specification for Zinc - 5% Aluminum -Mischmetal Alloy-Coated Steel Chain-Link Fence Fabric.

15. ASTM A120 – Pipe, Steel, Black and Hot-Dipped Zinc Coated (Galvanized) Welded and Seamless, for Ordinary Uses.
16. ASTM A428 – Weight of Coating on Aluminum-Coated Iron or Steel Articles.
17. ASTM A585 – Aluminum-Coated Steel Barbed Wire.
18. ASTM C94 – Ready-mixed Concrete.

- B. Chain Link Fence Manufacturers Institute:
1. CLFMI - Product Manual.

1.4 SYSTEM DESCRIPTION

- A. Fence Height: 6 feet nominal
 1. Not including barbed wire.
- B. Line Post Spacing: At intervals not exceeding 10 feet.
- C. Fence Post and Rail Strength: Conform to ASTM F1043 Heavy Industrial Fence quality.
- D. Gate Width: See drawings for gate width.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, gates, and schedule of components.
- C. Product Data: Submit data on fabric, posts, accessories, fittings and hardware.

1.6 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Accurately record actual locations of property perimeter posts relative to property lines and easements.
- C. Operation and Maintenance Data: Procedures for submittals.

1.7 QUALITY ASSURANCE

- A. Supply material in accordance with CLFMI - Product Manual.
- B. Perform installation in accordance with ASTM F567.
- C. Maintain one copy of each document on site.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years of experience.

- B. Installer: Company specializing in performing work of this section with minimum 3 years of experience.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Deliver fence fabric and accessories in packed cartons or firmly tied rolls.
- C. Identify each package with manufacturer's name.
- D. Store fence fabric and accessories in secure and dry place.

1.10 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on the shop drawings.

PART 2 - PRODUCTS

2.1 MATERIALS AND COMPONENTS

- A. Fabric Size: Match Existing Fence.
- B. Intermediate Posts: Match Existing.
- C. Terminal, Corner, Rail, Brace, and Gate Posts: Match Existing.
- D. Caps: Malleable iron galvanized sized to post diameter, set screw retainer.
- E. Extension Arms: Cast steel galvanized to accommodate 3 strands of barbed wire, single arm, sloped to 45 degrees.
- F. Gate Hardware: Fork latch with gravity drop, three 180 degrees gate hinges per leaf, and hardware for padlock.

2.2 COMPONENTS

- A. Line, Corner, Terminal, and Gate Posts: Diameters to match existing fence.
- B. Top and Brace Rail: Diameter to match existing top rail.
- C. Gate Frame: 2-inch minimum diameter for welded fabrication.
- D. Fabric: 2-inch diamond mesh interwoven wire, 9 gauge thick, top selvage twisted tight, bottom selvage knuckle end closed.
- E. Tension Wire: 6 gauge thick steel, single strand.

2.3 GATES

A. General:

1. Gate Types, Opening Widths and Directions of Operation: As indicated on Drawings.
2. Factory assemble gates.
3. Design gates for operation by one person.

B. Swing Gates:

1. Fabricate gates to permit 180 degree swing.
2. Gates Construction: ASTM F900 with welded corners. Use of corner fittings is not permitted.

2.4 FINISHES

A. Components and Hardware: Galvanized to ASTM A123; 2.0 ounces/square feet.

B. Fabric: Aluminum coating to ASTM A428; 0.40 ounces/square feet.

C. Accessories: Same finish as framing.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install framework, fabric, accessories and gates in accordance with ASTM F567.

B. Set intermediate, terminal, gate, posts plumb, in concrete footings with top of footing 1 inch above 6 inches below finish grade. Slope top of concrete for water runoff.

C. Line Post Footing Depth Below Finish Grade: According to ASTM F567.

D. Corner, Gate and Terminal Post Footing Depth Below Finish Grade: According to ASTM F567.

E. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail one bay from end and gate posts.

F. Install top rail through line post tops and splice with 6 inches long rail sleeves.

G. Install center and bottom brace rail on corner gate leaves.

H. Place fabric on outside of posts and rails.

I. Do not stretch fabric until concrete foundation has cured 28 days.

J. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.

K. Position bottom of fabric to match existing fence.

- L. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.
- M. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.
- N. Install bottom tension wire stretched taut between terminal posts.
- O. Install support arms sloped inward and attach barbed wire; tension and secure.
- P. Support gates from gate posts. Do not attach hinged side of gate from building wall.
- Q. Install gate with fabric and barbed wire overhang to match fence. Install three hinges on each gate leaf, latch, catches, drop bolt foot bolts and sockets torsion spring retainer retainer and locking clamp.
- R. Provide concrete center drop to footing depth and drop rod retainers at center of double gate openings.
- S. Install posts with 6 inches maximum clear opening from end posts to buildings, fences and other structures.
- T. Excavate holes for posts to diameter and spacing indicated on Drawings without disturbing underlying materials.
- U. Center and align posts. Place concrete around posts, and vibrate or tamp for consolidation. Verify vertical and top alignment of posts and make necessary corrections.
- V. Extend concrete footings 1 inches above grade, and trowel, forming crown to shed water.
- W. Allow footings to cure minimum 7 days before installing fabric and other materials attached to posts.

3.2 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation From Plumb: 1/4 inch.
- C. Maximum Offset From Indicated Position: 1 inch.
- D. Components shall not infringe adjacent to property lines.

3.3 SCHEDULES

- A. Property Perimeter: 6 feet high.

END OF SECTION

SECTION 32 91 13
SOIL PREPARATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Preparation of subsoil.
 - 2. Soil testing.
 - 3. Placing topsoil.

- B. Related Sections:
 - 1. Section 31 22 13 - Rough Grading: Rough grading of site.
 - 2. Section 31 23 17 - Trenching: Rough grading over cut.
 - 3. Section 32 91 19 - Landscape Grading: Preparation of subsoil and placement of topsoil in preparation for the Work of this section.
 - 4. Section 32 92 19 - Seeding

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Topsoil: Excavated from site and free of weeds.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

- B. Verify prepared soil base is ready to receive the Work of this section.

3.2 PREPARATION OF SUBSOIL

- A. Prepare sub-soil to eliminate uneven areas and low spots. Maintain lines, levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.

- B. Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated sub-soil.

- C. Scarify subsoil to depth of 3 inches where topsoil is to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted sub-soil.

3.3 PLACING TOPSOIL

- A. Spread topsoil to minimum depth of 4 inches over area to be seeded. Rake until smooth.
- B. Place topsoil during dry weather and on dry unfrozen subgrade.
- C. Remove vegetation matter and foreign non-organic material from topsoil while spreading.
- D. Grade topsoil to eliminate rough, low or soft areas, and to ensure positive drainage.
- E. Install edging at periphery of seeded areas in straight lines to consistent depth.

END OF SECTION

SECTION 32 91 19

LANDSCAPE GRADING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Final grade topsoil for finish landscaping.
 - 2. Topsoil.
- B. Related Sections:
 - 1. Section 31 22 13 - Rough Grading: Site contouring.
 - 2. Section 31 23 17 - Trenching: Backfilling trenches.
 - 3. Section 31 23 23 - Fill: Backfilling at building areas.
 - 4. Section 32 92 19 - Seeding.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Landscape Grading and Cleanup and Restoration:
 - 1. Basis of Measurement: Included in the lump sum bid item for cleanup and restoration.
 - 2. Basis of Payment: Includes all labor, excavation, fill for landscape grading necessary to obtain the required contours, replacement of necessary fences, trees, shrubs, guard rail, mail boxes, and other landscaping necessary to return Work area to preconstruction conditions. Includes final grading during construction or from settling. Includes installation of 4 inches of topsoil, which matches quality of existing topsoil in lawn areas.
- B. Topsoil:
 - 1. Basis of Measurement: Included in the lump sum bid item for cleanup and restoration.
 - 2. Basis of Payment: Includes all labor, material, and equipment necessary to haul imported screened top soil, and lightly compact topsoil to the depth and grades as shown on the drawings. Onsite topsoil may be reused as shown on the drawings and as directed by the Engineer. Reuse of existing top soil will not be accepted.

PART 2 - PRODUCTS

2.1 MATERIAL

- A. Topsoil: Min. 4 inches compacted depth, unless otherwise stated.
- B. Topsoil: Imported, Screened, Friable loam; free of subsoil, roots, grass, excessive amount of weeds, stone, and foreign matter; acidity range (pH) of 5.5 to 7.5; containing a minimum of 4 percent and a maximum of 25 percent organic matter. Topsoil shall be imported as specified on the plans.

- C. Contractor shall conduct fertility and calcium tests on all topsoil to be used in lawn and planting areas to assure that soil conditions are ready to receive plantings.
- D. Submit lab results or samples for testing as requested by the Owner or Engineer if imported topsoil is used.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify building and trench backfilling have been inspected.
- C. Verify substrate base has been contoured and compacted.
- D. Beginning Work of this Section requires acceptance of existing conditions.

3.2 SUBSOIL PREPARATION

- A. Eliminate uneven areas and low spots. Remove debris, roots, branches, and stones, in excess of 1/2 inch in size. Remove and dispose of offsite any subsoil contaminated with petroleum products.
- B. Scarify subgrade to minimum depth of 8 inches where topsoil is scheduled. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

3.3 PLACING TOPSOIL

- A. Place topsoil to a minimum 4 inches compacted depth in areas where seeding, sodding and planting is scheduled.
- B. Use topsoil in relatively dry state. Do not place topsoil when weather conditions are excessively windy.
- C. Handle and place topsoil only when weather and soil moisture permits.
- D. Placement of topsoil in frozen or muddy conditions shall not be permitted.
- E. Fine grade topsoil eliminating rough or low areas. Maintain levels, profiles, and contours of subgrade.
- F. Remove stone, roots, grass, weeds, debris, and foreign material while spreading.
- G. Manually spread topsoil around trees and plants to prevent damage.
- H. Lightly compact placed topsoil in preparation for seeding, fertilizing, and mulching.

- I. Fertilizer and lime shall be applied at the minimum rates indicated by tests and shall be raked into the top 2 inches of the topsoil.
- J. Remove surplus subsoil and topsoil from Site.
- K. Import topsoil as necessary to match the depths as specified on the plans.
- L. Leave stockpile area and site clean and raked, ready to receive landscaping.
- M. Place required trees, shrubs, fences, and mail boxes in their proper locations.
- N. All grades must have positive drainage to a manhole, catchbasin, drain, etc. No ponding must occur in graded areas. Contractor will be required to regrade if ponding occurs in landscaped or yard areas.

3.4 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Top of Topsoil: Plus or minus 1/2 inch.

3.5 PROTECTION OF INSTALLED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Prohibit construction traffic over topsoil.

END OF SECTION

SECTION 32 92 19

SEEDING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fertilizing.
2. Seeding.
3. Hydroseeding.
4. Mulching.
5. Maintenance.

B. Related Sections:

1. Section 31 22 13 - Rough Grading: Rough grading of site.
2. Section 31 23 17 - Trenching: Rough grading over cut.
3. Section 32 91 13 - Soil Preparation
4. Section 32 91 19 - Landscape Grading: Preparation of subsoil and placement of topsoil in preparation for the Work of this section.
5. Section 31 10 00 - Site Clearing.
6. Section 31 23 16 - Excavation.
7. Section 31 23 23 - Fill.
8. Section 32 91 19 - Landscape Grading.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Seeding, Fertilizing and Mulching:

1. Basis of Measurement: At the lump sum price bid as stated in the proposal.
2. Basis of Payment: Includes labor, equipment, and material necessary to seed all disturbed areas not specified to receive other seeding or planting treatments. This includes finish grading, subsoil, daily seeding with approved seed mix, mulching, watering and maintenance to provide for uniform grass growth and any reseeding and erosion repair. Re-seeding and erosion repair is included to provide for uniform grass growth at the completion of the project and up to one year after completion.

1.3 REFERENCES

A. ASTM International:

1. ASTM C602 - Standard Specification for Agricultural Liming Materials.

1.4 DEFINITIONS

- ###### A. Weeds: Vegetative species other than specified species to be established in given area.

1.5 SUBMITTALS

- A. Product Data: Submit data for seed mix, fertilizer, mulch, erosion control blankets, and other accessories.
- B. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.
 - 1. Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, any tags from seed bags and any receipts associated with seeding.

1.6 QUALITY ASSURANCE

- A. Provide seed mixture in containers showing percentage of seed mix, germination percentage, inert matter percentage, weed percentage, year of production, net weight, date of packaging, and location of packaging.
- B. The Contractor shall make arrangements to obtain seed materials with nurseries a maximum 30 days after he/she is awarded contract and provide a list of suppliers to the Engineer.
- C. The Contractor will provide a final list of all species purchased to the Engineer a minimum of 90 days prior to seeding

1.7 QUALIFICATIONS

- A. Seed Supplier: Company specializing in manufacturing Products specified in this section.
- B. Installer: The seeding Contractor must be experienced and specialized in seeding the respective species as determined by the Engineer. He/she shall properly supervise a competent staff. The Contractor must have the necessary equipment to complete this task.
- C. Maintenance Services: Shall be provided by the Contractor for up to one year to guarantee establishment of growth.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable.
- C. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

1.9 MAINTENANCE SERVICE

- A. Maintain seeded and sodded areas immediately after placement until grass is well established, exhibits a vigorous growing condition and is accepted by the Owner. Guarantee reseeding of bare areas for one year following acceptance.

1.10 COORDINATION

- A. Coordinate Work under provisions of Section 01 30 00 – Administrative Requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Topsoil:
 - 1. Topsoil: Imported, screened, friable loam; free of subsoil, roots, grass, excessive amount of weeds, stone, and foreign matter; acidity range (ph) of 5.5 to 7.5; containing a minimum of 4 percent and a maximum of 25 percent organic matter.
 - 2. Topsoil furnished from outside the project limits shall be approved by the Engineer.

- B. MDOT General Roadside Seed Mix, TGM (Turf Medium to Heavy Soil)

% by Weight	Common Name
10	Kentucky Blue Grass
20	Perennial Ryegrass
30	Hard Fescue
40	Creeping Red Fescue

Apply per MDOT standards and specifications, minimum 220 lb/acre

- C. Fertilizer:
 - 1. Apply 500 pounds per acre (12 pounds per 1000 square feet) of 12-12-12 commercial grade fertilizer or Engineer approved equivalent
- D. Mulch:
 - 1. Apply 1200 pounds per acre (28 pounds per 1000 square feet) small grain straw mulch that is clean and weed free on all seeded areas unless otherwise indicated.
 - 2. Apply tackifier to mulch according to manufacturer's recommendations as approved by the Engineer.
- E. Hydroseeding Mulching Material:
 - 1. Apply 1400 pounds/acre of Conwed Verdoyl #2000 with hydraulic seeder.
- F. Mulch Blankets:
 - 1. Install North American Green S75 as indicated on the plans or directed by the Engineer.
 - 2. Install all mulch blankets with wooden stakes. Stake according to manufacturer's recommendations as approved by the Engineer.
- G. Lime: ASTM C602, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent.
- H. Water: Clean, fresh and free of substances or matter capable of inhibiting vigorous growth of grass.

I. Stakes: Softwood lumber, chisel pointed.

2.2 SOURCE QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Testing, inspection and analysis requirements.
- B. Analyze to ascertain percentage of nitrogen, phosphorus, potash, soluble salt content, organic matter content, and pH value.
- C. Provide recommendation for fertilizer and lime application rates for specified seed mix as result of testing.
- D. Testing is not required when recent tests and certificates are available for imported topsoil. Submit these test results to testing laboratory. Indicate, by test results, information necessary to determine suitability.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify that prepared soil base is ready to receive the Work of this section and that the necessary excavation Work has been completed. See Section 32 91 19 - Landscape Grading and Section 31 23 16 – Excavation
- C. Disc and cultipack (roll) site to ensure a flat and firm seedbed.

3.2 FERTILIZING

- A. Apply lime at application rate recommended by soil analysis. Work lime into top 6 inches of soil.
- B. Apply fertilizer at application rate recommended by soil analysis.
- C. Apply after smooth raking of topsoil and prior to roller compaction.
- D. Do not apply fertilizer at same time or with same machine used to apply seed.
- E. Mix fertilizer thoroughly into upper 2 inches of topsoil.
- F. Lightly water soil to aid dissipation of fertilizer. Irrigate top level of soil uniformly.

3.3 SEEDING

- A. Daily seed and mulch all finished graded areas with approved seed mix.
- B. Apply mixes at the specified rates.

- C. Additional seeding is required until uniform growth of grass is established.
- D. Apply seed at rate specified above evenly in two intersecting directions. Rake in lightly.
- E. Do not seed areas in excess of that which can be mulched on same day.
- F. Do not sow when ground is too dry or when winds are over 12 mph.
- G. Immediately following seeding, apply mulch as specified.
- H. Apply water with fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.
- I. Seeding method:
 - 1. Hand broadcast native seed mix, and cover crop in designated areas. Mix seed with a lightweight inert material such as damp sawdust or vermiculite.
 - 2. For areas larger than 1 acre a mechanical planter, such as a Truax drill, may be used.
 - 3. Upon completion of seeding, rake or drag seed so that it is lightly covered with soil (approx. ¼ inch deep). The site should then be rolled to firm the seed into the soil. Approximately 25 percent of the seed should still be visible on the surface.
- J. Apply mulch or mulch blankets at specified rates of application evenly on prepared seedbed and maintain clear of trees and shrubs. Allow sunlight to penetrate mulch so as not to cover more than 70% of the soil surface or as directed by the Engineer.

3.4 MAINTENANCE

- A. Immediately reseed areas, which show bare spots.
- B. Repair any eroded areas and reseed immediately.
- C. Final payment will not be issued until a uniform growth of grass is established for period of one year on all areas disturbed as a result of the construction of this Project. A minimum of eighty percent of the species seeded shall be established prior to final payment.
- D. The Contractor shall be responsible for watering during the one year guarantee period.
- E. Monitor all seeded areas during site visits for water stress.
- F. The Contractor shall replace, at no cost to the Owner, all dead vegetation during the Guarantee period.
- G. Judgment of the plant's health will be the Engineers or the Owners.
- H. Protection from traffic and erosion in newly seeded areas is the responsibility of the Contractor. Safety fences and/or silt fences with appropriate signage may be used at the Contractor's expense until the grasses and flowers are fully established.

END OF SECTION

SECTION 33 05 13

MANHOLES AND STRUCTURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cast-in-place concrete manholes and structures with transition to cover frame, covers, anchorage, and accessories.
2. Modular precast concrete manholes and structures with tongue-and-groove joints and transition to cover frame, covers, anchorage, and accessories.
3. Masonry manhole and structure sections with masonry transition to cover frame, covers, anchorage, and accessories.
4. Doghouse manhole connections to existing storm sewer lines.
5. Bedding and cover materials.
6. Pile support systems.

B. Related Sections:

1. Section 03 10 00 - Concrete Forming and Accessories: Erection and bracing of forms.
2. Section 03 20 00 - Concrete Reinforcing: Execution requirements for reinforcing steel as required by this Section.
3. Section 03 30 00 - Cast-in-Place Concrete: Concrete type for manhole and structure foundation slab construction.
4. Section 31 23 16 - Excavation: Excavating for manholes, structures, and foundation slabs.
5. Section 31 23 23 - Fill: Backfilling after manhole and structure installation.
6. Section 33 05 13.13 - Manhole Grade Adjustment: Resetting existing castings and grates.
7. Section 33 41 13 - Public Storm Utility Drainage Piping: Piping connections to manholes and structures.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Manholes and Structures:

1. Basis of Measurement: At the unit price bid per each manhole, catch basin, flared end section, or inlet tee.
2. Basis of Payment: Includes all material, labor, and equipment necessary for trenching, backfilling, bedding, structure installation, connection to sewer piping, adjusting rings, castings, grates, and shop drawings. Catch basins, manholes, and inlet tees complete as shown on the plans and as stated in the specifications. When replacing an existing structure, includes reconnection of all existing pipes to proposed structure.

B. Conc. Manhole Collar:

1. Basis of Measurement: At the unit price bid per each as stated in the proposal.
2. Basis of Payment: Includes all material, labor, and equipment to provide approved MDOT concrete collar with thermoplastic molding, per the drawings on all manholes within the proposed paved road surface.

1.3 REFERENCE STANDARDS

- A. American Association of State Highway Transportation Officials:
 - 1. AASHTO M91 - Standard Specification for Sewer and Manhole Brick (Made from Clay or Shale).
 - 2. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
 - 3. AASHTO M306 - Standard Specification for Drainage, Sewer, Utility, and Related Castings.
- B. American Concrete Institute:
 - 1. ACI 530/530.1 - Building Code Requirements and Specification for Masonry Structures.
- C. ASTM International:
 - 1. ASTM A48 - Standard Specification for Gray Iron Castings.
 - 2. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 3. ASTM C32 - Standard Specification for Sewer and Manhole Brick (Made From Clay or Shale).
 - 4. ASTM C55 - Standard Specification for Concrete Building Brick.
 - 5. ASTM C361 - Standard Specification for Reinforced Concrete Low-Head Pressure Pipe.
 - 6. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.
 - 7. ASTM C497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.
 - 8. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures.
 - 9. ASTM C923 - Standard Specification for Resilient Connectors between Reinforced Concrete Manhole Structures, Pipes, and Laterals.

1.4 SUBMITTALS

- A. Product Data: Submit data for manhole covers, component construction, features, configuration, dimensions.
- B. Shop Drawings:
 - 1. Indicate structure locations and elevations.
 - 2. Indicate sizes and elevations of piping, conduit, and penetrations.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
- E. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- F. Qualifications Statements:
 - 1. Submit qualifications for manufacturer and installer.
 - 2. Submit manufacturer's approval of installer.

1.5 SUSTAINABLE DESIGN SUBMITTALS

1.6 QUALITY ASSURANCE

- A. Perform Work according to MDOT Standard Specifications for Construction, current edition.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.
- B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Comply with precast concrete manufacturer's instructions and ASTM C913 for unloading, storing, and moving precast manholes and drainage structures.
- D. Storage:
 - 1. Store precast concrete manholes and drainage structures to prevent damage to Owner's property or other public or private property.
 - 2. Repair property damaged from materials storage.

1.9 AMBIENT CONDITIONS

- A. Section 01 50 00 - Temporary Facilities and Controls: Requirements for ambient condition control facilities for product storage and installation.
- B. Cold Weather Requirements: Comply with ACI 530/530.1.

PART 2 - PRODUCTS

2.1 MANHOLES AND STRUCTURES

- A. Manhole and Structure Sections:
 - 1. Concrete: Barrel and conical top and flat top sections. (Nominal Diameters of 2' to 8')
 - a. Reinforced, precast concrete pipe section conforming to ASTM C-478.
 - b. Nominal diameter as indicated on the drawings.
 - c. Precast reinforced concrete base as indicated as drawing and approved by Engineer, or integral base.
 - d. Tongue and groove premium joints with o-ring gaskets or approved equal.

2.2 INLET TEES

- A. R.C.P. inlet tees are to be prefabricated by concrete pipe supplier, and shall be made of ASTM C-76 pipe with class matching that of the main line pipe onto which the inlet tee is being installed.
- B. H.P. storm inlet tees are to be H.P. storm welded bell tees conforming to ASTM 2881 and AASHTO M339 with gaskets meeting ASTM F477.

2.3 FRAMES AND COVERS

- A. Castings as indicated on the Drawings.

2.4 RISER RINGS

- A. Manufacturers:
 - 1. Furnish materials in accordance to MDOT Standard Specifications for Construction, current edition.
 - 2. Comply with ASTM C478

2.5 ACCESSORIES

- A. Geotextile Filter Fabric per Section 31 32 21 – Filter Fabric.
- B. Bedding/Backfill Materials: See Section 31 23 23 – Fill.

2.6 REINFORCING

- A. Steel reinforcing bars and mesh must comply with American Iron and Steel requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify that items provided by other Sections of Work are properly sized and located.
- C. Verify that built-in items are in proper location and are ready for roughing into Work.
- D. Verify correct size of manhole and structure excavation.

3.2 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.

- B. Mark each precast structure by indentation or waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers as indicated on Drawings to indicate its intended use.
- C. Coordinate placement of inlet and outlet pipe or duct sleeves required by other Sections.
- D. Do not install manholes and structures where Site conditions induce loads exceeding structural capacity of manholes or structures.
- E. Inspect precast concrete manholes and structures immediately prior to placement in excavation to verify that they are internally clean and free from damage; remove and replace damaged units.

3.3 INSTALLATION

- A. Excavation and Backfill:
 1. Excavate for manholes and structures as specified in Section 31 23 16 - Excavation and in indicated locations and depths.
 2. Provide clearance around sidewalls of manhole or structure for construction operations including placing backfill and placement of geotextile filter fabric.
 3. If groundwater is encountered, prevent accumulation of water in excavations; place manhole or structure in dry trench.
 4. Where possibility exists of watertight manhole or structure becoming buoyant in flooded excavation, anchor manhole or structure to avoid flotation, as approved by Architect/Engineer.
- B. Install manholes and structures supported at proper grade and alignment on crushed stone bedding as indicated on Drawings.
- C. Backfill excavations for manholes and structures as specified in Section 31 23 16 – Excavation and Section 31 23 23 - Fill.
- D. Form and place manhole or structure cylinder plumb and level, to correct dimensions and elevations.
- E. Cut and fit for pipe.
- F. Grout base of shaft sections to achieve slope to exit piping, trowel smooth, and contour to form continuous drainage channel as indicated on Drawings.
- G. Set cover frames and covers level to correct elevations without tipping.
- H. Precast Concrete Manholes and Structures:
 1. Lift precast components at lifting points designated by manufacturer.
 2. When lowering manholes and structures into excavations and joining pipe to units, take precautions to ensure that interior of pipeline and structure remains clean.
 3. Set precast structures, bearing firmly and fully on crushed stone bedding, compacted as specified in Section 31 23 16 - Excavation and Section 31 23 23 - Fill or on other support system as indicated on Drawings.
 4. Assembly:

- a. Assemble multi-section manholes and structures by lowering each section into excavation.
- b. Install rubber gasket joints between precast sections according to manufacturer's recommendations.
- c. Lower, set level, and firmly position base section before placing additional sections.
5. Remove foreign materials from joint surfaces and verify sealing materials are placed properly.
6. Maintain alignment between sections by using guide devices affixed to lower section.
7. Joint sealing materials may be installed on Site or at manufacturer's plant.
8. Verify that installed manholes and structures meet required alignment and grade.
9. Remove knockouts or cut structure to receive piping without creating openings larger than required to receive pipe; fill annular spaces with mortar.
10. Cut pipe flush with interior of structure.
11. Shape inverts through manhole and structures as indicated on Drawings.

I. Doghouse Manholes and Structures:

1. Stake out location and burial depth of existing sewer line in area of proposed manhole or structure.
2. Carefully excavate around existing sewer line to adequate depth for foundation slab installation.
3. Protect existing pipe from damage.
4. Cut out soft spots and replace with granular fill compacted to 95 percent maximum density.
5. Prepare crushed stone bedding or other support system, as indicated on Drawings, to receive foundation slab as specified for precast manholes and structures.
6. Install pre-cast concrete manhole or structure around existing pipe according to applicable Paragraphs in this Section.
7. Grout pipe entrances.
8. Block upstream flow at existing manhole or structure with expandable plug.
9. Use hydraulic saw to cut existing pipe at manhole or structure entrance and exit and along pipe length at a point halfway up the outside diameter on each side of the pipe.
10. Bottom half of pipe to remain as manhole flow channel.
11. Saw cut to smooth finish with top half of pipe flush with interior of manhole or structure.
12. Grout base of manhole or structure to achieve slope to manhole or structure channel.

J. Castings:

1. Set frames using mortar and masonry as indicated on Drawings.

3.4 FIELD QUALITY CONTROL

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.
- B. Test concrete manhole and structure sections according to ASTM C497.
- C. Vertical Adjustment of Existing Manholes and Structures:
 1. If required, adjust top elevation of existing manholes and structures to finished grades as indicated on Drawings.
 2. Frames, Grates, and Covers:
 - a. Carefully remove frames, grates, and covers cleaned of mortar fragments.

- b. Reset to required elevation according to requirements specified for installation of castings.
- 3. Reinforcing Bars:
 - a. Remove concrete without damaging existing vertical reinforcing bars if removal of existing concrete wall is required.
 - b. Clean vertical bars of concrete and bend into new concrete top slab or splice to required vertical reinforcement as indicated on Drawings.

END OF SECTION

SECTION 33 11 13

PUBLIC WATER UTILITY DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Underground pipe markers.
 - 2. Pipe support systems.
 - 3. Pile support systems.
 - 4. Bedding and cover materials.
 - 5. Pipe restraint.
 - 6. Pressure testing.

- B. Related Requirements:
 - 1. Section 03 20 00 - Concrete Reinforcing: Reinforcing steel and required supports for cast-in-place concrete.
 - 2. Section 03 30 00 - Cast-in-Place Concrete: Concrete for thrust restraints.
 - 3. Section 31 05 13 - Soils for Earthwork: Soils for backfill in trenches.
 - 4. Section 31 05 16 - Aggregates for Earthwork: Aggregate for backfill in trenches.
 - 5. Section 31 23 16 - Excavation: Product and execution requirements for excavation and backfill required by this Section.
 - 6. Section 31 23 17 - Trenching: Execution requirements for trenching required by this Section.
 - 7. Section 31 23 23 - Fill: Requirements for backfill to be placed by this Section.
 - 8. Section 33 05 23 - Trenchless Utility Installation: Waterline installation under roadways and other obstructions.
 - 9. Section 33 12 13 - Water Service Connections: Backflow prevention at water main.
 - 10. Section 33 12 16 - Water Utility Distribution Valves: Valves and valve boxes for fire hydrant and water main installation.
 - 11. Section 33 12 19 - Water Utility Distribution Fire Hydrants: Fire hydrants used in water main installations.
 - 12. Section 33 13 00 - Disinfecting of Water Utility Distribution: Disinfection of water piping.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Pipe and Fittings (Furnish and Install):
 - 1. Basis of Measurement: Included in the unit price bid for each water main lowering.
 - 2. Basis of Payment: Includes all associated labor, material and equipment, hand-trimming, excavation, pavement removal and replacement, bedding, backfilling, restoration, pipe and fittings, tracer wire, pigging, testing and complete installation as stated in the specifications and indicated on the drawings.

- B. Joint Restraints:
 - 1. Basis of Measurement: Included in the unit price bid for water main lowering.
 - 2. Basis of Payment: Includes all associated labor, material and equipment for joint restraint required for this project for a complete installation.

- C. Lower Existing Water Main:
 - 1. Basis of Measurement: At the unit price bid for each, as stated in the Proposal.
 - 2. Basis of Payment: All labor, excavation, exploratory excavation, materials, pipe and fittings, thrust blocks restraints, disinfection, sampling, testing and fill required for lowering existing water main for a complete installation.

1.3 REFERENCE STANDARDS

- A. American Society of Mechanical Engineers:
 - 1. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.
- B. ASTM International:
 - 1. ASTM A126 – Gray Iron Casting for Valves, Flange and Pipe Fittings.
 - 2. ASTM A536 – Standard Specification for Ductile Iron Castings.
 - 3. ASTM D2241 – Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
 - 4. ASTM D3035 – Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
 - 5. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
 - 6. ASTM F1674 – Standard Test Method for Joint Restraint Products for Use with PVC Pipe
 - 7. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- C. American Water Works Association:
 - 1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
 - 2. AWWA C105 - Polyethylene Encasement for Ductile-Iron Pipe Systems.
 - 3. AWWA C110 - Ductile-Iron and Gray-Iron Fittings.
 - 4. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - 5. AWWA C115 - Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
 - 6. AWWA C116 – Protective Fusion Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile Iron and Gray Iron Fittings for Water Supply Service.
 - 7. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast.
 - 8. AWWA C153 - Ductile-Iron Compact Fittings.
 - 9. AWWA C223 – Fabricated Steel and Stainless Steel Tapping Sleeves
 - 10. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances.
 - 11. AWWA C605 - Underground Installation of PVC and PVCO Pressure Pipe and Fittings.
 - 12. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution.
 - 13. AWWA C909 – Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe, 4 inch through 24 inch, for water, wastewater and reclaimed water service.
 - 14. NSF 14 – Plastic Piping System Components and Related Materials.
 - 15. NSF/ANSI – Standard 61 Drinking Water System Components.
 - 16. Michigan Safe Drinking Water Act 1976 PA 399, as amended.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

- B. Product Data: Submit data on pipe materials, pipe fittings, valves, and accessories.
- C. Shop Drawings: Indicate piping layout, including piping specialties.
- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- E. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- F. Submit certification of manufacture in U.S.A. for all products.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for closeout procedures.
- B. Project Record Documents:
 - 1. Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations.
 - 2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.6 QUALITY ASSURANCE

- A. Valves: Mark valve body with manufacturer's name and pressure rating.
- B. Perform Work according to Municipal, State, and Federal standards.
- C. Maintain one copy of each document on-site.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Deliver and store valves in shipping containers with manufacturer's labeling in place.
- C. Block individual and stockpiled pipe lengths to prevent moving.
- D. Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.
- E. Store polyethylene and PVC materials out of sunlight.

1.8 EXISTING CONDITIONS

- A. Field Measurements: Verify field measurements prior to fabrication. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 BUY AMERICAN CLAUSE

- A. All products shall be made in U.S.A.

2.2 WATER PIPING

- A. Ductile-Iron Pipe: AWWA C151, Bituminous Outside Coating: AWWA C151. Piper Mortar Lining: AWWA C104, double thickness, Polyethylene Encasement: AWWA C105.
 - 1. Pipe Class: AWWA C151, thickness Class 52.
 - 2. Fittings: Ductile Iron, AWWA C110, compact fittings AWWA C153.
 - a. Coating and Lining:
 - 1) Bituminous Coating: AWWA C110.
 - 2) Cement Motor Lining: AWWA C104, double thickness.
 - b. Bolts & Fasteners: NSS Cor-Blue "T" Bolts and fasteners or equal.
 - 3. Joints:
 - a. Mechanical and Push-on Joints: AWWA C111, nitrile gaskets.
 - b. Flanged Joints: AWWA C115 and ASME B16.1.
 - 4. Jackets: AWWA C105 polyethylene jacket.
 - 5. Standard Pipe Lengths: 20 feet with a maximum of 15 percent random lengths.
 - 6. Pipe wall: Shall be marked with pipe thickness class and AWWA markings for water main.
- B. PVC: AWWA C900, or AWWA C909, SDR 18, Class 235
 - 1. Fittings: Ductile iron, AWWA C110. compact fittings AWWA C153.
 - a. Coating and Lining:
 - 1) Bituminous Coating: AWWA C110.
 - 2) Cement Mortar Lining: AWWA C104, double thickness.
 - b. Bolts & Fasteners: Only NSS Core-Blue "T" Bolts and fasteners will be accepted.
 - 2. Joints: ASTM D3139, ASTM F477, PVC flexible elastomeric seals. Solvent-cement couplings are not permitted.
 - 3. Bolts & Fasteners: NSS Cor-Blue "T" bolts and fasteners or equal.
 - 4. Standard Pipe Lengths: 20 feet with a maximum of 15 percent random lengths not less than 10 feet.
 - 5. Pipe Wall: Shall be marked with NSF-pw or shall otherwise indicate conformance with ANSI/NSF Standards 14 and 61.

2.3 CORROSION PROTECTIVE MATERIAL

- A. Coatings: To be applied to buried nuts, bolts, threaded rod and flanges including those used for flanged, mechanical and restrained joints.
 - 1. Manufacturers:
 - a. San Chem, Inc. 1600 South Canal Street, Chicago, IL 60616
Product: NO-OXG-GG-2
 - b. Coronado Paint Product: Coal Tar Epoxy, 10 mil (DMT)
 - c. Or equal.
- B. Polyethylene Encasement: ANSI/AWWA C105/A21.5, 8 mil linear low-density polyethylene film or 4 mil high-density, cross-laminated polyethylene film. Encasement to be wrapped around all ductile iron pipes, fittings, valves and hydrants to within a foot of finish grade. Secure wrap in place according to manufacturer's instructions.

2.4 JOINT RESTRAINT

- A. Manufacturer: MEGALUG by EBAA Iron.
 - 1. Series 1100 for mechanical joints restraints on ductile iron pipe or equal.
 - 2. Series 1700 for push joint/bell restraints on ductile iron pipe or equal.
 - 3. Series 2000 PV for mechanical joint restraints on PVC pipe or equal.
 - 4. Series 1600 for push joint/bell restraints on PVC pipe or equal.
- B. Restrain all mechanical joints with retainer glands. Restrain all joints within lengths(s) according to restraint schedule.
- C. Restrain hydrants, tees, valves, etc. according to manufacturer's requirements for application soil type, trench detail, test pressure of 150 psi, safety factor of 2 and depth of bury.
- D. Mechanical joint restraint shall be incorporated into the design of the follower gland. The restraint mechanism shall consist of plurality of individually actuated gripping surfaces to maximize restraint capability. Glands shall be manufactured of ductile iron conforming to ASTM A536-80.

The gland shall be such that it can replace the standardized mechanical joint gland and can be used with the standardized mechanical joint bell conforming to ANSI/AWWA C111/A21.11 and ANSI/AWWA C153/A21.53 of latest version. Twist off nuts, sized same as tee-head bolts, shall be used to insure proper actuating of restraining devices.

The restraining glands shall have a pressure rating equal to that of the pipe on which it is used. The restraining glands shall have been tested to ASTM F1674, be listed by Underwriters Laboratories, and be approved by Factory Mutual. The restraint shall be MegaLug as manufactured by EBAA Iron or approved equal.

- E. Ductile iron pipe restraint shall consist of a wedge action restraint ring on the spigot joined to a ductile iron follower gland behind that bell. The restraint ring shall have individually actuated wedges that increase their resistance to pullout as pressure or external forces increase. The restraint ring and its wedging components shall be made of a minimum grade of 60-42-10 ductile iron conforming to ASTM A536. The wedges shall be heat-treated to a minimum hardness of 370 BHN. Torque limiting twist off nuts shall be used to insure proper actuation of the restraining wedges. The follower gland shall be made of a minimum grade of 60-42-10 ductile iron conforming to ASTM A536. The connecting tie rods that join the two rings shall be made of low alloy steel that conforms to ANSI/AWWA C111/A21.11. The assembly shall have a rated pressure, with a minimum two to one safety factor, of 350 psi in sizes sixteen inch and below and 250 psi in the sized eighteen inch through thirty-six inch. The product shall be the Series 1700 MegaLug restraint harness manufactured by EBAA Iron or approved equal.

Restraint for PVC pipe bell (AWWA C900) shall consist of the following. The restraint shall be manufactured of ductile iron conforming to ASTM A536. A split ring shall be utilized behind the pipe bell. A serrated ring shall be used to grip the pipe and a sufficient number of bolts shall be used to connect the bell ring and the gripping ring. The combination shall have a minimum working pressure rating of 150 psi. The restraint shall be approved by Factory Mutual. The restraint shall be the Series 1600 as manufactured by EBAA Iron, Inc. or approved equal.

Retainer glands for C909 pipe must be specifically manufactured for use with C909 products.

No foreign fittings or accessories will be allowed.

2.5 VALVES AND FIRE HYDRANTS

- A. Valves: As specified in Section 33 12 16 - Water Utility Distribution Valves.
- B. Tapping Sleeves and Valves in Section 33 12 16 – Water Utility Distribution Valves.
- C. Fire Hydrants: As specified in Section 33 12 19 - Water Utility Distribution Fire Hydrants.

2.6 AIR RELEASE VALVES

- A. The Contractor shall furnish and install an air release valve on the end of the water main as shown on the plan or as directed by the Engineer.
- B. The air release valve shall include furnish and installing the tapped plug, curb stop and box, copper pipe of sufficient length to extend to the existing ground elevation and any necessary adaptor fitting required.

2.7 VALVE BOXES

- A. As specified in Section 33 12 16 – Water Distribution Valves.

2.8 CONCRETE ENCASEMENT AND CRADLES

- A. Concrete: As specified in Section 03 30 00 - Cast-in-Place Concrete 3500 psi, 28-day reinforced concrete, air entrained, rough-trowel finish.
- B. Concrete Reinforcement: As specified in Section 03 20 00 - Concrete Reinforcing.
- C. Concrete Forming: As specified in Section 03 10 00 Concrete Forming Accessories.

2.9 MATERIALS

- A. Bedding and Cover:
 - 1. Bedding: Fill MDOT Class II Sand, as specified in Section 31 23 23 – Fill.
 - 2. Cover: Fill MDOT Class II Sand, as specified in Section 31 23 23 - Fill.
 - 3. Soil Backfill from above Pipe to Finish Grade:
 - a. MDOT Class II Sand, as specified in Section 31 23 23 Fill in areas under pavement, native material as specified in Section 31 05 13 Soils for Earthwork for native material for green belt areas.

2.10 FINISHES

- A. Steel: Galvanizing, ASTM A123; hot-dip galvanize after fabrication.

2.11 TRACER WIRE

- A. Single Strand – (Double Strand for HDD Only) - #12 Gauge Copper – Clad Steel (CCS) – Extra High Strength Hard Drawn.
- B. Color – Blue.

- C. As manufactured by Copperhead Industries, LLC or approved equal.
- D. Joints made using Locking Snakebite connectors as manufactured by Copperhead Industries.
- E. Tested for continuity prior to acceptance.
- F. Include slack for connections and bring to surface in Snake Pit magnetized tracer box. Model LD14TP with blue cover or approved equal.
- G. Install tracer box next to valve box. Secure tracer box to valve box using a minimum of two (2) stainless steel straps.

2.12 CULVERTS

- A. Culverts shall be of the following materials and specifications:
 6", 8", 10", 12", 15", 18" and 21" – 16 gage
 2/3" x 1/2" Corrugation, C.M.P.
 24" – 16 gage, 2 2/3"x1/2" Corrugation C.M.P.
 30" – 14 gage, 2 2/3"x1/2" Corrugation C.M.P.
 36" – 14 gage, 2 2/3"x1/2" Corrugation C.M.P.
 48" – R.C.P. C-76-III
 60" – R.C.P. C-76-III
- B. Culverts shall include flared metal end section or concrete flared end section, dimple connection bands, complete sand backfill, and restoration of shoulder and/or berm.

2.13 ACCESSORIES

- A. Concrete for Thrust Restraints: As specified in Section 03 30 00 - Cast-in-Place Concrete.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify that existing utility water main size, location, and invert are as indicated on Drawings.
- C. Verify that excavations are to required grade, dry and not over-excavated.

3.2 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.
- B. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs. Use only equipment specifically designed for pipe cutting. The use of chisels or hand saws is not permitted. Grind edges smooth with beveled end for push-on connections.
- C. Remove scale and dirt on inside and outside before assembly.

- D. Hand trim trench excavation to required elevations. Correct over excavation with compacted Type A material as specified in Section 31 23 23 – Fill at no additional cost. Remove large stones or other hard matter which could damage pipe.

3.3 BEDDING

- A. Excavate pipe trench as specified in Section 31 23 17 - Trenching. Hand trim excavation for accurate placement of pipe to elevations indicated on Drawings.
- B. Dewater excavations to maintain dry conditions and preserve final grades at bottom of excavation.
- C. Provide sheeting and shoring as specified in Section 31 23 17 - Trenching.
- D. Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 12 inches compacted depth; compact to 95 percent.

3.4 CONNECTION TO EXISTING WATER MAIN

- A. The Contractor shall connect the proposed water main to the existing water main as shown on the plans or as directed by the Engineer.
- B. The Contractor shall locate the existing water main prior to construction of the proposed water main and shall furnish and install the necessary fittings, including tees, bends, crosses, cutting-in-sleeves, pipe and/or adaptors as necessary to complete the construction.
- C. The Contractor shall be paid for the linear feet of water main installed at his bid price necessary to accomplish the connection.

3.5 CROSSING EXISTING UTILITIES

- A. Where gas mains and services, water mains and services, sewers or any underground utilities cross the trench in open cut, compacted sand backfill shall be required to bed the crossing line.
- B. The sand backfill shall extend to 4 inches above the top of the pipe or conduit which is being supported.
- C. In addition to the sand backfill it may be necessary to support the pipe crossing the trench with a 6"x6" timber with ends supported on solid earth at both sides of the trench.
- D. When supporting pipes with collars or bell joints, the timber shall be placed 3" below such collars or bells and the barrel of the pipe supported with hardwood blocking at 3 foot centers.
- E. The cost of sand backfill used for supporting cross trench piping and the timber supports shall be included in the unit price bid for water main.

3.6 BACKFILLING TRENCH NOT REQUIRING COMPLETE SAND BACKFILL

- A. As soon as the backfill has been brought to the original surface, the material in the trench shall be saturated with water by the method known as spiking, whereby water is forced into the backfill material through a 1" or larger nozzle-type pipe pushed into the backfill 3/4 of the distance from

the surface of the ground to the top of the pipe and allowing water to run until it appears at the surface, other than around the nozzle.

- B. This should be repeated at 6' to 10' intervals along the trench, depending upon the character of the soil.
- C. After saturation, the fill should be allowed to dry out before the backfilling is completed.
- D. Should a deficiency in the backfilling occur, in either quantity or quality of excavated materials taken from the trench, the Contractor shall supply the deficiency without extra charge to the Owner.
- E. No foreign nor perishable material shall be used in the backfilling.

3.7 MAINTAINING WATER SERVICE

- A. The Contractor shall coordinate any proposed interruptions in the existing water system with both the Owner and Engineer.
- B. If any portions of the existing water mains cannot remain in service due to construction of the proposed water mains, the Contractor shall extend a temporary 1-1/4-inch polyethylene service to each customer affected by the outage.
- C. The cost of these temporary connections, if required, shall be included in all other items of the Contract.
- D. Services shall be reconnected to the existing water main.

3.8 INSTALLATION

- A. Pipe:
 - 1. Install pipe according to AWWA C600 for D.I. pipe and AWWA C605 for PVC and PVCO and manufacturer's instructions.
 - 2. Handle and assemble pipe according to manufacturer's instructions and as indicated on Drawings.
 - 3. Install to the line and elevations shown on the drawings.
 - 4. Water Main shall have a minimum cover of 5'-6" from proposed finish grade. Unless shown otherwise on the drawings or directed by the Engineer.
 - 5. After the trench or tunnel has been graded, place a minimum 4 inches of compacted Type B, material, as specified in Section 31 23 23 - Fill in the trench as a bed for the pipe.
 - 6. Hand trim for bell and spigot pipe joints.
 - 7. Carefully lay the pipe on the bedding to insure positive bearing along the full length of the pipe.
 - 8. Place 4" of Granular MDOT Class II material along the side of the pipe, filling any void space under the pipe. Execute tamping with a T bar or other approved tamping device approved by the Engineer.
 - 9. Place additional tamped Granular MDOT Class II material along the side of the pipe to a height equal to the top of the pipe.
 - 10. Place and compact Granular MDOT Class II material to 12" above the top of the pipe.
 - 11. Restrain pipe and fittings as detailed on the drawings or as described in the specifications.
 - 12. Steel Rods, Bolt, Lugs, and Brackets: Corrosion control per 2.3 Corrosion Protective Material.

13. Maintain 10 feet horizontal separation of water main from sewer piping according to 10 State Standards.
14. Install pipe to indicated elevation to within tolerance of 5/8 inches.
15. Install ductile-iron piping and fittings according to AWWA C600.
16. Flanged Joints: Not to be used in underground installations except within structures.
17. Route pipe in straight line. Relay pipe that is out of alignment or grade.
18. Install pipe with no high points. If unforeseen field conditions arise that necessitate high points, install air release valves as directed by Engineer.
19. Install pipe to have bearing along entire length of pipe. Excavate bell holes to permit proper joint installation. Do not lay pipe in wet or frozen trench.
20. Prevent foreign material from entering pipe during placement.
21. Install pipe to allow for expansion and contraction without stressing pipe or joints.
22. Close pipe openings with watertight plugs during work stoppages.
23. Install access fittings to permit disinfection of water system performed under Section 33 13 00 - Disinfecting of Water Utility Distribution.
24. Establish and verify elevations of buried piping and furnish a copy to the Engineer.

B. Valves and Hydrants:

1. Install valves as specified in Section 33 12 16 - Water Utility Distribution Valves.
2. Install hydrants as specified in Section 33 12 19 - Water Utility Distribution Fire Hydrants.

3.9 POLYETHYLENE ENCASEMENT

- A. Install in accordance with manufacturer's instructions and AWWA C105.
- B. Install to prevent contact between ductile iron pipe, fittings, valves and hydrants and the surrounding backfill and bedding material.
- C. Encasement is not intended to be a completely air tight nor water tight enclosure.
- D. Overlap joints a minimum of 18 inches and secure with adhesive tape or plastic string for the purpose of holding polyethylene in place until backfilling operations are complete.
- E. Encase valves up to the operating nut without interfering with valve operation.
- F. Encase hydrants to the grade line.
- G. Repair rips, punctures and other damage with adhesive tape or with a piece of polyethylene secured in place.

3.10 THRUST RESTRAINTS

- A. Provide valves, tees, bends, caps, and plugs with concrete thrust blocks. Pour concrete thrust blocks against undisturbed earth. Dry mix concrete will not be allowed. Locate thrust blocks at each elbow or change of pipe direction to resist resultant force and so pipe and fitting joints will be accessible for repair.
- B. Install clamps, setscrew retainer glands, or restrained joints. Protect metal-restrained joint components against corrosion per 2.3 Corrosion Protective Material. Do not encase pipe and fitting joints with concrete.

- C. Install thrust blocks, and joint restraint at dead ends of water main.

3.11 SERVICE CONNECTIONS

- A. Install service connections as specified in Section 33 12 13 - Water Service Connections.

3.12 BACKFILLING

- A. Backfill around sides and to top of pipe with cover fill in minimum lifts of 9 inches, tamp in place, and compact to 95 percent.
- B. Backfill around sides and to top of pipe as specified in Section 31 23 23 - Fill.
- C. Maintain optimum moisture content of bedding material to attain required compaction density.

3.13 DISINFECTION OF POTABLE WATER PIPING SYSTEM

- A. Flush and disinfect system as specified in Section 33 13 00 - Disinfecting of Water Utility Distribution.

3.14 FIELD QUALITY CONTROL

- A. Field inspection will be performed under provisions of Section 01 40 00- Quality Requirements.
- B. Compaction Testing for Bedding: According to ASTM D2922 and ASTM D6938.
- C. When test indicate Work does not meet specified requirements, remove Work, replace, and retest.
- D. Frequency of Compaction Tests: As determined by Engineer.

3.15 TESTING

- A. Pressure Leakage Test:
 - 1. Perform Hydrostatic pressure test per AWWA C600 for D.I. Pipe and AWWA C605 for C900 PVC and C909 PVCO.
 - 2. Procedure: Tests shall be performed only after the pipeline has been properly filled, flushed, and purged of air. The specified test pressure shall be applied by means of an approved pumping assembly connected to the pipe in a manner satisfactory to the purchaser. The test pressure shall not exceed the design pressure of the pipe, fittings, valves, or thrust restraints. If necessary, the test pressure shall be maintained by additional pumping for the specified time. During tests, the system and exposed pipe, fittings, valves, and hydrants shall be carefully examined for leakage. Visible leaks shall be stopped. Defective elements shall be required or removed and replaced and the test repeated until the test requirements have been met.
 - 3. Test Duration: The duration of the hydrostatic test shall be 2 hour.
 - 4. Test Pressure: The hydrostatic test pressure shall be 125 psi.
 - 5. Test Allowance: The testing allowance shall be defined at the quantity of water that must be supplied to the pipe section being tested to maintain a pressure within 5 psi (34 kPa) of the specified hydrostatic test pressure. No installation will be accepted if the quantity of makeup water is greater than that determined by the formula:

$$Q = \frac{LD\sqrt{P}}{148,000} \quad (\text{Eq 1})$$

Where:

- Q = quantity of makeup water, in gallons per hour
- L = length of pipe section being tested, in ft.
- D = Nominal Diameter of pipe in in.
- P = Gauge test pressure in psi

6. Allowance tables: Makeup water allowances for various pipe diameters and test pressures are provided in Table 2.
7. Hydrant: When hydrants are in the test section, the test shall be made against closed hydrant valves.
8. Visible leaks: Visible leaks shall be repaired, regardless of the amount of leakage.

Table 2 Hydrostatic test makeup water allowances per 1,000 ft (305 m) of PVC pipe* --gph†

Avg. Test Pressure		Nominal Pipe Diameter, in. (mm)													
psi	(kPa)	4 (100)	6 (150)	8 (200)	10 (250)	12 (300)	14 (350)	16 (400)	18 (450)	20 (500)	24 (610)	30 (760)	36 (915)	42 (1,070)	48 (1,220)
300	(2,070)	0.47	0.70	0.94	1.17	1.40	1.64	1.87	2.11	2.34	2.81	3.51	4.21	4.92	5.62
275	(1,900)	0.45	0.67	0.90	1.12	1.34	1.57	1.79	2.02	2.24	2.69	3.36	4.03	4.71	5.38
250	(1,720)	0.43	0.64	0.85	1.07	1.28	1.50	1.71	1.92	2.14	2.56	3.21	3.85	4.49	5.13
225	(1,550)	0.41	0.61	0.81	1.01	1.22	1.42	1.62	1.82	2.03	2.43	3.04	3.65	4.26	4.86
200	(1,380)	0.38	0.57	0.76	0.96	1.15	1.34	1.53	1.72	1.91	2.29	2.87	3.44	4.01	4.59
175	(1,210)	0.36	0.54	0.72	0.89	1.07	1.25	1.43	1.61	1.79	2.15	2.68	3.22	3.75	4.29
150	(1,030)	0.33	0.50	0.66	0.83	0.99	1.16	1.32	1.49	1.66	1.99	2.48	2.98	3.48	3.97
125	(860)	0.30	0.45	0.60	0.76	0.91	1.06	1.21	1.36	1.51	1.81	2.27	2.72	3.17	3.63
100	(690)	0.27	0.41	0.54	0.68	0.81	0.95	1.08	1.22	1.35	1.62	2.03	2.43	2.84	3.24
75	(520)	0.23	0.35	0.47	0.59	0.70	0.82	0.94	1.05	1.17	1.40	1.76	2.11	2.46	2.81
50	(340)	0.19	0.29	0.38	0.48	0.57	0.67	0.76	0.86	0.96	1.15	1.43	1.72	2.01	2.29

* If the pipeline under test contains sections of various diameters, makeup water allowance will be the sum of the test allowance for each size.

† To obtain makeup water allowance in liters per hour, multiply the values in the table by 3.79.

3.16 FILLING AND FLUSHING

- A. Lines shall be filled slowly with potable water at a maximum Velocity of 1 ft/sec (0.3 m/sec) while venting air. Precautions shall be taken to prevent entrapping air in the lines. After filling, lines shall be flushed at blowoffs and dead ends at a minimum velocity of 3 ft/sec (0.9 m/sec). A minimum of three changes of treated water shall be used in flushing operations. Valve shall be closed slowly to prevent excessive surges while maintaining positive pressure at all times throughout the new line. Flushing water shall be discharged without causing erosion damage, nuisance, or interruption of traffic. Disposal of flushing water shall be in accordance with SEC. 4.1.1.2 (AWWA C651). A special pipeline pig may be required when the required flushing velocity cannot be achieved or when needed to conserve water. The contractor shall make provisions for launching and retrieving the pig.

3.17 SCHEDULES

A. Pipe Restraint Table:

PIPE RESTRAINT SCHEDULE FOR GROUND BURIED PRESSURE PIPES ^{a b}							
LENGTH OF RESTRAINT REQUIRED ^c							
Deflection Angle	22 1/2	33 3/4	45	56 1/4	67 1/2	78 3/4	90 , tee or dead end
Pipe							
6"	8	12	16	20	25	31	59
8"	10	15	20	26	33	40	77
10"	12	18	25	32	40	49	93
12"	14	21	29	37	47	57	109
14"	16	24	33	41	54	66	125
16"	18	27	37	47	60	74	141
18"	20	30	41	53	67	82	157
20"	22	33	45	58	73	90	172
24"	25	39	53	68	85	105	202
30"	30	46	63	82	102	126	244
36"	35	54	74	95	119	146	283
42"	40	61	83	107	133	164	320
48"	44	67	92	118	148	181	356

^a This table is based on a test pressure of 150 PSI (Operating pressure + water hammer). For other test pressures, all values shall be increased or decreased proportionally.

^b Table is valid for depths of bury 5' or greater. For depths of bury less than 5', consult D.I.P.R.A. guidelines.

^c In each direction from point of deflection or termination, except for tee at which only the branch in the direction of the tee stem.

END OF SECTION

SECTION 33 12 13

WATER SERVICE CONNECTIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Pipe and fittings for domestic water service connections to buildings.
 - 2. Corporation stop assembly.
 - 3. Curb stop assembly.
 - 4. Bedding and cover materials.

- B. Related Requirements:
 - 1. Section 03 30 00 - Cast-In-Place Concrete.
 - 2. Section 31 05 13 - Soils for Earthwork.
 - 3. Section 31 05 16 - Aggregates for Earthwork.
 - 4. Section 31 23 16 - Excavation.
 - 5. Section 31 23 17 - Trenching.
 - 6. Section 31 23 23 - Fill.
 - 7. Section 33 05 13 - Manholes and Structures.
 - 8. Section 33 13 00 - Disinfecting of Water Utility Distribution

1.2 PRICE AND PAYMENT PROCEDURES

- A. Section 01 20 00 - Price and Payment Procedures Contract Sum/Price

- B. Copper Water Pipe and Fittings:
 - 1. Basis of Measurement: Included in the unit price bid for Relocate/Lower Existing Water Service.
 - 2. Basis of Payment: Includes all associated labor, material and equipment, hand trimming, pipe and fittings, excavation, bedding, backfilling and restoration for a complete installation as stated in the specifications and indicated on the drawings. All long side services shall be bored and be at right angles to roadway.

- C. Corporation and Saddle and Reconnect (Install Only, M-46):
 - 1. Basis of Measurement: At the unit price bid per each as stated in the Proposal.
 - 2. Basis of Payment: Includes all associated labor, investigation and equipment, tapping, corporation stop, reconnecting existing water service, excavation, bedding, backfilling, restoration for a complete installation as stated in the specifications and indicated on the drawings. **Corporation and Saddle and the appropriate size copper tubing (1" to 2") adaptors and fittings to be supplied by the Buena Vista Charter Township Water Department.**

- D. Relocate/Lower Existing Water Service:
 - 1. Basis of Measurement: Included in the unit price bid per each as stated in the proposal.
 - 2. Basis of Payment: Includes all labor, equipment, and material to relocated existing water service. Includes copper pipe to match existing size or ¾”, whichever is greater. Also includes new tap, corporation and saddle, curb stop box, connection to existing service, and repair to existing water main at old tap location.

- E. Reconnect Existing Water Service:
 - 1. Basis of Measurement: Included in the unit price bid per each for Corporation and Saddle (Install Only, M-46).
 - 2. Basis of Payment: Includes all associated labor, material and equipment, adaptors, fittings, excavation, bedding, backfilling, restoration, driveway pavement restoration, etc. for a complete installation.

1.3 REFERENCE STANDARDS

- A. American Society of Mechanical Engineers:
 - 1. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
 - 2. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings, Class 25, 125, 250 and 800.
 - 3. ASME B16.1 – Cast Iron Pipe Flanges and Flanged Fittings Class 25, 125, 250 and 800.
 - 4. ASME B16.26 – Cast Bronze Fittings for Flared Copper Tubes.

- B. ASTM International:
 - 1. ASTM A48/A48M - Standard Specification for Gray Iron Castings.
 - 2. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings.
 - 3. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
 - 4. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 - 5. ASTM D6938- Standard Test Method for Water Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 - 6. ASTM F-477 – Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

- C. American Water Works Association:
 - 1. AWWA C153- Ductile Iron Compact fittings, 3 inch through 24 inch and 54 inch through 64 inch for water service.

- D. NSF:
 - 1. NSF/ANSI Standard 61 Drinking Water System Components.
 - 2. Michigan Safe Drinking Water Act 1976 PA 399, as amended.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

- B. Product Data: Submit data on pipe materials, pipe fittings, corporation stop assemblies, curb stop assemblies, meters, meter setting equipment, service saddles, backflow preventer, and accessories.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations of piping mains, curb stops, connections, thrust restraints, and invert elevations.
- C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with Municipal, State, and Federal standards.
- B. Maintain one copy of each document on site.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. During loading, transporting, and unloading of materials and products, exercise care to prevent any damage.
- C. Store products and materials off ground and under protective coverings and custody, away from walls and in manner to keep these clean and in good condition until used.
- D. Exercise care in handling precast concrete products to avoid chipping, cracking, and breakage.

PART 2 - PRODUCTS

2.1 BUY AMERICAN CLAUSE

- A. All materials shall be made in the U.S.A.

2.2 WATER PIPING AND FITTINGS

- A. Copper Tubing: Type K, annealed: 3/4 inch diameter.
 - 1. Fittings: ASME B16.26, cast bronze.
 - 2. Joints: Flared.
 - 3. Unions: Mueller H-15403 or equal
 - 4. NSF 61-G

2.3 CORPORATION STOP ASSEMBLY

- A. Manufacturers:
 - 1. Mueller Company or equal
 - 2. NSF 61-G
- B. Furnish materials in accordance with Municipal standards.

- C. Corporation Stops:
 1. Mueller B-25000 or equal
 2. AWWA (CC) taper thread/flare fittings.
 3. NSF 61-G
- D. Service Saddles:
 1. PowerSeal Pipeline Products, Model 3417AS or equal
 2. AWWA (CC) threads.

2.4 CURB STOP ASSEMBLY

- A. Manufacturers:
 1. Mueller or equal
 2. NSF 61-G
- B. Furnish materials in accordance with Municipal standards.
- C. Curb Stops:
 1. Mueller B-25204 or equal
 2. Flare/Flare
- D. Curb Boxes and Covers:
 1. Bingham & Taylor – Eclipse E-100 with Type B, two-hole lid marked “water” or equal
 - a. Cast Iron, 1” upper, adjustable with brass ring
 - b. Cast iron arch-pattern base
 2. 1/2” Stainless Steel Rod
 - a. A.Y. McDonald model 5660SS or equal
 - b. 48” with locking pin

2.5 ACCESSORIES

- A. Concrete for Thrust Restraints: Concrete type specified in Section 03 30 00.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify building service connection and municipal utility water main size, location, and invert are as indicated on Drawings.

3.2 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.
- B. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.

- C. Remove scale and dirt on inside and outside before assembly.
- D. Prepare pipe connections to equipment with flanges or unions.

3.3 INSTALLATION - CORPORATION STOP ASSEMBLY

- A. Make connection for each different kind of water main using suitable materials, equipment and methods approved by the Engineer.
- B. Provide service clamps for mains other than of cast iron or ductile iron mains.
- C. Screw corporation stops directly into tapped and threaded water mains at 10 and 2 o'clock position on main's circumference; locate corporation stops at least 24 inches apart longitudinally and staggered.
- D. For plastic pipe water mains, provide full support for service clamp for full circumference of pipe, with minimum 2 inches width of bearing area; exercise care against crushing or causing other damage to water mains at time of tapping or installing service clamp or corporation stop.
- E. Use proper seals or other devices so no leaks are left in water mains at points of tapping; do not backfill and cover service connection until approved by the Engineer.

3.4 BEDDING

- A. Excavate pipe trench in accordance with Section 31 23 17 – Trenching for Work of this Section.
- B. Place bedding material at trench bottom, level fill materials in one continuous layer of at least 4 inches compacted depth; compact to 95 percent.
- C. Backfill around sides and to top of pipe in accordance with Section 31 23 23.
- D. Place fill material in accordance with Section 31 23 23.

3.5 INSTALLATION - PIPE AND FITTINGS

- A. Route pipe in straight line.
- B. Install pipe to allow for expansion and contraction without stressing pipe or joints.
- C. Install access fittings to permit disinfection of water system performed under Section 33 13 00.
- D. Form and place concrete for thrust restraints at each elbow or change of direction of pipe main.
- E. Establish elevations of buried piping with not less than 5.5 ft. of cover.
- F. Backfill trench in accordance with Section 31 23 23 - Fill.
- G. Install Work in accordance with Municipal standards.

3.6 INSTALLATION - CURB STOP ASSEMBLY

- A. Set curb stops on 4" Type A MDOT 6A compacted crushed limestone material as specified in Section 31 23 23 – Fill.
- B. Center and plumb curb box over curb stops. Set box cover flush with finished grade.

3.7 MAINTAINING WATER SERVICE

- A. The Contractor shall coordinate any proposed interruptions in the existing water system with both the Owner and Engineer.
- B. If any portions of the existing water mains cannot remain in service due to construction of the proposed water mains, the Contractor shall extend a temporary 1-1/4" polyethylene service to each customer affected by the outage.
- C. The cost of these temporary connections, if required, shall be included in all other items of the Contract.
- D. Services shall be reconnected to the existing water main.

3.8 SERVICE CONNECTIONS

- A. Work shall include all material for complete operation.
- B. This work shall not begin until the proposed main has been tested, disinfected, accepted by the Engineer and is in operation.
- C. Services shall pass visual inspection by the Engineer, under system pressure prior to backfilling.
- D. Install water service to ROW line. Connect to existing water service.

3.9 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Flush and disinfect system in accordance with Section 33 13 00.

3.10 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Requirements for inspecting, testing.
- B. Compaction Testing for Bedding: In accordance with ASTM D2922 and ASTM D3017.
- C. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- D. Frequency of Compaction Tests: Taken at the discretion of the Engineer.

END OF SECTION

SECTION 33 12 16

WATER UTILITY DISTRIBUTION VALVES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Valves.
 - 2. Valve boxes.

- B. Related Sections:
 - 1. Section 03 30 00 - Cast-In-Place Concrete.
 - 2. Section 31 05 16 - Aggregates for Earthwork.
 - 3. Section 31 23 16 - Excavation.
 - 4. Section 31 23 23 - Fill.
 - 5. Section 33 12 13 - Water Service Connections.
 - 6. Section 33 12 19 - Water Utility Distribution Fire Hydrants.
 - 7. Section 33 13 00 - Disinfecting of Water Utility Distribution.

1.2 REFERENCES

- A. American Water Works Association:
 - 1. AWWA C515 – Reduced-Wall, Resilient – Seated Gate Valves for Water Supply Service.
 - 2. AWWA C550 - Protecting Epoxy Interior Coating for Valves and Hydrants.
 - 3. ASTM D3139 – Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
 - 4. ASTM A126 – Gray Iron Casting for Valves, Flange and Pipe Fittings.
 - 5. AWWA C105 – Polyethylene Easement for Ductile Iron Pipe Systems.
 - 6. AWWA C111 – Rubber Gasket Joints for Ductile Iron Pressure Fittings.
 - 7. AWWA C116 – Protective Fusion Bonded Epoxy Coatings for the Interior and Exterior Surfaces for Ductile Iron and Gray Iron Fittings for Water Supply Service.
 - 8. AWWA C153 – Ductile Iron Compact fittings, 3 inch through 24 inch and 54 inch through 64 inch for water service.
 - 9. AWWA C104 – Cement-Mortar Lining for Ductile-Iron Pipe and Fitting for Water.
 - 10. AWWA C550 – Protective Interior Coatings for Valves and Hydrants.
 - 11. Michigan Safe Drinking Water Act 1976 PA 399, as amended.

- B. National Sanitation Foundation:
 - 1. NSF14 – Plastic Piping System Components and Related Materials.
 - 2. NSF 61 - Drinking Water System Components - Health Effects

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

- B. Shop Drawing:
 - 1. Installation Plan: Submit description of proposed installation.

- C. Design Data: Submit manufacturer's latest published literature include illustrations, installation instructions, maintenance instructions and parts lists.
- D. Manufacturer's Certificates: Submit Statement of Compliance, supporting data, from material suppliers attesting that valves and accessories provided meet or exceed AWWA Standards and specification requirements.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations of valves.
- C. Provide Operation and Maintenance Data for valves.

1.5 QUALITY ASSURANCE

- A. Perform work in accordance with Municipal, State and federal standards.

1.6 QUALIFICATIONS

- A. Manufacturer: company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum 3 years documented.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing and protecting products.
- B. Prepare valves and accessories for shipment according to AWWA Standards and seal valve and ends to prevent entry of foreign matter into product body.
- C. Store products in areas protected from weather, moisture, or possible damage; do not store products directly on ground; handle products to prevent damage to interior or exterior surfaces.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface or subsurface structures or utilities, and landscape in immediate or adjacent areas.

1.9 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

- B. Coordinate work with Richland Township's standards and utilities within construction area.

1.10 MAINTENANCE MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for maintenance materials.
- B. Furnish one tee wrench to Owner; required length.

PART 2 - PRODUCTS

2.1 BUY AMERICAN CLAUSE

- A. All products shall be made in U.S.A.

2.2 RESILIENT WEDGE GATE VALVES

- A. Manufacturers:
 1. EJIW
 2. Mueller
 3. or Equal
- B. Resilient Wedge Gate Valves: AWWA C515; iron body, bronze or ductile iron; including the manufacturer's name, pressure rating, and year of fabrication cast into valve body.
 1. Resilient seats.
 2. Single Wedge
 3. Stem: Non-rising bronze stem, bronze trim.
 4. Operating Nut: 2 inch Square; open Left (counter clockwise) unless otherwise indicated, painted black.
 5. Ends: Mechanical joint.
 6. Coating: AWWA C550; interior/exterior.
 7. Sizes 12 inch diameter and smaller: 200 psig.
 8. Sizes 16 inch diameter and larger: 150 psig.
 9. Direction of Opening: Indicated by an arrow cast on the operating nut skirt.

2.3 VALVE BOXES

- A. Manufacturers:
 1. Mueller
 2. EJIW
 3. Bibby
 4. Or Equal
- B. Valve Boxes:
 1. Cast Iron 5 1/2 inch diameter, three piece adjustable screw type, for installation of a 6 foot trench.
 2. Valve box extensions for trench depths greater than 6'-6".
 3. No. 6 round base for gate valves up to 8".

4. No. 160 oval base for valves 10" and greater.
5. Cast iron lid, marked "Water".

2.4 ACCESSORIES

- A. Concrete for Thrust Restraints: Concrete type specified in Section 03 30 00
- B. Valve Box Aligner: High-strength, plastic device designed to automatically center valve box base and prevent valve box base from shifting off center during backfilling.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Determine exact location and size of valves from Drawings; obtain clarification and directions from Architect/Engineer prior to execution of work.
- C. Verify invert elevations of existing utilities prior to excavation and installation of valves.

3.2 PREPARATION

- A. Identify required lines, levels, contours and datum locations.
- B. Locate, identify, and protect utilities to remain from damage.
- C. Do not interrupt existing utilities without permission and without making arrangements to provide temporary utility services.
 1. Notify Engineer not less than 3 days in advance of proposed utility interruption.
 2. Do not proceed without written permission from the Engineer.
- D. Perform trench excavation, backfilling and compaction in accordance with Section 31 23 17.

3.3 INSTALLATION VALVES

- A. Install valves in conjunction with pipe laying; set valves plumb.
- B. Tighten nuts on valve body.
- C. Set plumb on 4"x8"x16" concrete block. Use larger blocks for larger valves.
- D. Backfill with Type A MDOT 6A compacted crushed limestone material as specified in Section 31 23 23 - Fill to a minimum of 2 inches above the flange of the valve dome.
- E. Leave valves in the open position except for the valves that connect to the existing water main.

3.4 INSTALLATION – VALVE BOXES

- A. Set base on Type A MDOT 6A compacted crushed limestone material as specified in Section 31 23 23 – Fill a minimum of 2 inches above the flange on the valve dome and centered over the operating nut. Backfill to finish subgrade according to Section 31 23 23 – Fill.
- B. Set box plumb and centered over the valve operating nut.
- C. Adjust the top valve box to match proposed finish grade.
- D. Install extensions for trench depth greater than 6’-6”.

3.5 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Flush and disinfect system in accordance with Section 33 13 00.

3.6 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements Field inspecting, testing, adjusting, and balancing.
- B. Perform pressure test on domestic site water distribution system in accordance with AWWA C600.

3.7 POLYETHYLENE ENCASEMENT

- A. Install in accordance with manufacturer’s instructions and AWWA C105.
- B. Install to prevent contact between ductile iron pipe, fittings, valves and hydrants and the surrounding backfill and bedding material.
- C. Encasement is not intended to be a completely air tight nor water tight enclosure.
- D. Overlap joints a minimum of 18 inches and secure with adhesive tape or plastic string for the purpose of holding polyethylene in place until backfilling operations are complete.
- E. Encase valves up to the operating nut without interfering with valve operation.
- F. Encase hydrants to the grade line.
- G. Repair rips, punctures and other damage with adhesive tape or with a piece of polyethylene secured in place.

END OF SECTION

SECTION 33 12 19

WATER UTILITY DISTRIBUTION FIRE HYDRANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fire hydrants.
- B. Related Sections:
 - 1. Section 03 30 00 - Cast-In-Place Concrete.
 - 2. Section 31 23 16 – Excavation.
 - 3. Section 31 23 17 – Trenching.
 - 4. Section 31 23 23 – Fill.
 - 5. Section 33 12 13 - Water Service Connections.
 - 6. Section 33 12 16 - Water Utility Distribution Valves.
 - 7. Section 33 13 00 - Disinfecting of Water Utility Distribution.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Fire Hydrants:
 - 1. Basis of Measurement: At the unit price bid per each as stated in the Proposal.
 - 2. Basis of Payment: Includes all associated labor, material, and equipment; hand trimming, excavation, bedding, backfilling, blocking, and extensions for hydrants over 6’-6” bury, polyethylene wrap, marking flags, restoration, etc. for a complete installation.
- B. Remove Existing Hydrant:
 - 1. Basis of Measurement: At the unit price bid per each hydrant removed as stated in the Proposal.
 - 2. Basis of Payment: Includes all associated labor, material, equipment, excavation, backfilling, compaction, plugging/capping at existing water main, removal of hydrant and auxiliary valve, disposal and/or transportation to Owner’s designated site, restoration etc., for a complete installation.
- C. Relocate and Reset Existing Hydrant:
 - 1. Basis of Measurement: At the unit price bid per each as stated in the proposal.
 - 2. Basis of Payment: Includes all labor, equipment, and material to remove and salvage existing hydrant, as well as reinstalling hydrant at the new location shown on the plans or as directed in the field. Coordinate with Richland Township DPW to determine if hydrant shall be salvaged or removed prior to performing the work. If hydrant is to be removed and replaced with new, Contractor will get paid for the removal of existing hydrant and fire hydrant pay items in lieu of relocate and reset existing hydrant pay item.

1.3 REFERENCES

- A. American Water Works Association:

1. AWWA C502 - Dry-Barrel Fire Hydrants.
2. AWWA C550 - Protecting Epoxy Interior Coating for Valves and Hydrants.
3. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.

B. National Sanitation Foundation:

1. NSF 61 - Drinking Water System Components - Health Effects

C. National Fire Protection Association:

1. NFPA 281 - Recommended Practice for Fire Flow Testing and Marking of Hydrants

D. Michigan Safe Drinking Water Act 1976 PA 399, as amended.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Shop Drawing:

1. Installation Plan: Submit description of proposed installation.

C. Design Data: Submit manufacturer's latest published literature include illustrations, installation instructions, maintenance instructions and parts lists.

D. Manufacturer's Certificates: Submit Statement of Compliance, supporting data, from material suppliers attesting that hydrants and accessories provided meet or exceed AWWA Standards and specification requirements.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Record actual locations of fire hydrants.

C. Provide Operation and Maintenance Data for fire hydrants.

1.6 QUALITY ASSURANCE

A. Provide uniform color scheme for fire hydrants in accordance with Municipal standards.

B. Perform work in accordance with Municipal standards.

1.7 QUALIFICATIONS

A. Manufacturer: company specializing in manufacturing Products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing work of this section with minimum 3 years documented.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing and protecting products.
- B. Prepare hydrants and accessories for shipment according to AWWA Standards and seal hydrant and ends to prevent entry of foreign matter into product body.
- C. Store products in areas protected from weather, moisture, or possible damage; do not store products directly on ground; handle products to prevent damage to interior or exterior surfaces.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface or subsurface structures or utilities, and landscape in immediate or adjacent areas.

1.10 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate work with Richland Township's standards and utilities within construction area.

PART 2 - PRODUCTS

2.1 BUY AMERICAN CLAUSE

- A. All products shall be Made in U.S.A.

2.2 FIRE HYDRANTS

- A. Manufacturers:
 - 1. EJIW Water Master 5CD250 or equal.
- B. Furnish materials in accordance with Municipal, State, and Federal standards.
- C. Dry-barrel Break-away Type: AWWA C502; for 150 pounds working pressure, opening with the line pressure, mechanical joints, cast-iron body, compression type valve.
 - 1. Bury Depth: As indicated on the Drawings.
 - 2. Inlet Connection: 6 inches.
 - 3. Valve Opening: 5-1/4 inches diameter.
 - 4. Ends: Mechanical Joint.
 - 5. Bolts and Nuts: 304 Stainless steel
 - 6. Coating: AWWA C550; interior.
 - 7. Direction of Opening: Left (counter clockwise) turn opening accordance with Municipal standards unless otherwise indicated and shall be plainly marked with an arrow near the operating nut showing the opening direction.

8. Operating Nut: Pentagon, 1 1/2" point to flat.
9. Bronze mounted throughout with no iron to iron or steel contacts or threads.
10. Operating stem in base and valve seat shall be bronze.
11. Iron parts of high strength gray iron conforming ASTM Designation A-126 Class B.
12. Minimum inside barrel dimension of 7 1/4" inches.
13. Completely assembled at factory with drain opening sealed with threaded plug.

D. Two 2 1/2" NST hose nozzles, one 4 1/2" NST pumper nozzle.

E. Finish: Primer and two coats of enamel painted red above grade line and black below, color in accordance with the Municipal standards.

F. Provide proper length for installation in a trench depth as indicated on the drawings.

G. Tested to 300 pounds hydrostatic pressure from inlet side with valve in both open and closed position.

H. Designed so one man can easily remove or replace the working parts without removing the main valve seat.

2.3 ACCESSORIES

A. Concrete for Thrust Restraints: Concrete type specified in Section 03 30 00.

B. Aggregate: Aggregate for hydrant drainage specified in Section 31 05 16.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

B. Determine exact location and size of hydrants from Drawings; obtain clarification and directions from Engineer prior to execution of work.

C. Verify invert elevations of existing utilities prior to excavation and installation of fire hydrants.

3.2 PREPARATION

A. Identify required lines, levels, contours and datum locations.

B. Locate, identify, and protect utilities to remain from damage.

C. Do not interrupt existing utilities without permission and without making arrangements to provide temporary utility services.

1. Notify Engineer not less than 3 business days in advance of proposed utility interruption.

2. Do not proceed without written permission from the Engineer.

D. Perform trench excavation, backfilling and compaction in accordance with Section 31 23 17.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Set as plan location and grade as directed by the Engineer.

C. Set on concrete block with minimum dimensions of 4 inches by 8 inches by 16 inches.

D. Restrain as detailed on the plans.

E. In addition in blocking, restrain hydrants with MugaLugs as specified for mechanical joints in 33 11 13.

F. Set plumb.

G. Rotate up to 180 degrees to face the direction shown on the plans.

H. Set only when the Engineer is present.

I. Obtain approval of the Engineer prior to backfilling.

J. Backfill according to Section 31 23 23 - Fill.

3.4 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Flush and disinfect system in accordance with Section 33 13 00.

3.5 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. Perform pressure test on domestic site water distribution system in accordance with AWWA C600 and/or C605.

3.6 RELOCATING EXISTING HYDRANTS

A. Relocate existing hydrants as noted on the drawings.

B. Remove hydrant, horizontal pipe lead and hydrant valve and box.

C. Plug and block existing water main at hydrant tee.

D. Re-install hydrant and valve according to paragraphs 3.3 and Section 33 12 16 Water Utility Distribution Valves.

E. Replace or repair material damaged during relocation operation.

F. Furnish and install additional material required to complete relocation.

3.7 REMOVING EXISTING HYDRANTS

- A. Remove hydrant, horizontal pipe lead and hydrant valve and box.
- B. Return existing hydrants and valves to location designated by the Owner.
- C. Plug and Block existing water main at hydrant tee.
- D. Replace or repair material damaged during removal operation.
- E. Furnish and install additional material required to complete removal.

3.8 POLYETHYLENE ENCASEMENT

- A. Install in accordance with manufacturer's instructions and AWWA C105.
- B. Install to prevent contact between ductile iron pipe, fittings, valves and hydrants and the surrounding backfill and bedding material.
- C. Encasement is not intended to be a completely air tight nor water tight enclosure.
- D. Overlap joints a minimum of 18 inches and secure with adhesive tape or plastic string for the purpose of holding polyethylene in place until backfilling operations are complete.
- E. Encase valves up to the operating nut without interfering with valve operation.
- F. Encase hydrants to the grade line.
- G. Repair rips, punctures and other damage with adhesive tape or with a piece of polyethylene secured in place.

END OF SECTION

SECTION 33 13 00

DISINFECTING OF WATER UTILITY DISTRIBUTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes disinfection of potable water distribution and transmission system; and testing and reporting results.
- B. Related Sections:
 - 1. Section 33 11 13 – Public Water Utility Distribution Piping Product and Execution requirements for installation, testing, of public domestic water distribution piping.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Disinfection:
 - 1. Basis of Measurement: Included in the unit price bid for each Water Main Lowering.
 - 2. Basis of Payment: Includes all associated labor, material and equipment for cleaning and disinfecting water main required for the project for a complete installation.

1.3 REFERENCES

- A. American Water Works Association:
 - 1. AWWA B300 - Hypochlorites.
 - 2. AWWA B301 - Liquid Chlorine.
 - 3. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.
 - 4. AWWA C605 – Underground Installation of Polyvinyl Chloride (PVC).
 - 5. AWWA C651 - Disinfecting Water Mains
 - 6. NSF – Plastic Piping System Components and Related Materials.
 - 7. NSF/ANSI Standard 61 Drinking Water System Components
 - 8. Michigan Safe Drinking Water Act 1976 PA 399, as amended.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit procedures, proposed chemicals, and treatment levels for review.
- C. Test Reports: Indicate results comparative to specified requirements.
- D. Certificate: Certify cleanliness of water distribution system meets or exceeds MDEQ requirements.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with AWWA C651.
- B. Maintain one copy of each document on site.

1.7 QUALIFICATIONS

- A. Water Treatment Firm: Company specializing in disinfecting potable water systems specified in this section with minimum three years documented experience.
- B. Submit bacteriologist's signature and authority associated with testing.

PART 2 - PRODUCTS

2.1 DISINFECTION CHEMICALS

- A. Chemicals: AWWA B300, Hypochlorite, AWWA B301 and Liquid Chlorine.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify piping system has been cleaned, inspected, and pressure tested.
- C. Perform scheduling and disinfecting activity with start-up, water pressure testing, adjusting and balancing, demonstration procedures, including coordination with related systems.
- D. Sampling for water main lowering's use AWWA C-651, Section 5.1.1.1, Option A.

3.2 INSTALLATION

- A. Inject disinfectant, chlorine solution, through a corporation cock inserted in the horizontal axis of the water main.
- B. Inject at the beginning of the pipe line or a valved section.
- C. Slowly fill the line with potable water from the existing distribution line.
- D. Bleed water from a valve at the end of the line to ensure distribution and prevent pressure build up in excess of 20 psi.

- E. Inject disinfectant, chlorine solution, to obtain a minimum initial residual concentration of 40 to 50 mg/l in accordance with AWWA C651 "Continuous-Feed" method.
- F. Chlorine residual shall be checked with a proper residual test kit that can measure elevated chlorine residuals.
- G. Maintain disinfectant in pipe line for 24 hours and verify that the free chlorine residual concentration is no less than 10 mg/l.
- H. Flush disinfectant from pipe line. Contractor shall employ dechlorination methods before discharging into storm sewer, open drains, or over land. Dechlorinate flushing water per MDEQ requirements.
- I. Flushing shall continue until the chlorine residual in the disinfected main is absent or no higher than is normally found in the distribution system.
- J. Engineer, with assistance from the Contractor, will obtain samples for laboratory tests, a minimum of 24 hours after flushing the disinfectant from the pipeline.
- K. Do not place water mains into service until two (2) consecutive laboratory tests show safe results collected at least 24 hours apart.
- L. Repeat the complete disinfection process if laboratory results deem the water unsafe for drinking.
- M. Replace corporation cocks with brass plugs when the disinfection process is complete and water is determined safe for drinking.
- N. The use of chlorine pills or tables placed in the pipe during construction to be used in the disinfection process is prohibited.

3.3 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Disinfection, Flushing, and Sampling:
 1. Disinfect pipeline installation in accordance with AWWA C651. In addition, the use of chlorine pills or tables placed during construction will not be permitted.
 2. Upon completion of retention period required for disinfection, flush pipeline until chlorine concentration in water leaving pipeline is no higher than that generally prevailing in existing system or is acceptable for domestic use.
 3. Legally dispose of chlorinated water. When chlorinated discharge may cause damage to environment, apply neutralizing chemical to chlorinated water to neutralize chlorine residual remaining in water.

3.4 WATER COST

- A. The Contractor shall pay all water used during construction, including water main breaks and water necessary for testing, cleaning, and chlorinating water mains.

- B. The actual volume of water used shall be determined by the Engineer.
- C. The rate of pay for all water used shall be at the current rate per 1,000 gallons.
- D. The water necessary to fill the volume of the water main at the completion of the project shall be paid by the Owner.

END OF SECTION

SECTION 33 31 13

PUBLIC SANITARY UTILITY SEWERAGE PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sanitary sewerage pipe and fittings.
2. Wye branches and tees.
3. Sanitary laterals.
4. Bedding and cover materials.

B. Related Requirements:

1. Section 03 10 00 – Concrete Forming and Accessories.
2. Section 03 30 00 - Cast-In-Place Concrete: Concrete type for manhole base pad construction.
3. Section 03 60 00 - Grouting: Non-shrink grout.
4. Section 31 05 13 - Soils for Earthwork: Soils for backfill in trenches.
5. Section 31 05 16 - Aggregates for Earthwork: Aggregate for backfill in trenches.
6. Section 31 23 16 - Excavation: Product and execution requirements for excavation and backfill required by this Section.
7. Section 31 23 17 - Trenching: Execution requirements for trenching required by this Section.
8. Section 33 01 30.13 - Sewer and Manhole Testing: Pressure, infiltration, and deflection tests.
9. Section 33 05 13.16 - Public Manholes and Structures: Concrete manholes, frames, and grates for sanitary sewer.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Lower Existing Sanitary Sewer Service:

1. Basis of Measurement: Included in the unit price bid per each as stated in the Proposal.
2. Basis of Payment: Includes all associated labor, material, equipment, adapters, fittings, backfill, and excavation to the existing service lead as needed to install proposed storm sewer.

1.3 REFERENCE STANDARDS

A. American Association of State Highway and Transportation Officials:

1. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. ASTM International:

1. ANSI/ASTM D3033 – Type PSP Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
2. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
3. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.

4. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
5. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
6. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

1.4 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate Work of this Section with termination of sanitary sewer connection at the property line.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit manufacturer information indicating proposed materials, accessories, details,, and construction information.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Test and Evaluation Reports: Submit reports indicating field tests made and results obtained.
- E. Manufacturer Instructions:
 1. Indicate special procedures required to install specified products.
 2. Submit detailed description of procedures for connecting new sewer to existing sewer line and pipe jacking installation.
- F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- G. Qualifications Statements:
 1. Submit qualifications for manufacturer and installer.
 2. Submit manufacturer's approval of installer.

1.6 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Accurately record invert elevations and actual locations of pipe runs, connections, manholes, and cleanouts.
- C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.7 QUALITY ASSURANCE

- A. Perform Work according to Local, State, and Federal standards.

- B. Maintain one copy of each standard affecting Work of this Section on Site.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.
- B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience and approved by manufacturer.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Storage:
 - 1. Store materials according to manufacturer instructions.
 - 2. Store valves in shipping containers with labeling in place.
- D. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Block individual and stockpiled pipe lengths to prevent moving.
 - 3. Provide additional protection according to manufacturer instructions.
- E. Deliver and store valves in shipping containers with labeling in place.

1.10 EXISTING CONDITIONS

- A. Field Measurements:
 - 1. Verify field measurements and elevations are as indicated.

PART 2 - PRODUCTS

2.1 SEWER PIPE MATERIALS

- A. Plastic Pipe: ANSI/ASTM D3034, SDR 35, Type PSM Poly Vinyl Chloride (PVC) material; inside nominal diameter of 6, 8, 10, 12, 15 and 18 inches' rubber gasket joints. (Sewer 19' deep or less). Joint shall meet ASTM D3212. SDR26 for pipe deeper than 19'.

2.2 PIPE ACCESSORIES

- A. Fittings and Branch Connections: Same material and pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, wyes, cleanouts, reducers, traps and other configurations required.

2.3 MATERIALS

- A. Bedding and Cover:
 - 1. Bedding: Fill Type A as specified in Section 31 23 23.
 - 2. Cover: Fill Type B as specified in Section 31 23 23.
 - 3. Soil Backfill from Above Pipe to Finish Grade:
 - a. Soil Type B or D as specified in Section 31 23 23.

2.4 MIXES

- A. Grout: As specified in Section 03 60 00 - Grouting.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify that trench cut is ready to receive Work.
- C. Verify that excavations, dimensions, and elevations are as indicated on Drawings.

3.2 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.
- B. Hand trim excavations to required elevations, correct over-excavation with coarse aggregate. A1 as specified in Section 31 05 16 – Aggregates for Earth Work.
- C. Remove large stones or other hard materials that could damage pipe or impede consistent backfilling or compaction.
- D. Protect and support existing sewer lines, utilities, and appurtenances.
- E. Utilities:
 - 1. Maintain profiles of utilities.
 - 2. Coordinate with other utilities to eliminate interference.
 - 3. Notify Engineer if crossing conflicts occur.

3.3 INSTALLATION

- A. Bedding:
 - 1. Excavate pipe trench as specified in Section 31 23 17 - Trenching. Hand trim excavation for accurate placement of pipe to elevations indicated.

2. Excavate to lines and grades as indicated on Drawings, or as required to accommodate installation of encasement.
3. Dewater excavations to maintain dry conditions and to preserve final grades at bottom of excavation.
4. Provide sheeting and shoring as specified in Section 31 23 17 - Trenching.
5. Placement:
 - a. Place bedding material at trench bottom. Dig out for pipe bells.
 - b. Level materials in continuous layer not exceeding **6 inches** compacted depth.
 - c. Compact to 95 percent of maximum density.
 - d. Maintain optimum moisture content of bedding materials to attain required compaction density.

B. Piping:

1. Install pipe, fittings, and accessories according to ASTM D2321 for flexible pipe, and seal joints watertight.
2. Lay pipe to slope gradients as indicated on Drawings.
3. Maximum Variation from Indicated Slope: 1/16 inch.
4. Begin at downstream end and progress upstream.
5. Assemble and handle pipe according to manufacturer's instructions, except as may be modified on Drawings or by Engineer.
6. Keep pipe and fittings clean until Work has been completed and accepted by Engineer.
7. Cap open ends during periods of Work stoppage.
8. Lay bell and spigot pipe with bells upstream.
9. Polyethylene Pipe Encasement: Conform to AWWA C105.
10. Backfill and compact as specified in Section 31 23 17 - Trenching.
11. Do not displace or damage pipe when compacting.
12. Connect pipe to existing sewer system at existing manhole or using doghouse manhole connection.
13. Installation Standards: Install Work according to local, State and Federal standards.

C. Wye Branches and Tees:

1. Concurrent with pipe-laying operations, install wye branches and pipe tees at locations indicated on Drawings.
2. Use standard fittings of same material and joint type as sewer main.
3. Maintain minimum 5 ft separation distance between wye connection and manhole.
4. Use saddle wye or tee with stainless-steel clamps for taps into existing piping.
5. Mount saddles with solvent cement or gasket and secure with metal bands.
6. Lay out holes with template, and cut holes with mechanical cutter.

D. Sanitary Laterals:

1. Construct laterals from wye branch to terminal point at right-of-way.
2. Where depth of main pipeline warrants, construct riser-type laterals from wye branch.
3. Minimum Depth of Cover over Piping: 5 feet.
4. Minimum Separation Distance between Laterals: 5 feet.

- E. Backfilling:
 - 1. Backfill around sides and to top of pipe with cover fill in minimum lifts of 6 to 8 inches, tamp in place, and compact to 95 percent of maximum density.
 - 2. Maintain optimum moisture content of bedding material as required to attain specified compaction density.

3.4 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Requirements for inspecting and testing.
- B. Request inspection by Engineer prior to and immediately after placing bedding.
- C. Testing:
 - 1. If tests indicate that Work does not meet specified requirements, remove Work, replace, and retest.
 - 2. Perform testing on Site sanitary sewage system according to Municipal of standards.
 - 3. Compaction Testing:
 - a. Comply with Michigan one point cone method.
 - b. Testing Frequency: As directed by the Engineer.

3.5 PROTECTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION

SECTION 33 41 13

PUBLIC STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Storm drainage piping.
 - 2. Piping accessories.
 - 3. Drainage structures.
 - 4. Bedding and cover materials.
 - 5. Pile support systems.
 - 6. Pipe support systems.
 - 7. Concrete encasement and cradles.

- B. Related Sections:
 - 1. Section 03 20 00 - Concrete Reinforcing: Reinforcement of concrete cradles.
 - 2. Section 31 23 16 - Excavation: Product and execution requirements for excavation and backfill required by this Section.
 - 3. Section 31 23 17 - Trenching: Execution requirements for trenching required by this Section.
 - 4. Section 31 23 23 - Fill: Requirements for backfill to be placed by this Section.
 - 5. Section 33 05 13.16 - Public Manholes and Structures: Concrete manholes, frames and grates for storm drainage.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Storm Sewer:
 - 1. Basis of Measurement: At the unit price bid per linear foot as stated in the proposal.
 - 2. Basis of Payment: Includes all material, labor, and equipment necessary for trenching, dewatering, backfilling, bedding (both granular and crushed aggregate), pipe, installation, fittings, protection of buried lines and cables, premium joints, (where required) bitumastic compound, filter fabric, and accessories as stated in the specifications and indicated on the plans.

- B. 6 Inch Perforated Tile with Sock:
 - 1. Basis of Measurement: At the unit price bid per linear foot of perforated tile installed as stated in the proposal.
 - 2. Basis of Payment: Includes all material, labor, and equipment necessary for placing perforated tile with sock in trench and making all connections as necessary to install as shown on the drawings. Also includes connecting to the storm sewer manhole and manhole/catch basin as shown on the drawings. All trenching, dewatering, backfilling, bedding, and storm sewer installation shall be paid for in the storm sewer pay item.

- C. Lateral Tile Connections:
 - 1. Basis of Measurement: At the unit price bid per each as stated in the proposal.

2. Basis of Payment: Includes all associated labor, material and equipment, pipe and fittings, investigate and reconnect all existing tiles, sump leads, services leads, etc., less than 12" in diameter, for the project whether shown on the plans or located in the field for a complete installation for the project. Note: All connections to main lateral tile line sewer shall be made with ADS inserta tee fittings or Kor-N-Tee connections.
- D. Sewer, Rem:
1. Basis of Measurement: Included in the unit price bid for utility being installed.
 2. Basis of Payment: Includes all labor, equipment, and material to remove and dispose of existing storm sewer as indicated in the plans.
- E. Dr Structure, Rem:
1. Basis of Measurement: Included in the unit price bid for utility being installed.
 2. Basis of Payment: Includes all labor, equipment, and material to remove and dispose of drainage structures as indicated in the plans.
- F. Bulkhead Existing Storm Sewer:
1. Basis of Measurement: Included in the unit price bid for utility being installed.
 2. Basis of Payment: Includes all labor, equipment, and material to construct bulkhead on existing storm sewer as shown on plans. Bulkhead shall contain a concrete brick and mortar cap on existing sewer, and the end of the pipe shall be encapsulated in concrete.

1.3 REFERENCE STANDARDS

- A. American Association of State Highway and Transportation Officials:
1. AASHTO M170 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
 2. AASHTO M252 - Standard Specification for Corrugated Polyethylene Drainage Pipe.
 3. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
 4. AASHTO M294 - Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter.
 5. AASHTO T180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. ASTM International:
1. ASTM B745 - Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains.
 2. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
 3. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
 4. ASTM C969 - Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines.
 5. ASTM C1103 - Standard Practice for Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines.
 6. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 7. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).

8. ASTM D2235 - Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
9. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
10. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.
11. ASTM D2680 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Composite Sewer Piping.
12. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
13. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings.
14. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
15. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
16. ASTM F405 - Standard Specification for Corrugated Polyethylene (PE) Pipe and Fittings.
17. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
18. ASTM F667 - Standard Specification for 3 through 24 in. Corrugated Polyethylene Pipe and Fittings.
19. ASTM F2881 – Standard Specification for polypropylene (PP) dual wall pipe and fittings.

1.4 PREINSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Requirements for preinstallation meeting.
- B. Convene minimum one week prior to commencing Work of this Section.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data indicating pipe and pipe accessories.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
- E. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- F. Qualifications Statements:
 1. Submit qualifications for manufacturer and installer.
 2. Submit manufacturer's approval of installer.

1.6 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.

- B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.7 QUALITY ASSURANCE

- A. Perform Work according with MDOT Standard Specifications for Construction, current edition.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.
- B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Storage:
 - 1. Store materials according to manufacturer instructions.
 - 2. Block individual and stockpiled pipe lengths to prevent moving.
 - 3. Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.
 - 4. Do not place pipe flat on ground; cradle to prevent point stress.
- D. Protection:
 - 1. Keep UV-sensitive materials out of direct sunlight.
 - 2. Provide additional protection according to manufacturer instructions.

PART 2 - PRODUCTS

2.1 STORM DRAINAGE PIPING

- A. ASTM C-76 III, IV, V Reinforced Concrete Pipe nominal sizes 48"-12" plain joint for main line storm sewer and catch basin leads, with premium joints and wrapped with filter fabric (see section - 31 32 21 - Filter Fabric).
- B. ASTM F2881 / AASHTO M330 Polypropylene (H.P. Storm) pipe 12" through 48" pipe shall have a smooth interior with annular exterior corrugations. Polypropylene pipe shall be joined with a gasketed integral bell & spigot joint and shall be watertight according to the requirements of ASTM D3212 unless otherwise indicated on the plans.

2.2 DRAINAGE STRUCTURES

- A. Description: As specified in Section 33 05 13.16 - Public Manholes and Structures.

2.3 MATERIALS

- A. Description: As specified in Section 31 23 23 – Fill.
- B. Bedding and Cover:
 - 1. As specified in Section 31 23 23 – Fill and as shown on the drawings.
- C. Subsoil: No rocks more than 6 inches in diameter, frozen earth, or foreign matter.

2.4 ACCESSORIES

- A. Geotextile Filter Fabric as specified in Section 31 32 21.

2.5 REINFORCING

- A. Steel reinforcing bars and mesh must comply with American Iron and Steel requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify that excavation base is ready to receive Work.
- C. Verify that excavations, dimensions, and elevations are as indicated on Drawings.

3.2 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.
- B. Correct over-excavation with per Section 31 23 23 - Fill.
- C. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.
- D. Hand trim excavations to required elevations. Correct over excavation with fill material.
- E. Cut out soft areas of subgrade not capable of insitu compaction. Backfill with MDOT 6AA course aggregate and compact to density equal to or greater than requirements for support of pipe or structure and subsequent backfill material.

- F. Hand trim excavation for accurate placement of pipe to elevations indicated allowing for bedding thickness.

3.3 INSTALLATION

- A. Excavation and Bedding:
 - 1. Excavate pipe trench as specified in Section 31 23 17 - Trenching.
 - 2. Hand trim excavation for accurate placement of piping to indicated elevations.
 - 3. Dewater excavations to maintain dry conditions to preserve final grades at bottom of excavation.
 - 4. Provide sheeting and shoring as specified in Section 31 23 17 - Trenching.
 - 5. Level materials in continuous layers not exceeding compacted depth of 12 inches.
 - 6. Maintain optimum moisture content of bedding material to attain required compaction density.
 - 7. Install pipe on compacted subgrade meeting bedding requirements.
 - 8. Cradle bottom 20 percent of diameter to avoid point load.
 - 9. Compact to 95 percent maximum density within influence of improved surfaces.
 - 10. Place geotextile fabric over backfill as indicated on Drawings.
- B. Piping:
 - 1. Install pipe, fittings, and accessories in accordance with ASTM Standards and manufacturer's instructions.
 - 2. Place pipe on specified bedding.
 - 3. Lay pipe to slope gradients noted on layout drawings by the use of a laser beam alignment method proven reliable and operated by competent, experienced personnel.
 - 4. Place remainder of bedding as specified. Do not displace or damage pipe when compacting.
 - 5. Contractor shall use appropriate measures, approved by the engineer to provide a sealed connection between the storm sewer and appurtenances.
 - 6. Wrap joints of concrete pipe with a 24" wide strip of filter fabric overlapping ends 12-inch minimum. Secure with tape.
 - 7. Seal joints as indicated on the plans.
- C. Pipe Joints
 - 1. Premium Joint – watertight gasket.
 - 2. Nitrile Joint – Petroleum resistant gasket.
 - 3. Wrapped Joint – Coat the top two thirds of the pipe joint with bitumastic compound leaving the bottom third of the joint un-sealed to allow for ground water infiltration.
Note: all joint to be wrapped with a minimum of 24-inch wide strip of non-woven filter fabric overlapping ends 12-inch minimum. Secure with tape.
- D. Installation Standards: Install Work according to MDOT Standard Specifications for Construction, current edition.

3.4 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Requirements for tolerances.
- B. Maximum Variation from Indicated Pipe Slope: 1/8 inch in 10 feet.

3.5 FIELD QUALITY CONTROL

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.
- B. Request inspection by Architect/Engineer prior to and immediately after placing aggregate cover over pipe.
- C. HP storm pipe shall be mandrel tested by Contractor according to MDOT Construction Advisory CA 2011-08.

3.6 PROTECTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION