

CONTRACT DOCUMENTS AND  
SPECIFICATIONS FOR:

**RIVERFRONT PLAZA  
AND SPLASH PAD**

OWNER:  
**CITY OF ALLEGAN**  
112 LOCUST STREET  
ALLEGAN, MICHIGAN 49010

ENGINEER:  
**ABONMARCHE**  
95 W. MAIN STREET  
BENTON HARBOR, MICHIGAN 49022  
P: (269) 927-2295  
F: (269) 927-1017

June 2018  
PROJECT NUMBER: 18-0197



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**SECTION 00 00 60**  
**PROGRESS CLAUSE****PROGRESS CLAUSE:**

The Contractor shall start work on **the date agreed upon with the Engineer**. In no case shall any work be commenced prior to receipt of formal Notice of Award by the City.

The project shall be **substantially completed** (substantial completion is defined as all underground utilities work installed and complete, and all concrete and pavement restored) within 10 weeks upon commencement of construction. The project must be **fully completed** by November 16<sup>th</sup>, 2018.

Mandatory weekly progress meetings will also be held between the Contractor, City Staff, and Engineering Consultant to monitor progress and address and property owner concerns.

The Progress Schedule shall include, as a minimum, the controlling work items for completion of the project and the planned dates (or work day for a workday project) that these work items will be controlling operations. When specified in the bidding proposal, the date the project is to be opened to traffic as well as the final project completion date shall also be included in the project schedule.

Failure on the part of the Contractor to carry out the provisions of the Progress Schedule, as established, may be considered sufficient cause to prevent bidding future projects until a satisfactory rate of progress is again established.



**SECTION 00 01 15**  
**LIST OF DRAWING SHEETS****PART 1 - GENERAL****1.01 DESCRIPTION**

- A. The Plans bearing the general title of **RIVERFRONT PLAZA AND SPLASH PAD** and dated **June 2018**, included with and form a part of the Contract Documents for this Project.

**1.02 LIST OF PLANS**

<u>SHEET NUMBER</u>	<u>TITLE</u>
1	Cover Sheet
2	Existing Conditions/Removals
3	Site Plan
4	Dimension Plan
5	Grading/Utilities Plan
6	Soil Erosion and Sedimentation Control Plan
7	Standard Details - 1
8	Standard Details - 2

**END OF SECTION**





**SECTION 00 11 16**  
**ADVERTISEMENT FOR BID****Allegan Riverfront Plaza and Splash Pad Project**

Sealed bids bearing the project name as well as the name and address of the bidder shall be submitted to the City of Allegan, 112 Locust Street, Allegan, MI 49010 by or before **Thursday, June 28<sup>th</sup>, 2018** at **10:00 AM EST** at which time the bids will be opened publically and read aloud.

Electronic copies of the bidding documents are provided free of charge at [www.abonmarche.com](http://www.abonmarche.com). A hard copy of the bidding documents may be obtained from ABONMARCHE, 95 W. Main Street, Benton Harbor, Michigan 49022, (269) 927-2295 for a non-refundable fee of \$25.00 for each set.

Bidding documents will be available on **Monday, June 4<sup>th</sup>, 2018 at 8:00 am.**

Questions concerning the project may be directed to Eric Kamps, EIT from Abonmarche at (269) 926-4556 or [ekamps@abonmarche.com](mailto:ekamps@abonmarche.com).

Bidders will be required to provide Bid security in the form of a certified check, cashier's check, money order, or a Bid Bond, of a sum no less than *5 percent (5%)* of the total bid amount, made payable to the City of Allegan, as security for the proper execution of the Contract.

The project is scheduled to be completed no later than **November 16, 2018**. See additional information regarding contract times in the agreement form provided in the bidding documents.

Your Bid will be required to be submitted under a condition of irrevocability for a period of *90 days* after submission.

The Owner reserves the right to reject any and all bids, waive any informality in bidding or to accept the bid, consistent with law, which best serves the interest of the Owner.



**SECTION 00 21 13**  
**INSTRUCTIONS TO BIDDERS**  
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**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 and where the bidding procedures are to be administered.

**ARTICLE 2 – COPIES OF BIDDING DOCUMENTS**

- 2.01 Complete sets of the Bidding Documents in the number and for the non-refundable sum, if any, stated in the advertisement or invitation to bid may be obtained from the Issuing Office.
- 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, Bidder shall submit at the time of bidding written evidence such as financial data, previous experience, present commitments, and such other data as may be called for below.
- A. Required Bid security in the form of a certified check, bank money order, or a Bid Bond;
- B. List of Proposed Subcontractors;
- C. List of Project References;
- D. Signed and notarized Non-Collusion Affidavit (Section 00 45 19);
- 3.02 Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.

**ARTICLE 4 – EXAMINATION OF BIDDING DOCUMENTS, OTHER RELATED DATA, AND SITE**

- 4.01 Subsurface and Physical Conditions
- A. The Supplementary Conditions identify:
1. Those reports known to Owner of explorations and tests of subsurface conditions at or contiguous 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).
- B. Copies of reports and drawings referenced in Paragraph 4.01.A will be made available by Owner to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the “technical data” contained therein upon which Bidder is entitled to rely as provided in Paragraph 4.02 of the General Conditions has been identified and established in Paragraph 4.02 of 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.

#### 4.02 Underground Facilities

- A. Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site is based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others.

#### 4.03 Hazardous Environmental Condition

- A. The Supplementary Conditions identify any reports and drawings known to Owner relating to a Hazardous Environmental Condition identified at the Site.
- B. Copies of reports and drawings referenced in Paragraph 4.03.A will be made available by Owner to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the “technical data” contained therein upon which Bidder is entitled to rely as provided in Paragraph 4.06 of the General Conditions has been identified and established in Paragraph 4.06 of 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.

- 4.04 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 4.02, 4.03, and 4.04 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 4.06 of the General Conditions.
- 4.05 On request, Owner will provide Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies as Bidder deems necessary for submission of a Bid. 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. Bidder shall comply with all applicable Laws and Regulations relative to excavation and utility locates.
- 4.06 It is the responsibility of each Bidder before submitting a Bid to:
- A. examine and carefully study the Bidding Documents, and the other related data identified in the Bidding Documents;
  - B. visit the Site and become familiar with and satisfy Bidder as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;
  - C. become familiar with and satisfy Bidder as to all federal, state, and local 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 contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in Paragraph 4.02 of the Supplementary Conditions as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in the Paragraph 4.06 of the Supplementary Conditions as containing reliable "technical data";
  - E. consider the information known to Bidder; 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, including applying any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs;

- F. agree at the time of submitting its Bid that 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(s) 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; and
  - I. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.
- 4.07 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions thereof by Engineer are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

## **ARTICLE 5 – SITE AND OTHER AREAS**

- 5.01 The Site is identified in the Bidding Documents. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by Owner unless otherwise provided in the Bidding Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by Contractor.
- 5.02 Access to adjacent sites by roadway or waterway shall be maintained, to the greatest extent possible, at all times.

## **ARTICLE 6 – INTERPRETATIONS AND ADDENDA**

- 6.01 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 mailed or delivered to all parties recorded by Engineer as having received the Bidding Documents. Questions received less than ten 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.
- 6.02 Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by Owner or Engineer.

**ARTICLE 7 – BID SECURITY**

- 7.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of five (5%) percent of Bidder's maximum Bid price and in the form of a certified check, bank money order, or a Bid Bond (on the form attached) issued by a surety meeting the requirements of Paragraphs 5.01 and 5.02 of the General Conditions.
- 7.02 The Bid security of the Successful Bidder will be retained until 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 returned. 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. The Bid security of other Bidders whom 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 Agreement or 91 days after the Bid opening, whereupon Bid security furnished by such Bidders will be returned.
- 7.03 Bid security of other Bidders whom Owner believes do not have a reasonable chance of receiving the award will be returned within seven (7) days after the Bid opening.

**ARTICLE 8 – CONTRACT TIMES**

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

**ARTICLE 9 – LIQUIDATED DAMAGES**

- 9.01 Provisions for liquidated damages, if any, are set forth in the Agreement.

**ARTICLE 10 – SUBSTITUTE AND "OR-EQUAL" ITEMS**

- 10.01 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration of possible substitute or "or-equal" items. Whenever it is specified or described in the Bidding Documents that a substitute or "or-equal" item of material or equipment may be furnished or used by Contractor if acceptable to Engineer, application for such acceptance will not be considered by Engineer until after the Effective Date of the Agreement.

**ARTICLE 11 – SUBCONTRACTORS, SUPPLIERS AND OTHERS**

- 11.01 Bids shall be accompanied by a list of all Subcontractors, Suppliers, individuals, or entities proposed for portions of the Work.
- 11.02 The apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening, submit to Owner experience statements with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, individual, or entity if requested by Owner. 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 a substitute without an increase in the Bid.

- 11.03 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, individuals, or entities. Declining to make requested substitutions will not 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 revocation of such acceptance after the Effective Date of the Agreement as provided in Paragraph 6.06 of the General Conditions.
- 11.04 Contractor shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom Contractor has reasonable objection.

## **ARTICLE 12 – PREPARATION OF BID**

- 12.01 The Bid Form is included with the Bidding Documents. Additional copies may be obtained from the Engineer.
- 12.02 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 unit price item listed therein. In the case of optional alternatives the words “No Bid,” “No Change,” or “Not Applicable” may be entered.
- 12.03 A Bid by a corporation shall be executed in the corporate name by the president or a vice-president or other corporate officer accompanied by evidence of authority to sign. The corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown.
- 12.04 A Bid by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership shall be shown.
- 12.05 A Bid by a limited liability company shall be executed in the name of the firm by a member 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.
- 12.06 A Bid by an individual shall show the Bidder's name and official address.
- 12.07 A Bid by a joint venture shall be executed by each joint venturer in the manner indicated on the Bid Form. The official address of the joint venture shall be shown.
- 12.08 All names shall be printed in ink below the signatures.
- 12.09 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.
- 12.10 Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.

- 12.11 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 13 – BASIS OF BID; COMPARISON OF BIDS**

### **13.01 Unit Price**

- A. Bidders shall submit a Bid on a unit price basis for each item of Work listed in the Bid schedule.
- B. The total of all estimated prices will be the sum of the products of the estimated quantity of each item and the corresponding unit price. The final quantities and Contract Price will be determined in accordance with Paragraph 11.03 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.

### **13.02 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 11.02.B of the General Conditions.

### **13.03 Completion Time Comparisons**

- A. Bid prices will be compared after adjusting for differences in the time designated by Bidders for Substantial Completion. The adjusting amount will be determined at the rate set forth in the Contract Documents for liquidated damages for failing to achieve Substantial Completion for each day before or after the desired date appearing in Article 9 above.

## **ARTICLE 14 – SUBMITTAL OF BID**

- 14.01 With each copy of the Bidding Documents, a Bidder is furnished one separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with the Bid security and the following documents:

- A. Required Bid security in the form of a certified check, bank money order, or a Bid Bond;
- B. List of Proposed Subcontractors;
- C. List of Project References;

D. Signed and notarized Non-Collusion Affidavit (Section 00 45 19);

- 14.02 A Bid shall be submitted 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." A mailed Bid shall be addressed to:

A. City of Allegan  
112 Locust Street  
Allegan, MI 49010  
Phone: 269-673-5511

#### **ARTICLE 15 – MODIFICATION AND WITHDRAWAL OF BID**

- 15.01 A Bid may be modified or 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.
- 15.02 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 16 – OPENING OF BIDS**

- 16.01 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 17 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE**

- 17.01 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 18 – EVALUATION OF BIDS AND AWARD OF CONTRACT**

- 18.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to not be responsible. Owner may also reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Project to make an award to that

Bidder. Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder.

- 18.02 More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.
- 18.03 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.
- 18.04 In evaluating Bidders, Owner will consider the qualifications of Bidders and may consider the qualifications and experience of Subcontractors, Suppliers, and other individuals or entities proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other individuals or entities must be submitted as provided in the Supplementary Conditions.
- 18.05 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work in accordance with the Contract Documents.
- 18.06 If the Contract is to be awarded, Owner will award the Contract to the Bidder whose Bid is in the best interests of the Project.

## **ARTICLE 19 – CONTRACT SECURITY AND INSURANCE**

- 19.01 Article 5 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 executed Agreement to Owner, it shall be accompanied by such bonds.

## **ARTICLE 20 – SIGNING OF AGREEMENT**

- 20.01 When Owner issues a Notice of Award to the Successful Bidder, it shall be accompanied by the required number of unsigned counterparts of the Agreement along with the other Contract Documents which are identified in the Agreement as attached thereto. Within 15 days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner. Within ten days thereafter, Owner shall deliver one fully signed counterpart to Successful Bidder with a complete set of the Drawings with appropriate identification.

**SECTION 00 22 13**  
**SUPPLEMENTARY INSTRUCTIONS TO BIDDERS**

**PART 1 - GENERAL MODIFICATIONS**

**1.01 MODIFICATIONS**

- A. These Supplementary Instructions to Bidders amend or supplement, Section 00 2113, Instructions to Bidders, as indicated below. All provisions which are not amended or supplemented remain in full force and effect.
- B. The terms used in these Supplementary Instructions to Bidders have the meanings assigned to them in the Instructions to Bidders, General Conditions, and as follows:
  - 1. OWNER – City of Allegan, a Municipal Corporation, and being a party of the first part of this Contract.
  - 2. ENGINEER – Abonmarche, 95 West Main Street, Benton Harbor, MI 49022

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**



**SECTION 00 41 43**  
**BID FORM – UNIT PRICE**  
**(SINGLE-PRIME CONTRACT)**  
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**ARTICLE 1 – BID RECIPIENT**

1.01 This Bid is submitted to:

- A. City of Allegan  
112 Locust St.  
Allegan, MI 49010  
Phone: 269-673-5511

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, other related data identified in the Bidding Documents, and the following Addenda, receipt of which is hereby acknowledged:

Addendum No.

Addendum Date

_____	_____
_____	_____
_____	_____

- B. Bidder has visited the Site 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. Bidder is familiar with and is satisfied 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 contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in SC-4.02 as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in SC-4.06 as containing reliable "technical data."
- E. Bidder has considered the information known to Bidder; 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, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs.

- F. Based on the information and observations referred to in Paragraph 3.01.E above, Bidder does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) 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 the written resolution thereof by Engineer is acceptable to Bidder.
- 1. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

## **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):

### BASE BID

Item No.	Description	Unit	Estimated Quantity	Unit Price	Bid Price
1	Mobilization, Max. \$40,000	LSUM	1	\$	\$
2	Site Grading	LSUM	1	\$	\$
3	Tree, Rem, 6 inch to 18 inch	Ea	4	\$	\$
4	Stump, Rem, 6 inch to 18 inch	Ea	2	\$	\$
5	Curb and Gutter, Rem	Ft	575	\$	\$
6	Pavt, Rem	Syd	2528	\$	\$
7	Sidewalk, Rem	Syd	35	\$	\$
8	Light Pole, Rem	Ea	1	\$	\$
9	Sign, Type III, Rem	Ea	2	\$	\$
10	Electrical Panel, Relocate	Ea	1	\$	\$
11	Bollard, Relocate	Ea	6	\$	\$
12	Aggregate Base, 8 inch	Syd	1350	\$	\$
13	Subbase, CIP	Cyd	450	\$	\$
14	HMA, 13A	Ton	175	\$	\$
15	HMA, 36A	Ton	125	\$	\$
16	Curb and Gutter, Conc, Det D2, Modified	Ft	375	\$	\$
17	Stand Up Concrete Curb	Ft	88	\$	\$
18	Sidewalk, Conc, Nonreinf, 4 inch	Sft	6950	\$	\$
19	Sidewalk, Conc, 6 inch, Thickened Edge	Sft	1150	\$	\$
20	Sidewalk, Conc, Reinf, 6 inch	Sft	2250	\$	\$
21	Sidewalk Ramp, Conc, 6 inch	Sft	70	\$	\$
22	Detectable Warning Surface	Ft	5	\$	\$

Item No.	Description	Unit	Estimated Quantity	Unit Price	Bid Price
23	Shade Structure	LSUM	1	\$	\$
24	Site Furniture, Install	LSUM	1	\$	\$
25	Seatwall, Block	Ft	105	\$	\$
26	Fire Place	LSUM	1	\$	\$
27	Post, Steel, 3 lb	Ft	45	\$	\$
28	Sign, Type IIIA	Sft	4.5	\$	\$
29	Parking Bumper, Conc	Ea	11	\$	\$
30	Pavt Mrkg, Waterborne, 4 inch, White	Ft	120	\$	\$
31	Pavt Mrkg, Waterborne, 4 inch, Blue	Ft	325	\$	\$
32	Pavt Mrkg, Thermopl, 12 inch, Cross Hatching, White	Ft	70	\$	\$
33	Pavt Mrkg, Thermopl, Accessible Symbol, Blue	Ea	4	\$	\$
34	Hardwood Mulch, 3 inch	Syd	110	\$	\$
35	Irrigation System	LSUM	1	\$	\$
36	Riprap, Plain	Syd	15	\$	\$
37	Acer Rubrum 'Armstrong', 2.5" BB	Ea	1	\$	\$
38	Fagus Sylvatica Roseomarginata, 2.5" BB	Ea	1	\$	\$
39	Echinacea P. 'Magnus', No. 1	Ea	32	\$	\$
40	Hemerocallis 'Stella De Oro', No. 1	Ea	70	\$	\$
41	Thuja Occidentalis 'Techny', 8' BB	Ea	8	\$	\$
42	Nepeta X. F. 'Walkers Low', No. 1	Ea	30	\$	\$
43	Pennisetum A. 'Hameln', No. 2	Ea	23	\$	\$
44	Gate Valve and Box, 6 inch	Ea	1	\$	\$
45	Gate Valve and Box, 3 inch	Ea	1	\$	\$
46	Water Main, DI, 6 inch, Tr Det G	Ft	255	\$	\$
47	Water Main, DI, 3 inch, Tr Det G	Ft	20	\$	\$
48	Water Serv	Ea	2	\$	\$
49	Water Serv, Long	Ea	1	\$	\$
50	Fire Hydrant	Ea	1	\$	\$
51	Sanitary Manhole, 48 inch Dia	Ea	2	\$	\$
52	Sanitary Sewer, PVC SDR 26, 8 inch, Tr Det G	Ft	198	\$	\$
53	Sewer Tap, 8 inch	Ea	1	\$	\$
54	Gate Valve and Box, 8 inch	Ea	2	\$	\$
55	Structure, Inside Drop	Ea	1	\$	\$
56	Structure, Exterior Drop	Ea	1	\$	\$

Bid Form – Unit Price (Single-Prime Contract)

00 41 43 - 4

Item No.	Description	Unit	Estimated Quantity	Unit Price	Bid Price
57	Dr Structure, 48 inch dia	Ea	6	\$	\$
58	Sewer, PVC, 8 inch, Tr Det B	Ft	13	\$	\$
59	Sewer, SLCPP, 12 inch, Tr Det B	Ft	263	\$	\$
60	Dr Structure Cover, Type B	Ea	1	\$	\$
61	Dr Structure Cover, Type C	Ea	3	\$	\$
62	Dr Structure Cover, Type D	Ea	2	\$	\$
63	Dr Structure Cover, Type Q	Ea	3	\$	\$
64	Gas Service	LSUM	1	\$	\$
65	Electrical Service	Ea	2	\$	\$
66	Drinking Fountain	Ea	1	\$	\$
67	Post Hydrant	Ea	2	\$	\$
68	Slope Restoration, Type B	Syd	20	\$	\$
69	Erosion Control, Inlet Protection, Fabric Drop	Ea	8	\$	\$
70	Erosion Control, Silt Fence	Ft	300	\$	\$
71	Barricade, Type III, High Intensity, Lighted, Furn	Ea	2	\$	\$
72	Barricade, Type III, High Intensity, Lighted, Oper	Ea	2	\$	\$
73	Channelizing Device, 42 inch, Furn	Ea	10	\$	\$
74	Channelizing Device, 42 inch, Oper	Ea	10	\$	\$
75	Sign, Type B, Temp, Prismatic, Furn	Sft	10	\$	\$
76	Sign, Type B, Temp, Prismatic, Oper	Sft	10	\$	\$
77	Construction Safety Fence	Ft	650	\$	\$
	<b>Total:</b>				\$

**ALTERNATE 1 BID**

Item No.	Description	Unit	Estimated Quantity	Unit Price	Bid Price
1	Brick Paver, Rem	Syd	300	\$	\$
2	Sidewalk, Conc, 4 inch	Sft	2500	\$	\$
	<b>Total:</b>				\$

Base Bid Total Cost: \$ \_\_\_\_\_

Alternate 1 Bid Total Cost: \$ \_\_\_\_\_

**Total Project Cost:** \$ \_\_\_\_\_

Bid Form – Unit Price (Single-Prime Contract)

00 41 43 - 5

Unit Prices have been computed in accordance with Paragraph 11.03.B of the General Conditions.

Bidder acknowledges that 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 fully completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions no later than **November 16<sup>th</sup>, 2018**.

6.02 The completion dates are subject to the following work limitations resulting from holidays and local festivals. No Work will be permitted on the following days and times;

A. Labor Day: Monday, September 3, 2018

6.03 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 in the form of a certified check, bank money order, or a Bid Bond;

B. List of Proposed Subcontractors;

C. List of Proposed Suppliers;

D. List of Project References;

E. Signed and Notarized Non-Collusion Affidavit;

## **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 – BID SUBMITTAL**

9.01 This Bid is submitted by:

If Bidder is:

An Individual

Name (typed or printed): \_\_\_\_\_

By: \_\_\_\_\_  
(Individual's signature)

Doing business as: \_\_\_\_\_

A Partnership

Partnership Name: \_\_\_\_\_

By: \_\_\_\_\_  
(Signature of general partner -- attach evidence of authority to sign)

Name (typed or printed): \_\_\_\_\_

A Corporation

Corporation Name: \_\_\_\_\_ (SEAL)

State of Incorporation: \_\_\_\_\_

Type (General Business, Professional, Service, Limited Liability): \_\_\_\_\_

By: \_\_\_\_\_  
(Signature -- attach evidence of authority to sign)

Name (typed or printed): \_\_\_\_\_

Title: \_\_\_\_\_  
(CORPORATE SEAL)

Attest \_\_\_\_\_

Date of Qualification to do business in the State of Michigan is \_\_\_\_/\_\_\_\_/\_\_\_\_.

A Joint Venture

Name of Joint Venture: \_\_\_\_\_

First Joint Venturer Name: \_\_\_\_\_ (SEAL)

By: \_\_\_\_\_  
(Signature of first joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): \_\_\_\_\_

Title: \_\_\_\_\_

Second Joint Venturer Name: \_\_\_\_\_(SEAL)

By: \_\_\_\_\_  
(Signature of second joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): \_\_\_\_\_

Title: \_\_\_\_\_

(Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.)

Bidder's Business Address \_\_\_\_\_

\_\_\_\_\_

Phone No. \_\_\_\_\_ Fax No. \_\_\_\_\_

E-mail \_\_\_\_\_

SUBMITTED on \_\_\_\_\_ 20\_\_\_\_.

State Contractor License No. \_\_\_\_\_.





**SECTION 00 45 19**  
**NON-COLLUSION AFFIDAVIT**

STATE OF \_\_\_\_\_

COUNTY OF \_\_\_\_\_

The undersigned bidder or agent, being duly sworn, on oath says that he will not, nor will any other member, representative, or agent of the firm, company, corporation, or partnership represented by him, entered into any combination, collusion or agreement with any person relative to the price to be bid by anyone at such letting, nor to prevent any person from bidding nor to induce anyone to refrain from bidding, and that his bid is made without reference to any other bid and without any agreement, understanding, or combination with any other person in reference to such bidding in any way or manner whatever.

\_\_\_\_\_

\_\_\_\_\_  
Bidder or AgentFOR: \_\_\_\_\_  
Firm or Corporation

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

My commission expires: \_\_\_\_\_

\_\_\_\_\_  
Notary Public



## NOTICE OF AWARD

---

Date of Issuance:

Owner: City of Allegan

Owner's Contract No.: n/a

Engineer: Abonmarche

Engineer's Project No.: 18-0197

Project: Riverfront Plaza and Splash Pad

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 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 BETWEEN OWNER AND CONTRACTOR FOR CONSTRUCTION CONTRACT (UNIT PRICE)

THIS AGREEMENT is by and between City of Allegan ("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: Riverfront Plaza and Splash Pad

## ARTICLE 2 – THE PROJECT

- 2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows: Riverfront Plaza and Splash Pad

## ARTICLE 3 – ENGINEER

- 3.01 The part of the Project that pertains to the Work has been designed by Abonmarche.
- 3.02 The Owner has retained Abonmarche (“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 *Dates for Substantial Completion and Final Payment*
- A. Bidder agrees that the Work will be fully completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions no later than **November 16<sup>th</sup>, 2018**.
- 4.03 *The completion dates are subject to the following work limitations resulting from holidays and local festivals. No Work will be permitted on the following days and times;*
- A. Labor Day: Monday, September 3<sup>rd</sup>, 2018
- B. During holidays and festival shutdowns, the contractor shall restore all roads through aggregate base and make them passable for vehicles. Sidewalk closures may remain in effect.

#### 4.04 *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 \$600.00 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 Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner \$600.00 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.

#### 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 other than Unit Price Work, a lump sum of: \$           .

All specific cash allowances are included in the above price in accordance with Paragraph 13.02 of the General Conditions.

- B. For all Unit Price Work, an amount equal to the sum of the extended prices (established for each separately identified item of Unit Price Work by multiplying the unit price times the actual quantity of that item):

#### SEE ATTACHED BID FORM

- C. The Bid prices for Unit Price Work set forth as of the Effective Date of the Agreement are based on estimated quantities. As provided in Paragraph 11.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by Engineer as provided in Paragraph 9.07 of the General Conditions.
- D. For all Work, at the prices stated in Contractor's Bid, attached hereto as an exhibit.

#### ARTICLE 6 – PAYMENT PROCEDURES

**6.01 Submittal and Processing of Payments**

- A. Contractor shall submit Applications for Payment in accordance with Article 14 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 30th day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below. All such payments will be measured by the schedule of values established as provided in Paragraph 2.07.A of 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 in the General Requirements.
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 Engineer may determine or Owner may withhold, including but not limited to liquidated damages, in accordance with Paragraph 14.02 of the General Conditions.
- 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. 90 percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).
- B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 95 percent of the Work completed, less such amounts as Engineer shall determine in accordance with Paragraph 14.02.B.5 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 tentative list of items to be completed or corrected attached to the certificate of Substantial Completion.

**6.03 Final Payment**

- A. Upon final completion and acceptance of the Work in accordance with Paragraph 14.07 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 14.07.

**ARTICLE 7 – INTEREST**

- 7.01 All moneys not paid when due as provided in Article 14 of the General Conditions 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 Agreement, Contractor makes the following representations:
- A. Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.

- B. Contractor has visited the Site 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 federal, state, and local 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 contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities), if any, that have been identified in Paragraph SC-4.02 of the Supplementary Conditions as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in Paragraph SC-4.06 of the Supplementary Conditions as containing reliable "technical data."
- E. Contractor has considered the information known to Contractor; 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, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents; and (3) Contractor's safety precautions and programs.
- F. Based on the information and observations referred to in Paragraph 8.01.E above, Contractor does not consider that 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 Documents.
- 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.

## ARTICLE 9 – CONTRACT DOCUMENTS

### 9.01 *Contents*

- A. The Contract Documents consist of the following:
  - 1. This Agreement (pages \_\_\_ to \_\_\_, inclusive).
  - 2. Performance bond (pages \_\_\_ to \_\_\_, inclusive).
  - 3. Payment bond (pages \_\_\_ to \_\_\_, inclusive).
  - 4. Other bonds (pages \_\_\_ to \_\_\_, inclusive).
    - a. \_\_\_\_\_ (pages \_\_\_\_\_ to \_\_\_\_\_, inclusive).
    - b. \_\_\_\_\_ (pages \_\_\_\_\_ to \_\_\_\_\_, inclusive).



- c. \_\_\_\_ (pages \_\_\_\_ to \_\_\_\_, inclusive).
5. General Conditions (pages \_\_\_\_ to \_\_\_\_, inclusive).
6. Supplementary Conditions (pages \_\_\_\_ to \_\_\_\_, inclusive).
7. Specifications as listed in the table of contents of the Project Manual.
8. Drawings consisting of \_\_\_\_ sheets with each sheet bearing the following general title: \_\_\_\_ [or] the Drawings listed on attached sheet index.
9. Addenda (numbers \_\_\_\_ to \_\_\_\_, inclusive).
10. Exhibits to this Agreement (enumerated as follows):
  - a. Contractor's Bid (pages \_\_\_\_ to \_\_\_\_, inclusive).
  - b. Documentation submitted by Contractor prior to Notice of Award (pages \_\_\_\_ to \_\_\_\_, inclusive).
11. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:
  - a. Notice to Proceed (pages \_\_\_\_ to \_\_\_\_, inclusive).
  - b. Work Change Directives.
  - c. Change 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 Paragraph 3.04 of 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. 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, moneys that may become due and moneys that are 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 partners, successors, assigns, and legal representatives to the other party hereto, its partners, 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.

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:

City of Allegan

By: \_\_\_\_\_

By: \_\_\_\_\_

Title: \_\_\_\_\_

Title: \_\_\_\_\_

*(If Contractor is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)*

Attest: \_\_\_\_\_

Attest: \_\_\_\_\_

Title: \_\_\_\_\_

Title: \_\_\_\_\_

Address for giving notices:

Address for giving notices:

112 Locust Street

Allegan, MI 49010

License No.: \_\_\_\_\_

*(where applicable)*

*(If Owner is a corporation, attach evidence of authority to sign. If Owner is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this Agreement.)*

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



### NOTICE TO PROCEED

---

Owner:	City of Allegan	Owner's Contract No.:	n/a
Contractor:		Contractor's Project No.:	
Engineer:	Abonmarche	Engineer's Project No.:	18-0197
Project:	Riverfront Plaza and Splash Pad	Contract Name:	Riverfront Plaza and Splash Pad
		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 \_\_\_\_\_, and the date of readiness for final payment is \_\_\_\_\_] **or** [the number of days to achieve Substantial Completion is \_\_\_\_\_, and the number of days to achieve readiness for final payment is \_\_\_\_\_].

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):*

City of Allegan  
112 Locust Street  
Allegan, MI 49010

### CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description *(name and location):*

### 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

\_\_\_\_\_  
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 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):*

City of Allegan  
112 Locust Street  
Allegan, MI 49010

### CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description *(name and location):*

### 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

\_\_\_\_\_  
*(seal)*

Contractor's Name and Corporate Seal

By: \_\_\_\_\_

Signature

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Title

Attest: \_\_\_\_\_

Signature

\_\_\_\_\_  
Title

\_\_\_\_\_  
*(seal)*

Surety's Name and Corporate Seal

By: \_\_\_\_\_

Signature *(attach power of attorney)*

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Title

Attest: \_\_\_\_\_

Signature

\_\_\_\_\_  
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:



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CONSTRUCTION CONTRACT****TABLE OF CONTENTS**

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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. §§5101 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.I 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 consider 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 for whom the Owner is responsible 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 11.04.C.2.a and 11.04.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 additional 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.



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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.

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## ARTICLE 2 – PRELIMINARY MATTERS

### *SC-2.01 Delivery of Bonds and Evidence of Insurance*

**SC-2.01** Delete Paragraphs 2.01 B. in its entirety and insert the following in its place:

- B. Evidence of Insurance:** Before any Work at the Site is started, Contractor shall deliver to the Owner, with copies to each additional insured identified in the Supplementary Condition SC-6.03, certificates of insurance (and other evidence of insurance which Owner or any additional insured may reasonably request) which Contractor is required to purchase and maintain in accordance with Article 6 of the General Conditions.

### *SC-2.02 Copies of Documents*

**SC-2.02** Delete Paragraph 2.02.A in its entirety and insert the following new paragraph in its place:

- B. Owner shall furnish to Contractor up to 3 printed or hard copies of the Drawings and Project Manual and one set in electronic format. Additional copies will be furnished upon request at the cost of reproduction.**

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

### *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.**



**ARTICLE 6 – BONDS AND INSURANCE***SC-6.03 Contractor's 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:**

<b>State:</b>	<u>Statutory</u>
<b>Federal, if applicable (e.g., Longshoreman's):</b>	<u>Statutory</u>
<b>Employer's Liability:</b>	
Bodily injury, each accident	\$ <u>500,000</u>

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

<b>General Aggregate</b>	\$ <u>2,000,000</u>
<b>Products - Completed Operations Aggregate</b>	\$ <u>2,000,000</u>
<b>Personal and Advertising Injury</b>	\$ <u>1,000,000</u>
<b>Each Occurrence (Bodily Injury and Property Damage)</b>	\$ <u>1,000,000</u>
<b>Property Damage liability insurance shall provide Explosion, Collapse, and Underground coverages where applicable</b>	

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

<b>Bodily Injury:</b>	
Each person	\$ <u>1,000,000</u>
Each accident	\$ <u>1,000,000</u>
<b>Property Damage:</b>	
Each accident	\$ <u>1,000,000</u>

- 4. Excess or Umbrella Liability:**

<b>Per Occurrence</b>	\$ <u>1,000,000</u>
<b>General Aggregate</b>	\$ <u>2,000,000</u>

**5. Contractor's Professional Liability:**

Each Claim	\$ <u>1,000,000</u>
Annual Aggregate	\$ <u>1,000,000</u>

**6. Contractor shall purchase and maintain Owner's and Contractors Protective Liability Insurance which shall:**

1. Be written by the same insurance carrier as Contractor'
2. 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
3. Liability for work performed by Contractor or Subcontractors under this Contract
4. Name Owner as the insured
5. Name the following as additional insured:
  - a. Abonmarche
6. Be insured by an insurer who endorses the policy to reflect that, in the event of payment of any loss or damages, subrogation rights under these Contract Documents will be waived by the insurer with respect to claims against Owner or Engineer
7. Provide coverage for not less than the following amounts:
  - a. Separate:
    - i. Bodily Injury;

Each Person	\$ <u>1,000,000</u>
Each Accident	\$ <u>1,000,000</u>
    - ii. Property Damage;

Each Accident	\$ <u>1,000,000</u>
Annual Aggregate	\$ <u>1,000,000</u>

**ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES****SC-7.02 Labor; Working Hours****SC-7.02.B. Delete Paragraph 7.02 B. in its entirety, and insert the following:**

- 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 the hours of 7:00am to 6:00 pm Monday through Friday. Contractor will not permit the performance of Work on Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.**

*SC-7.06 Concerning Subcontractors, Suppliers, and Others***SC 7.06 Add a new paragraph immediately after Paragraph 7.06.G:**

- H. Owner may furnish to any Subcontractor or Supplier, at their discretion, information about amounts paid to Contractor on account of Work performed for Contractor by a particular Subcontractor or Supplier.

*SC-7.08 Permits***SC-7.08 Add a new paragraph immediately after Paragraph 7.08.A:**

- B. The Owner shall furnish permits for water and sanitary from MDEQ. The Contractor shall obtain and pay for all other construction and regulatory permits and licenses per the requirements of GC-7.08 paragraph A above.

*SC-7.16 Shop Drawings, Samples, and Other Submittals***SC-7.16 Add a new paragraph immediately after Paragraph 7.16.E:**

- F. In the event that Contractor requests a change of a previously approved item, Contractor shall reimburse Owner for Engineer's charges for its review time unless the need for such change is beyond the control of Contractor.

**ARTICLE 8 – OTHER WORK AT THE SITE***SC-8.02 Coordination***SC-8.02 Delete Paragraph 8.02.A in its entirety and replace with the following:**

- A. Owner reserves the right to contract with others for the performance of other work on the Project at the Site.
1. Contractor shall have authority and responsibility for coordination of the various contractors and work forces at the Site;
  2. The following specific matters are to be covered by such authority and responsibility: construction, maintenance and daily operations of existing facilities, including both public and private operations on the project site.
  3. The extent of such authority and responsibilities is: to contact and discuss scheduling considerations with representatives of public and private operations on or adjacent to the Project Site and to make accommodations for completion of their operations during construction.

*SC-8.04 Claims Between Contractors***SC-8.04 Add the following new paragraph immediately after paragraph GC-8.03:****SC 7.04 Claims Between Contractors**

- A. Should Contractor cause damage to the work or property of any other contractor at the Site, or should any claim arising out of Contractor's performance of the Work at the Site be made by any other contractor against

Contractor, Owner, Engineer, or the construction coordinator, then Contractor (without involving Owner, Engineer, or construction coordinator) shall either (1) remedy the damage, (2) agree to compensate the other contractor for remedy of the damage, or (3) remedy the damage and attempt to settle with such other contractor by agreement, or otherwise resolve the dispute by arbitration or at law.

- B. Contractor shall, to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner, Engineer, the construction coordinator and the officers, directors, partners, employees, agents and other consultants and subcontractors of each and any of them from and against all claims, costs, losses and damages (including, but not limited to, fees and charges of engineers, architects, attorneys, and other professionals and court and arbitration costs) arising directly, indirectly or consequentially out of any action, legal or equitable, brought by any other contractor against Owner, Engineer, consultants, or the construction coordinator to the extent said claim is based on or arises out of Contractor's performance of the Work. Should another contractor cause damage to the Work or property of Contractor or should the performance of work by any other contractor at the Site give rise to any other Claim, Contractor shall not institute any action, legal or equitable, against Owner, Engineer, or the construction coordinator or permit any action against any of them to be maintained and continued in its name or for its benefit in any court or before any arbiter which seeks to impose liability on or to recover damages from Owner, Engineer, or the construction coordinator on account of any such damage or Claim.
- C. If Contractor is delayed at any time in performing or furnishing the Work by any act or neglect of another contractor, and Owner and Contractor are unable to agree as to the extent of any adjustment in Contract Times attributable thereto, Contractor may make a Claim for an extension of times in accordance with Article 12. An extension of the Contract Times shall be Contractor's exclusive remedy with respect to Owner, Engineer, and construction coordinator for any delay, disruption, interference, or hindrance caused by any other contractor. This paragraph does not prevent recovery from Owner, Engineer, or construction coordinator for activities that are their respective responsibilities.

## 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. 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.

2. **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.
3. **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.
4. **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.
5. **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.
6. **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.
7. **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.

**8. 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.

**9. 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.

**10. 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.

**11. 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.

**12. 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.

**13. 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.

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

*SC-13.03 Unit Price Work*

**SC 13.03.E** Delete Paragraph 13.03.E in its entirety and insert the following in its place:

- E. The unit price of an item of Unit Price Work shall be subject to reevaluation and adjustment under the following conditions:**
1. if the extended price of a particular item of Unit Price Work amounts to 5 percent or more of the Contract Price (based on estimated quantities at the

time of Contract formation) and the variation in the quantity of that particular item of Unit Price Work actually furnished or performed by Contractor differs by more than 25 percent from the estimated quantity of such item indicated in the Agreement; and

2. if there is no corresponding adjustment with respect to any other item of Work; and
3. if Contractor believes that Contractor has incurred additional expense as a result thereof, Contractor may submit a Change Proposal, or if Owner believes that the quantity variation entitles Owner to an adjustment in the unit price, Owner may make a Claim, seeking an adjustment in the Contract Price.

#### **ARTICLE 14 - TESTS AND INSPECTIONS, CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK**

##### *SC-14.05 Uncovering Work*

Delete Paragraph 14.05.C in its entirety and insert the following in its place:

- C. Contractor shall provide timely notice of intent to cover work. If Contractor has provided timely notice of intent to cover work, and if Engineer has not acted with reasonable promptness in response to such notice, and if Engineer has subsequently required work to be uncovered for the purposes of inspecting and testing, and if the uncovered Work is then 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, Contractor may make a Claim therefor as provided in Paragraph 12.01.

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

##### *SC-15.03 Substantial Completion*

**SC 15.03.B** Add the following new subparagraph to Paragraph 15.03.B:

1. If some or all of the Work has been determined not to be at a point of Substantial Completion and will require re-inspection or re-testing by Engineer, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, shall be paid by Contractor to Owner. If Contractor does not pay, or the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under Article 15.

#### **ARTICLE 17 – FINAL RESOLUTION OF DISPUTES**

##### *SC-17.02 Liquidated Damages*

**SC-17.02** Add the following new paragraph immediately after Paragraph 17.01.

##### **SC-17.02 Liquidated Damages**

- A. Liquidated damages, if applicable, are referenced in the Proposal and Agreement. The requirements for liquidated damages should be included herein.



- B. If CONTRACTOR shall fail to Substantially Complete the Work within the Contract Time, or extension of time granted by OWNER, then CONTRACTOR will pay to OWNER the amount for liquidated damages as specified in the Agreement for each calendar day that CONTRACTOR shall be in default after the time stipulated in the Contract Documents. The liquidated damages charged shall be deducted from CONTRACTOR's progress payments.**
- C. CONTRACTOR shall not be charged with liquidated damages or any excess cost when the delay in Substantial Completion of the Work is due to the following and CONTRACTOR has given written notice of such delay within seven (7) calendar days to OWNER or ENGINEER.**
- 1. To any preference, priority or allocation order duly issued by the OWNER.**
  - 2. To unforeseeable causes beyond the control and without the fault or negligence of the CONTRACTOR, including but not restricted to, acts of God, or of the public enemy, acts of the OWNER, acts of another CONTRACTOR in the performance of a Contract with the OWNER, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and abnormal and unforeseeable weather; and**
  - 3. To any delays of subcontractors occasioned by any of the causes specified in Items A and B of this article.**



**SECTION 01 11 00**  
**SUMMARY OF WORK****PART 1 - GENERAL****1.01 SUMMARY****A. Section Includes:**

1. Work by Others.
2. Owner supplied products.
3. Contractor's use of site.
4. Specification Conventions.

**1.02 WORK BY OTHERS**

- A. Where the Work of the Contract requires alterations to electric, telecommunications, or natural gas utility systems, such alterations shall be performed by others. Unless otherwise stated in the bidding documents, all other work shall be considered included in the Contract.

**1.03 CONTRACTOR'S USE OF SITE****A. Limit use of site to allow:**

1. Work by Others.
2. Use of site by City staff, Engineer, and all regulating authorities.
3. Vehicular access to all properties within site.

**B. Construction Operations: Limited to areas noted on Drawings.****C. Time Restrictions for Performing Work (except in connection with the safety or protection of persons or the Work or property at the Site):**

1. Monday through Friday (except legal holidays): 7:00 am to 6:00 pm.
2. Saturdays or Sundays: not without written approval from City
3. Legal holidays: not without written approval from City.

**1.04 SPECIFICATION CONVENTIONS**

- A. These specifications are written in imperative mood and streamlined form. This imperative language is directed to the 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**

## **PART 4 - MEASUREMENT AND PAYMENT**

### **4.01 BASIS OF PAYMENT**

- A. Payment for the following item(s) of work shall cover all materials, equipment and labor necessary to install the following pay items in accordance with the plans and these specifications.

### **4.02 METHOD OF MEASUREMENT**

<b>Description</b>	<b>Unit Price</b>
Mobilization, Max _____	LSUM

**Mobilization, Max \_\_\_\_\_** includes transportation of all equipment, materials, and personnel to and from site, rentals, storage, handling, delivery, cost of bonding and insurance, project administration and miscellaneous costs.

**END OF SECTION**

**SECTION 01 20 00**  
**PRICE AND PAYMENT PROCEDURES****PART 1 - GENERAL****1.01 SUMMARY**

- A. Section Includes:
  - 1. Progress Payments.
  - 2. Change procedures.
  - 3. Defect assessment.
  - 4. Unit prices.
  - 5. Alternates.

**1.02 PROGRESS PAYMENTS**

- A. Payment Period: One payment per month, covering all work completed through the week ending prior to the first Monday of each month.
- B. Engineer shall generate all payment requests and obtain Contractor approval and signature prior to submitting to Owner for payment. Do not submit invoices to Owner.
- C. Sign each payment request and return to Engineer.
- D. Engineer shall submit signed payment request to Owner for payment.

**1.03 CHANGE PROCEDURES**

- A. Submittals: Submit name of individual authorized to receive change documents, and be responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.
- B. For minor changes which do not involve a change in Contract Price or Contract Time, the Engineer may issue a Field Order.
- C. For changes which necessitate a change in Contract Price or Contract Time, the Engineer shall issue a Change Order. Change Order will be executed on fixed unit price basis. For unit costs or quantities of units of work which are not pre-determined, changes in Contract Price or Contract Time will be computed as specified in GC12.01.
- D. For changes which necessitate a change in Contract Price or Contract Time, but the amount of the change in Contract Price or Contract Time has not yet been agreed upon, the Engineer may issue a Work Change Directive for subsequent inclusion in a Change Order. Work Change Directive will describe changes in the Work and

method of determining the change in Contract Price or Contract Time. Promptly execute change.

- E. 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 effect on Contract Price and Contract Time with full documentation.
- F. Change Forms:
  - 1. EJCDC C-940 Work Change Directive
  - 2. EJCDC C-941 Change Order
  - 3. EJCDC C-942 Field Order
- G. Execution of Change Orders: Engineer will issue Change Orders for signatures of parties as provided in Conditions of the Contract. Upon execution by both parties, Engineer will revise the form of payment requests to include the authorized changes.

#### **1.04 DEFECT ASSESSMENT**

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

#### **1.05 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 sections govern.
- C. Take measurements and compute all payment quantities for work completed each day. Engineer will verify measurements and quantities. Engineer's record of quantities shall provide the basis for each progress payment.
- D. Unit Quantities: Quantities and measurements indicated in Bid Form are estimated for bidding and contract purposes only. Actual quantities provided shall determine payment. When actual Work requires more or fewer quantities than those quantities indicated, provide required quantities.
- 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 price for Work incorporated in or made necessary by the Work.
- G. Measurement Of Quantities:
  - 1. Weigh Scales: Inspected, tested and certified by State of Michigan within past year.
  - 2. Platform Scales: Of sufficient size and capacity to accommodate conveying vehicle.
  - 3. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.
  - 4. Measurement by Area: Measured by square dimension using mean length and width or radius.
  - 5. Measurement by Length: Measured by linear dimension, at item centerline or mean chord.

## **PART 2 - PRODUCTS - NOT USED**

## **PART 3 - EXECUTION - NOT USED**

### **END OF SECTION**





**SECTION 01 30 00**  
**ADMINISTRATIVE REQUIREMENTS****PART 1 - GENERAL****1.01 SUMMARY**

- A. Section Includes:
1. Coordination and project conditions.
  2. Field engineering.
  3. Preconstruction meeting.
  4. Progress meetings.
  5. Special procedures.

**1.02 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.

**1.03 FIELD ENGINEERING, LAND SURVEYING, AND CONSTRUCTION STAKING**

- A. Owner will employ Surveyor registered in State of Michigan and acceptable to Engineer.
- B. Locate survey control points, benchmarks, and property corners prior to starting work.
- C. Protect survey control points, benchmarks, and property corners throughout the duration of the work.
- D. Promptly report to Engineer any survey control points, benchmarks, and property corners requiring relocation because of changes in grades or other reasons
- E. Owner employed Surveyor will replace dislocated survey control points, benchmarks, and property corners based on original survey at Contractor's expense. Pay cost.
- F. Owner employed Surveyor will provide stakes at Contractor's request. Submit staking requests to Surveyor with copy to Engineer with minimum 48 hours notice. If staking requests require less than 48 hour response time, Surveyor may charge Contractor a fee for expedited service. Pay cost.
- G. Protect stakes from damage or dislocation as evidence that completed work has conformed to stakes. Do not remove stakes until directed by Engineer.

- H. All requested stakes will be provided for Contractor free of charge one time only. Protect stakes. Request restaking for dislocated stakes. Restaking will be provided by Surveyor at Contractor's expense. Pay cost.
- I. Payments due to Surveyor from Contractor will be charged to Contractor by deducting charges from Contract Price.

#### **1.04 PRECONSTRUCTION MEETING**

- A. A preconstruction meeting shall be held prior to beginning the Work.
- B. Engineer will schedule meeting after Notice of Award, make arrangements for meeting, prepare agenda with copies for participants, notify participants of time and location at least four days in advance, and preside at meeting.
- C. Attendance Required:
  - 1. Owner.
  - 2. Engineer.
  - 3. Contractor.
  - 4. Major Subcontractors.
  - 5. All regulating authorities which are affected by the Work.
  - 6. Private utility companies which are affected by the Work.
- D. Minimum Agenda:
  - 1. Verify prior execution of Owner-Contractor Agreement.
  - 2. Submission of executed bonds and insurance certificates.
  - 3. Distribution of Contract Documents.
  - 4. Submission of list of Subcontractors, list of products, and progress schedule.
  - 5. Designation of personnel representing all parties and distribution of contact information for each.
  - 6. Schedule of progress meetings.
  - 7. Review project schedule.
  - 8. Review inspection and testing procedures and responsibilities.
  - 9. Review any temporary utility needs.
  - 10. Review hours of operation.
  - 11. Review procedures for maintaining record documents.
- E. Engineer will record minutes and distribute copies to all participants.

#### **1.05 PROGRESS MEETINGS**

- A. Engineer will administer weekly progress meetings on site, to be scheduled at time agreed upon at the preconstruction meeting.

- B. Attendance Required:
  - 1. Job superintendent.
  - 2. Engineer.
  - 3. Major subcontractors and suppliers as appropriate to the agenda.
  - 4. Owner's representative as appropriate to the agenda.
  - 5. City or other regulatory authorities as appropriate to the agenda.
  - 6. Private utility companies as appropriate to the agenda.
- C. Minimum Agenda:
  - 1. Review of Work progress.
  - 2. Field observations, problems, and decisions.
  - 3. Identification of problems impeding planned progress.
  - 4. Scheduling and Coordination.
  - 5. Change Orders.
  - 6. Payment Application.
- D. The Engineer shall record the minutes and distribute copies to participants, with copies to Owner, Contractor, and those affected by decisions made.

## **PART 2 - PRODUCTS - NOT USED**

## **PART 3 - EXECUTION**

### **3.01 SPECIAL PROCEDURES**

- A. Materials: Perform all work with specified products. All products shall be new, unless the approval of salvaged products is provided for in the individual product sections.
- B. Employ skilled and experienced persons to perform alteration work.
- C. Remove unsuitable material not marked for salvage, including rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished Work.
- D. Where new Work abuts or aligns with existing, provide smooth and even transition.
- E. Call MISS DIG at 1-800-482-7171 or 811 not less than three full working days before performing any portion of the Work that involves any soil disturbance.
  - 1. Request underground utilities to be located and marked within and surrounding construction areas.

**F. Protect all existing structures and utilities.**

1. Pay cost of cleaning, repair, relocation, raising, lowering, or replacement of structures and utilities which interfere with the Work or which are damaged as a result of Contractor's operations.
2. Supply, utilize and pay for all temporary sheeting, bracing, poles, cables, sand fill or other means used to support a structure or utility exposed or endangered by Contractor's operations.
3. Be responsible for temporary and permanent relocation of power, light, telephone and other service poles and appurtenant structures.
4. Make necessary arrangements with the owner of the pole or structure and pay all costs involved.
5. Pay cost of replacing any pavement (including roads, driveways, and sidewalks) which is damaged as a result of Contractor's operations.
6. Pay cost of any landscaping or tree replacement due to damage as a result of Contractor's operations.
7. Pay cost of replacing any damaged fences, mailboxes, signs, guard posts, culverts, irrigation systems or similar items which are damaged as a result of Contractor's operations.

**G. Property corners, Government survey corners, and plat monuments:**

1. Protect from damage or disturbance.
2. Replace if disturbed or removed as a result of construction
  - a) Arrange for replacement by a licensed professional surveyor.
  - b) Pay all costs.

**END OF SECTION**

**SECTION 01 33 00**  
**SUBMITTAL PROCEDURES****PART 1 - GENERAL****1.01 SUMMARY**

- A. Section Includes:
  - 1. Submittal procedures.
  - 2. Construction progress schedules.
  - 3. Proposed products list.
  - 4. Product data.
  - 5. Shop drawings.
  - 6. Test reports.
  - 7. Certificates.
  - 8. Manufacturer's instructions.

**1.02 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 in accordance with requirements of the Work and Contract Documents.
- E. Schedule submittals to expedite Project, and deliver to Engineer at business address. Coordinate submission of related items.
- F. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of completed Work.
- G. When revised for resubmission, identify changes made since previous submission.
- H. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.

**1.03 CONSTRUCTION PROGRESS SCHEDULES**

- A. Submit initial schedule within 15 days after date of Owner-Contractor Agreement.
- B. Submit revised Progress Schedules with each Application for Payment.
- C. Indicate reasons for delays and impact on schedule.
- D. Indicate corrective actions needed or taken.

#### **1.04 PROPOSED PRODUCTS 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, give manufacturer, trade name, model or catalog designation, and reference standards.

#### **1.05 PRODUCT DATA**

- A. Product Data: Submit to Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
- B. Submit number of copies Contractor requires, plus one copy 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. Retain minimum one copy for project record documents described in section 01 70 00 Execution and Closeout Requirements.

#### **1.06 SHOP DRAWINGS**

- A. Shop Drawings: Submit to Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
- B. Submit number of copies Contractor requires, plus one copy Engineer will retain.
- C. Retain minimum one copy for project record documents described in Section 01 70 00 - Execution and Closeout Requirements.

#### **1.07 TEST REPORTS**

- A. Submit testing and inspection reports to Engineer for limited purpose of verifying conformance with Contract Documents.

#### **1.08 CERTIFICATES**

- A. When specified in individual specification sections, submit certifications 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.

#### **1.09 MANUFACTURER'S INSTRUCTIONS**

- A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, adjusting, and finishing, to Engineer for delivery to Owner in quantities specified for Product Data.

#### **PART 2 - PRODUCTS - NOT USED**

#### **PART 3 - EXECUTION - NOT USED**

**END OF SECTION**





**SECTION 01 40 00**  
**QUALITY REQUIREMENTS****PART 1 - GENERAL****1.01 SUMMARY**

- A. Section Includes:
  - 1. Quality control and control of installation.
  - 2. Tolerances.
  - 3. References.
  - 4. Labeling.
  - 5. Testing and inspection services.
  - 6. Manufacturers' field services.
  - 7. Examination.
  - 8. Preparation.

**1.02 QUALITY CONTROL AND CONTROL OF INSTALLATION**

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. When manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform Work by persons qualified to produce required and specified quality.
- F. Verify field measurements are as indicated on Shop Drawings or as instructed by manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

**1.03 TOLERANCES**

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

- B. Comply with manufacturers' tolerances. When manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

#### **1.04 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 on date of receiving bids, except where specific date is established by code.
- C. Obtain copies of standards where required by product specification sections.
- D. When specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.
- E. Neither contractual relationships, duties, nor responsibilities of parties in Contract nor those of Engineer shall be altered from Contract Documents by mention or inference otherwise in reference documents.

#### **1.05 TESTING AND INSPECTIONS BY CONTRACTOR**

- A. Where individual specification sections require, conduct testing and inspections.
- B. Perform testing and inspections in accordance with the following sections:
  - 1. Section 32 13 13 - Concrete Paving: Source Quality Control and Tests
  - 2. Section 33 11 13 - Public Water Utility Distribution Piping
  - 3. Section 33 13 00 - Disinfecting of Water Utility Distribution
- C. Engineer shall review Contractor's testing reports to verify that the Work is in conformance with specifications.
- D. Testing and Inspection Reports: At a minimum, testing and inspection reports shall contain the following information:
  - 1. Project title.
  - 2. Name of personnel conducting testing and inspections.
  - 3. Description of testing and inspection procedures.
  - 4. Date and time of testing or inspection.
  - 5. Location in Project.
  - 6. Results of tests.
  - 7. Conformance with Contract Documents.
  - 8. Other information as required in individual specification sections.

**1.06 TESTING AND INSPECTIONS BY OWNER**

- A. Owner will employ and pay for services of an independent firm to perform testing and inspections in accordance with the following sections:
  - 1. Section 31 22 13 - Rough Grading
  - 2. Section 31 23 33 - Trenching and Backfilling
  - 3. Section 32 11 16 - Subbase Courses
  - 4. Section 32 11 23 - Aggregate Base Courses
  - 5. Section 32 12 16 - Asphalt Paving
  - 6. Section 32 13 13 - Concrete Paving: Field Quality Control
  - 7. Section 33 11 13 - Public Water Utility Distribution Piping
  - 8. Section 33 12 13 - Water Service Connections
- B. Owner reserves the right to inspect any portion of the Work at any time.
- C. The independent firm will perform tests, inspections and other services specified in individual specification sections and as required by authority having jurisdiction.
- D. Testing, inspections and source quality control may occur on or off project site.
- E. Reports will be submitted by independent firm to Engineer, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.
- F. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
  - 1. Notify Engineer and independent firm 48 hours prior to expected time for operations requiring services, or as specified in individual specification sections.
  - 2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.
  - 3. Provide access to each layer of bedding and backfill for testing.
- G. Testing and employment of testing agency or laboratory shall not relieve Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- H. Re-testing or re-inspection required because of non-conformance to specified requirements shall be performed by same independent firm on instructions by Engineer. Payment for re-testing or re-inspection will be charged to Contractor by deducting testing charges from Contract Price.
- I. Limits On Testing Firm:
  - 1. Testing Firm or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.

2. Testing Firm or laboratory may not approve or accept any portion of the Work.
3. Testing Firm or laboratory may not assume duties of Contractor.
4. Testing Firm or laboratory has no authority to stop the Work.

#### **1.07 MANUFACTURERS' 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, and to provide instruction when necessary.
- B. Report observations and site decisions or instructions given to Contractor that are supplemental or contrary to manufacturers' written instructions.

#### **PART 2 - PRODUCTS - NOT USED**

#### **PART 3 - EXECUTION - NOT USED**

**END OF SECTION**

**SECTION 01 50 00**  
**TEMPORARY FACILITIES AND CONTROLS****PART 1 - GENERAL****1.01 SUMMARY****A. Section Includes:**

1. Temporary Utilities:
  - a) Temporary electricity.
2. Construction Facilities:
  - a) Vehicular access.
  - b) Parking.
  - c) Progress cleaning and waste removal.
  - d) Traffic regulation.
3. Temporary Controls:
  - a) Barriers.
  - b) Water control.
  - c) Dust control.
  - d) Erosion and sediment control.
  - e) Noise control.
  - f) Pollution control.
4. Removal of utilities, facilities, and controls.

**1.02 REFERENCES**

- A. Michigan Department of Transportation (MDOT):**
1. MDOT 2012 Standard Specifications for Construction.

**1.03 TEMPORARY ELECTRICITY**

- A. Request temporary electric service from Consumers Energy.**
1. Submit a written request which identifies desired location of meter, type of service (3 phase or single phase), voltage, and peak demand (amps).
- B. Obtain electrical permit from Consumers Energy.**
- C. Obtain meter base from Consumers Energy.**
- D. Install meter base and all required electrical work downstream of the meter base.**

- E. Comply with all electrical code requirements.
- F. Obtain electrical inspection from Consumers Energy.
- G. Consumers Energy will install all required electrical work upstream of the meter base and will energize the meter after the meter base and downstream installation has passed inspection by Consumers Energy
- H. Contractor will pay all costs due and payable to Consumers Energy, pay all other costs.

#### **1.04 VEHICULAR ACCESS**

- A. Maintain vehicular access to all driveways for public use at all times.
- B. Construct temporary access roads of width and load bearing capacity to accommodate traffic.
- C. Construct temporary bridges and culverts to span low areas and allow unimpeded drainage.
- D. Extend and relocate vehicular access as Work progress requires, provide detours as necessary for unimpeded traffic flow.
- E. Provide unimpeded access for emergency vehicles.
- F. Provide and maintain access to fire hydrants. Keep fire hydrants free of obstructions.
- G. Provide means of removing mud from vehicle wheels before entering streets.

#### **1.05 PEDESTRIAN ACCESS**

- A. Maintain pedestrian access to all doorway along the buildings at all times.
- B. Maintain pedestrian access along the Riverfront Boardwalk.
- C. Construct and maintain a construction safety fence along the outer limits of the construction areas to deter the public from entering the site.

#### **1.06 PARKING**

- A. Allow legal parking on public streets or within site only.
- B. Do not allow parking on private property unless otherwise permitted in writing by property owner.

#### **1.07 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 daily and dispose off-site.

#### **1.08 TRAFFIC REGULATION**

- A. Provide and maintain traffic control in accordance with the current Michigan Manual on Uniform Traffic Control Devices (MMUTCD) and Michigan Department of Transportation (MDOT) "Maintaining Traffic Typical".
- B. Haul Routes:
  - 1. Consult with Public Works Director to determine approved haul routes within the city.
  - 2. Confine construction traffic to approved haul routes.
- C. Traffic Control Devices:
  - 1. Provide traffic control devices configured according to applicable MDOT Maintaining Traffic Typical to meet the specified Traffic Control Requirements stated on plans.
- D. Relocation:
  - 1. Relocate traffic control devices as Work progresses to maintain effective traffic control.
- E. Removal:
  - 1. Remove equipment and devices when no longer required.
  - 2. Repair damage caused by installation.

#### **1.09 SECURITY**

- A. Security Program:
  - 1. Protect Work from theft, vandalism, and unauthorized entry.
  - 2. Initiate program at project mobilization.
  - 3. Maintain program throughout construction period until Substantial Completion.
  - 4. Repair or replace Work damaged by theft or vandalism, pay cost.

#### **1.10 WATER CONTROL**

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

#### **1.11 DUST CONTROL**

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

- B. Apply water or brine to site to control dust.

#### **1.12 EROSION AND SEDIMENT CONTROL**

- A. Plan and execute construction by methods to control surface drainage from cuts and fills, and from borrow and waste disposal areas. Prevent erosion.
- B. Minimize surface area of bare soil exposed at one time.
- C. Provide temporary measures including berms, dikes, drains, and other devices to control water flow.
- D. Inspect earthwork minimum once per week to detect evidence of erosion and sedimentation; promptly apply corrective measures.

#### **1.13 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.

#### **1.14 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS**

- A. Remove temporary utilities, equipment, facilities, and materials, prior to final inspection.
- B. Clean and repair damage caused by installation or use of temporary work.
- C. Restore existing facilities used during construction to original condition.

### **PART 2 - PRODUCTS - NOT USED**

### **PART 3 - EXECUTION - NOT USED**

### **PART 4 - MEASUREMENT AND PAYMENT**

#### **4.01 BASIS OF PAYMENT**

- A. Payment for the following item(s) of work shall cover all materials, equipment and labor necessary to install the following pay items in accordance with the plans and these specifications.

#### **4.02 METHOD OF MEASUREMENT**



<b>Description</b>	<b>Unit</b>
Barricade, Type ____, High Intensity, Double Sided, Light, ____ .....	Each
Channelizing Device, __ inch, ____ .....	Each
Sign, Type __, Temp, _____, _____ .....	Square Foot
Construction Safety Fence .....	Foot

**Construction Safety Fence** includes the cost of furnishing and maintaining a safety fence along the exterior edges of the site location.

**END OF SECTION**



**SECTION 01 60 00**  
**PRODUCT REQUIREMENTS****PART 1 - GENERAL****1.01 SUMMARY**

- A. Section Includes:
  - 1. Products.
  - 2. Product delivery requirements.
  - 3. Product storage and handling requirements.
  - 4. Product options.
  - 5. Product substitution procedures.

**1.02 PRODUCTS**

- A. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise.
- B. The use of industrial byproducts, covered in 2014 PA 178, is prohibited for this project unless the use and application of a particular material is covered elsewhere in the Specifications.

**1.03 PRODUCT DELIVERY REQUIREMENTS**

- A. Transport and handle products in accordance with 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 by methods to prevent soiling, disfigurement, or damage.

**1.04 PRODUCT STORAGE AND HANDLING REQUIREMENTS**

- A. Store and protect products in accordance with manufacturers' instructions.
- B. Store with seals and labels intact and legible.
- C. Store sensitive products in weather tight, climate controlled enclosures in an environment favorable to product.
- D. Provide off-site storage and protection when site does not permit on-site storage or protection.

- E. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- F. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.
- G. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- H. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

#### **1.05 PRODUCT OPTIONS**

- A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Products of one of manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit request for substitution for any manufacturer not named in accordance with the following article.

#### **1.06 PRODUCT SUBSTITUTION PROCEDURES**

- A. Engineer will consider requests for Substitutions within 15 days after the effective date of Owner/Contractor agreement.
- B. Engineer will not be bound to any time limitations for review of substitution requests. Contractor shall not receive any adjustment to completion schedules because of product substitution requests.
- C. Substitutions may be considered when a product becomes unavailable through no fault of Contractor.
- D. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- E. A request constitutes a representation that Contractor:
  - 1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
  - 2. Will provide same warranty for Substitution as for 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 and Engineer for review or redesign services associated with re-approval by authorities having jurisdiction.
- F. 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 Contract Documents.
- G. 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 proposed product equivalence. Burden of proof is on Contractor.
  3. 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 60 00**  
**EXECUTION AND CLOSEOUT REQUIREMENTS****PART 1 - GENERAL****1.01 SUMMARY**

- A. Section Includes:
  - 1. Closeout procedures.
  - 2. Final cleaning.
  - 3. Protecting installed construction.
  - 4. Project record documents.
  - 5. Operation and maintenance data.
  - 6. Product warranties.

**1.02 CLOSEOUT PROCEDURES**

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's review.
- B. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

**1.03 FINAL CLEANING**

- A. Execute final cleaning prior to final project assessment.
- B. Wash dust from impacted adjacent structures and buildings upon request.
- C. Clean site; sweep paved areas, rake clean landscaped surfaces.
- D. Remove waste and surplus materials, rubbish, and construction facilities from site.

**1.04 PROTECTING INSTALLED CONSTRUCTION**

- A. Protect installed Work and provide special protection where specified in individual specifications sections.
- B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- C. Prohibit traffic from newly paved areas until pavement has cooled or cured and is able to support imposed traffic loads without damaging pavement.

- D. Prohibit traffic from landscaped areas.

## **1.05 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. Source Location and Names of Material Suppliers
  - 7. Manufacturer's instructions for assembly, installation, and adjusting.
  - 8. Test Reports of all Field Tests indicating conformance or non-conformance with specifications.
- 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 any variation from specified products including description of actual products installed, including the following:
  - 1. Manufacturer's name and product model and number.
  - 2. Product substitutions or alternates utilized.
  - 3. Changes made by Addenda and modifications.
- F. Record Drawings: Legibly mark each item to record actual construction including:
  - 1. Measured locations of underground utilities. Refer to individual specification sections for list of required measurements.
  - 2. Field changes of dimension and detail.
  - 3. Details not on original Contract drawings.
- G. Submit documents to Engineer with final Application for Payment.

## **1.06 OPERATION AND MAINTENANCE DATA**

- A. Submit data bound in 8-1/2 x 11 inch text pages, three D side ring binders with durable plastic covers.



- B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder when multiple binders are required.
- C. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- D. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- E. Contents: Prepare Table of Contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:
  - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Engineer, Contractor, Subcontractors, and major equipment suppliers.
  - 2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
    - a) Significant design criteria.
    - b) List of equipment.
    - c) Parts list for each component.
    - d) Operating instructions.
    - e) Maintenance instructions for equipment and systems.
    - f) Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
  - 3. Part 3: Project documents and certificates, including the following:
    - a) Shop drawings and product data.
    - b) Air and water balance reports.
    - c) Certificates.
    - d) Originals of warranties.

## **1.07 PRODUCT WARRANTIES**

- A. Obtain warranties executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within thirty days after completion of applicable item of work.
- B. Execute and assemble transferable warranty documents from subcontractors, suppliers, and manufacturers.
- C. Verify documents are in proper form, contain full information, and are notarized.
- D. Co-execute submittals when required.

- E. Include Table of Contents and assemble in three D side ring binder with durable plastic cover.
- F. Submit prior to final Application for Payment
- G. Time of Submittals:
  - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within fourteen days after acceptance.
  - 2. Make other submittals within thirty days after Date of Substantial Completion, prior to final Application for Payment.
  - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within fourteen days after acceptance, listing date of acceptance as beginning of warranty period.

**PART 2 - PRODUCTS - NOT USED****PART 3 - EXECUTION - NOT USED****END OF SECTION**

**SECTION 01 74 19**  
**CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

**PART 1 - GENERAL**

**1.01 SUMMARY**

A. Section Includes:

1. Construction Waste Collection and Disposal.

**PART 2 - PRODUCTS - NOT USED**

**PART 3 - EXECUTION**

**3.01 CONSTRUCTION WASTE COLLECTION**

- A. Collect construction waste materials in marked bins or containers and arrange for transportation to recycling centers or adaptive salvage and reuse processing facilities.
- B. Store construction waste materials to prevent environmental pollution, fire hazards, hazards to persons and property, and contamination of stored materials.
- C. Cover construction waste materials subject to disintegration, evaporation, settling, or runoff to prevent polluting air, water, and soil.

**3.02 CONSTRUCTION WASTE DISPOSAL**

- A. Dispose of construction waste which is not capable of being recycled by delivery to landfill, incinerator, or other legal disposal facility. Obtain receipt for deliveries.

**END OF SECTION**



**SECTION 01 89 00**  
**SITE CONSTRUCTION PERFORMANCE REQUIREMENTS****PART 1 - GENERAL****1.01 SCOPE OF WORK**

- A. This Section includes general performance requirements for earthwork complete with, reimbursement for crop damage, removal and disposal of structures and obstructions, protection of existing sewers, tiles and mains; protection of existing building and improvements, protection of trees and other types of vegetation, protection of utility lines, requirements for pavement replacement, restoration of driveways and parking areas, restoration of sidewalks, restoration of lawns and disturbed areas, transportation, and disposal of excess excavation.

**1.02 RELATED WORK SPECIFIED ELSEWHERE**

- A. Section 01 57 13: Temporary Erosion and Sediment Control
- B. Section 31 22 00: Grading
- C. Section 31 23 13: Subgrade Preparation
- D. Section 31 23 16: Structural Excavation and Backfill
- E. Section 31 23 33: Trenching and Backfilling
- F. Section 32 12 16: Bituminous Paving
- G. Section 32 13 15: Sidewalks and Driveways
- H. Section 32 92 19: Seeding

**1.03 REFERENCE STANDARDS**

- A. Unless otherwise specified, the Work for this Section shall conform to the applicable portions of the following Standard Specifications:
  - 1. MDOT - Michigan Department of Transportation Standard Specifications for Construction, latest edition.

**1.04 REQUIREMENTS OF REGULATORY AGENCIES**

- A. CONTRACTOR shall comply with Section 01 57 13, Temporary Erosion and Sediment Control. CONTRACTOR, at his expense, shall secure all permits, and post all bonds or deposits required to comply with the "Soil Erosion and Sedimentation Control," requirements, being Part 91 of PA 451 of 1994 as amended.

- B. CONTRACTOR shall comply with all requirements of the National Pollutant Discharge Elimination System (NPDES) Storm Water Program for Construction Activities, Part 31 of PA 451 of 1994 as amended.
- C. CONTRACTOR shall provide, maintain and remove such temporary and/or permanent soil erosion and sedimentation control measures as specified on the Plans or as determined by ENGINEER.
  - 1. Measures shall prevent surface runoff from carrying excavated materials into the waterways, to reduce erosion of the slopes, and to prevent silting in of waterways downstream of the Work.
  - 2. Measures should include provisions to reduce erosion by the wind of all areas stripped of vegetation, including material stockpiles.

#### **1.05 SUBMITTALS**

- A. Written permission for the use of all disposal and borrow sites shall be obtained and copies shall be furnished to ENGINEER.

#### **1.06 PROTECTION OF PLANT LIFE**

- A. Trees, shrubs, and other types of vegetation not within the limits of the Work or not designated on the Plans or by ENGINEER to be removed, shall be carefully protected from damage or injury during the various construction operations.
- B. Any tree, shrub or other type of vegetation not designated to be removed but which is damaged by CONTRACTOR's operation shall be repaired or replaced by CONTRACTOR, at his expense, as determined by ENGINEER.

#### **1.07 PROTECTION OF EXISTING STRUCTURES AND IMPROVEMENTS**

- A. Existing culverts, sewers, drainage structures, manholes, water gate wells, hydrants, water mains, utility poles, overhead lines, underground conduits, underground cables, pavement, or other types of improvements within the construction limits, not designated on the Plans to be removed, shall be carefully protected from damage during the construction operations.
- B. Existing structure or improvement not designated to be removed, but which is damaged by CONTRACTOR's operations shall be repaired or replaced by the CONTRACTOR, to the satisfaction of the owner, at his expense.
- C. Deposits of dirt or debris in sewers, culverts, tiles, drainage structures, manholes, gate wells, etc. caused by CONTRACTOR shall be cleaned out at the CONTRACTOR's expense.

#### **1.08 MAINTAINING DRAINAGE**

- A. Existing open drains, field and roadway ditches, drainage tile, sewers, enclosed drains, natural and artificial watercourses, surface drainage or any other types of drainage within the limits of the Work shall be maintained and free to discharge during construction.

- B. Drainage facility not designated to be abandoned, but which is damaged, or any drainage interrupted by the CONTRACTOR's operation shall be immediately repaired, replaced, or cleared by the CONTRACTOR.
- C. Costs incurred shall be incidental to the excavating, backfilling and compacting or grading operations.

## **PART 2 - PRODUCTS**

### **2.01 GRANULAR MATERIAL**

- A. Bank run sand meeting the requirements of MDOT, Granular Material Class II.

### **2.02 AGGREGATE FOR SHOULDERS, PARKING AREAS, DRIVEWAYS OR ROADS**

- A. Crushed Limestone, Natural Aggregate or Slag and meeting the requirements of MDOT Section 902.

## **PART 3 - EXECUTION**

### **3.01 DEWATERING**

- A. The area within the vicinity of the new Work shall be dewatered prior to commencing any construction activities. The depth of the dewatering shall be sufficient to allow the Work area to remain in a dry condition during the various construction operations.
- B. Costs incurred for furnishing, installing, maintaining and removing the dewatering equipment shall be at CONTRACTOR's expense.
- C. Refer to Section 31 2319, Dewatering, for additional requirements.

### **3.02 GENERAL**

- A. The various construction operations shall be restricted to the existing right-of-way or the areas indicated on the Plans. If CONTRACTOR requires additional area, CONTRACTOR shall furnish the ENGINEER with written permission obtained from the property owner for any part of the operations he conducts outside of the right-of-way or limits indicated.

### **3.03 EXISTING IMPROVEMENTS**

- A. CONTRACTOR shall expose existing sewers and structures to which the new Work is to be connected and notify ENGINEER of same. ENGINEER will verify the vertical and horizontal locations of the existing system and shall inform CONTRACTOR as to the necessary adjustments required to align the new Work with the existing system.

### **3.04 EXISTING UTILITIES**

- A. When existing utilities are shown on the Plans, their locations are approximate only, as secured in the field investigation and/or from available public records. Contractor, prior to the start of construction, shall contact Miss Dig and the public agency or utility having jurisdiction to request the verification of all utilities within the construction area.
- B. When existing utility lines, structures or utility poles are encountered during the performance of the Work, Contractor, at his expense, shall perform his operations in such a manner that the service will be uninterrupted.
- C. Contractor shall expose all existing utility lines prior to any excavation operation, to determine any conflict with the proposed improvement. Contractor shall be responsible for coordination of any removal or relocation required as a result of any conflict of existing utilities with the proposed improvement.
- D. Should it become necessary to move any utility structure, line or pole shown on the Plans or otherwise found necessary to be moved, Contractor shall make all arrangements with Owner of the utility for the removal or relocation.
- E. Prior to disturbing a utility line, structure or pole, Contractor shall furnish Engineer with satisfactory evidence that proper arrangements have been made with the owner of the utility.

### **3.05 UTILITY POLES**

- A. CONTRACTOR shall be responsible for coordination of any removal or relocation required as a result of any conflict of existing utility poles (including street light poles, guy poles, telephone poles, etc.) with proposed improvements.
- B. CONTRACTOR shall make all arrangements with the utility owner for removal or relocation of utility poles with the owner of the utility pole.
- C. Prior to disturbing any utility pole, CONTRACTOR shall provide ENGINEER with written evidence that proper arrangements have been made with the owner of the utility pole.
- D. When required by the Work, CONTRACTOR shall temporarily support poles in the vicinity of the Work at no additional cost to OWNER. Support shall be in accordance with and to the satisfaction of the utility company.

### **3.06 EXISTING SEWERS, TILE, AND MAINS**

- A. Existing sanitary sewers, storm sewers, drain tile, septic tank bed tiles, water mains or building services or leads, that are encountered during the performance of the Work that require relocation or are damaged, shall be restored with new materials equal in quality and type to the materials encountered.
- B. New material shall be installed as specified in the Contract Documents and per the requirements of the local agencies. Bedding and backfill material, unless otherwise specified, shall be an approved Class II granular material, compacted to 98% of its maximum unit weight.



- C. Seepage bed tile and water mains shall be replaced in accordance with the requirement of the agency having jurisdiction.
- D. Relocation or protection of existing sewers, tiles, tile field, water mains or building services and leads shall be at CONTRACTOR's expense, unless otherwise indicated in the Contract Documents.

### **3.07 EXISTING STRUCTURES**

- A. Existing surface and subsurface structures may be shown on the Plans, in locations considered most probable from information secured in the field investigation or from available public records.
- B. Neither the correctness nor completeness of such information is guaranteed or implied.
- C. Structures shall be protected, preserved or restored by CONTRACTOR, to the satisfaction of the structure owner, at no additional cost to the Project.

### **3.08 EXISTING BUILDINGS**

- A. Existing buildings or structures may be encountered throughout the Project within limits of the presently established right-of-way or easement. Good construction methods and procedures shall be employed by CONTRACTOR, at his expense, to protect the structures.
- B. When it becomes necessary for CONTRACTOR to move one of these buildings or structures in order to proceed with construction, CONTRACTOR, at his expense, shall exercise all due care in moving the building or structure to prevent undue damage.
- C. Prior to moving an existing building or structure, CONTRACTOR shall furnish ENGINEER with satisfactory evidence, in writing, that proper arrangements have been made with the owner.
- D. Unless otherwise specified in the Contract Documents, the length of the move shall be maintained to a minimum which will allow for construction of the improvement.

### **3.09 REMOVAL OF SEWERS AND CULVERTS**

- A. Unless otherwise specified in the Contract Documents, CONTRACTOR, at his expense, shall remove any abandoned culvert, pipe, sewer, structure or part of a structure which is to be replaced or rendered useless by the new construction.
- B. When a sewer or culvert is removed at a structure, CONTRACTOR shall install a masonry bulkhead in the structure.
- C. Removal of a culvert or sewer also includes the removal and disposal of end treatments or headwalls.

### **3.10 REMOVAL OF STRUCTURES**

- A. Removal of existing structures shall consist of removing and salvaging the existing frame and cover. The ends of the existing pipe shall be plugged and braced. The complete structure shall be removed entirely and disposed of. The excavation shall be backfilled with sand and compacted to 98% of its maximum unit weight. Maximum unit weight shall be determined by ASTM D698, Method B.
- B. If a structure is to be removed from a system that is to remain in service, a bypass system, approved by ENGINEER, shall be installed and maintained by the CONTRACTOR, during the rebuilding period.

### **3.11 ABANDONING STRUCTURES**

- A. Structure shall be broken down to at least 30 inches (750 mm) below the subgrade.
- B. Pipes connected to the structure shall be plugged with a brick, masonry or concrete bulkhead approved by ENGINEER.
- C. Structure shall be backfilled with flowable fill to 1-foot (300 mm) above the pipes and the remainder of the structure backfilled with sand-cement mixture at a 10 to 1 ratio to subgrade elevation or to 1-foot (300 mm) below finished grade.
- D. The remainder of the excavation shall be backfilled with a granular material, compacted to 98% of its unit weight, and shall meet with the approval of ENGINEER.
- E. Maximum unit weight shall be determined by ASTM D698, Method B.

### **3.12 SALVAGED MATERIAL**

- A. Salvaged materials shall become the property of CONTRACTOR unless otherwise specified in the Contract Documents, and shall be disposed of by CONTRACTOR, at his expense.

### **3.13 CROP DAMAGE**

- A. In areas where crops are encountered along the route of the construction, a written agreement shall be arrived at by CONTRACTOR and the crop owner as to the type and nature of the crop concerned prior to any construction within the area.
- B. CONTRACTOR shall be responsible for making full reimbursement to the owner of the crop damage on the basis of the following procedure:
  - 1. Area of the crop damage shall be determined by measurements taken by ENGINEER, and this area shall include those portions of the crop which may extend into the public right-of-way.
  - 2. Average yield of the crop shall be established by the County Office of the U.S. Agricultural Extension Service.
  - 3. Cost of the crop shall be determined by using the prevailing price at the time of harvest as furnished by the U.S. Agricultural Extension Service.

- C. CONTRACTOR shall furnish ENGINEER with satisfactory evidence that payment for crop damage was made, prior to receiving final payment on the Project.

### 3.14 TREES

- A. Trees excepting those specified on the Plans to be removed, shall be effectively protected by CONTRACTOR during his construction operations.
1. If in the opinion of ENGINEER, the methods of protection employed by CONTRACTOR are not adequate, CONTRACTOR shall carry on his operation by tunneling, or by other approved means, which will not cause undue damage to the trees.
- B. The requirements for tree tunneling are as follows:
1. Depth of Cover:
    - a) Tunnels shall be placed at a minimum depth of 30 inches (0.75 m), measured from the ground surface to the top of the tunnel.
  2. Length of Tunnel:
    - a) Tunnel length in feet (meters) shall be in direct proportion to diameter of tree in inches (millimeters) for trees eight (8) inches (200 mm) or larger in diameter. One (1) foot of tunnel shall be constructed for each inch of tree diameter whenever the trench or any portion thereof approaches the tree trunk a distance in feet equal to one-half the tree diameter in inches.
    - b) Example: A tree 12 inches in diameter shall require a 12-foot tunnel whenever the trench or any portion thereof approaches within six (6) feet of said tree.
  3. Measurements:
    - a) Trees under 8 inches in diameter will require the same length of tunnel as 8-inch trees. Measurements of tree diameters shall be taken four (4) feet above the ground surface.
- C. Where the Plans indicate areas allowing the cutting of minor trees, care should be used to keep damage to adjacent trees to an absolute minimum. Where these areas are specifically indicated on the Plan, they are to be cleared and all trunks and branches shall be disposed of by CONTRACTOR. Debris shall not be bulldozed on to adjacent private property.
- D. Trees damaged by the construction operation shall be repaired so not to inhibit growth or replaced at the expense of CONTRACTOR. Repair or replacement shall be contingent upon agreement between the damaged tree owner and CONTRACTOR. In any event, limbs, branches and roots damaged by CONTRACTOR shall be properly pruned to the satisfaction of ENGINEER.
- E. Costs incurred for protection of trees, including tunneling, repair and replacement, if necessary, shall be at CONTRACTOR's expense.

**3.15 REMOVING PAVEMENT**

- A. Removal of concrete and bituminous pavement as called for on the Plans shall consist of removing and disposing of pavement and shall include base courses, surface courses, integral and separate curbs, integral and separate curb and gutters, sidewalks and end headers.
- B. Pavement shall be removed to an existing joint or cut parallel to the existing pavement joints.
- C. Cutting shall be accomplished by using a power-driven concrete saw approved by ENGINEER. Depth of the saw cut shall be a minimum of 6-inches, to insure that the removal of the old pavement will not disturb or damage the section of pavement remaining in place.
- D. Residual concrete pavement shall not be less than five feet measured transversely, nor less than 6 feet longitudinally measured from a joint.
- E. In removing a concrete base course, where part of the existing bituminous surface is to remain in place, the bituminous surface shall be cut the full depth by the use of a power-driven saw, approved by ENGINEER along a line parallel to and at least one foot from either side of the base course removal.
- F. Old pavement with a concrete cap shall be considered as only one (1) pavement, whether or not there is a separation layer of earth, aggregate, or bituminous material between the old material and the concrete cap.
  - 1. Removal of Curb for Curb Drop:
    - a) Where curb is to be removed for a curb drop, the operation shall be performed by saw cutting or by cold milling, approved by ENGINEER, so as to leave a neat surface with a maximum 1-inch lip, without damage to the underlying pavement.
  - 2. Removal of Curb and Gutter:
    - a) Where curb and gutter are to be removed, the operation shall be performed by saw cutting. The limits of the removal shall be as called for on the Plans, or as approved by ENGINEER. However, in no case shall the width of removal be less than 18 inches for sections with rolled or straight curb or less than 24 inches for mountable curbs.
- G. If during the pavement removal operation any concrete or bituminous pavement or surfacing is damaged beyond the removal limits designated, the damaged pavement or surfacing shall be removed and replaced at CONTRACTOR's expense.
- H. Earth which may be removed during the pavement removal operation shall be replaced by backfilling to the proposed subgrade with a suitable material, approved by ENGINEER, at CONTRACTOR's expense.

**3.16 GUARDRAIL**

- A. Beam guardrail shall be relocated or shall be removed as specified on the Plans or as determined by ENGINEER. If any of the existing material is damaged or destroyed, CONTRACTOR shall replace the material at his expense.
- B. Where guardrail is encountered during construction, and its removal was not called for on the Plans, it shall be replaced or restored, at CONTRACTOR's expense, to a condition comparable to that prior to construction.
- C. After the guardrail removal or relocation operations are complete, all surplus material shall be removed and disposed of by CONTRACTOR, at his expense, unless otherwise called for in the Contract Documents.
- D. Any holes or voids resulting from the guardrail removal operation shall be backfilled with a Class II granular material, approved by ENGINEER.

**3.17 FENCES**

- A. Fences shall be removed and replaced or shall be removed as indicated on the Plans. If any of the existing material is damaged or destroyed, CONTRACTOR shall replace the material at his expense.
- B. Where fencing is encountered during construction, and its removal was not called for on the Plans, it shall be replaced or restored, at CONTRACTOR's expense, to a condition comparable to that prior to construction.
- C. After the fence removal or relocation operations are complete, all surplus material shall be removed and disposed of by CONTRACTOR, at his expense, unless otherwise called for in the Contract Documents.
- D. Any holes or voids resulting from the fence removal operation shall be backfilled with a suitable material, approved by ENGINEER.
- E. Where fences are encountered that are being used to confine livestock or to provide security, the fence shall be immediately replaced following construction. During construction, CONTRACTOR, at his expense, shall provide, install and maintain a temporary fence, meeting the approval of ENGINEER.

**3.18 HOLES**

- A. Earth removed during any phase of the excavation or removal operations, resulting in a hole or void, shall be replaced by backfilling to the proposed subgrade with a suitable granular material. Material shall be placed by the controlled density method or other effective means having the approval of ENGINEER and shall be compacted to 95% of maximum unit weight.
- B. Furnishing, placing and compacting of the backfill material shall be at CONTRACTOR's expense.

**3.19 RESTORATION IN RIGHT-OF-WAY AND YARD AREAS**

- A. Right-of-way and yard areas not paved or aggregate surfaced shall be restored in accordance with the type and location specified herein unless indicated otherwise on the Plans. Disturbed areas may be shaped by "Machine Grading" or another method approved by ENGINEER to achieve the cross section, line and grade shown on the Plans. Areas where slopes are 1 on 4 or flatter shall be restored with topsoil, seed and mulch. Slopes steeper than 1 on 4 shall be restored with sod.
- B. Excess material from the restoration operation shall be disposed of by CONTRACTOR at his expense.
- C. Disturbed areas shall be graded to receive either topsoil and seed or topsoil and sod. Topsoil, seed, sod, fertilizer and mulch shall conform to the requirements specified on the Plans and in Section 32 9219, Seeding, or Section 32 9223, Sodding.
- D. CONTRACTOR, at his expense, shall furnish, place, and compact any additional fill, meeting the approval of ENGINEER, needed to restore the disturbed areas to the cross sections called for on the Plans or as determined by ENGINEER.

**3.20 RESTORATION OF AGGREGATE SURFACES**

- A. Shoulders:
  - 1. Shoulder shall be regarded as the area between the edge of pavement and the ditch, or the area within 10 feet of the pavement, whichever is the lesser.
  - 2. Backfilling of trenches in the shoulder area shall be carried to within 5 inches of the existing surface as specified under Trench "A" or Trench "B." The remaining depth shall be backfilled with a minimum of 5 inches of compacted 22A or 23A aggregate with calcium chloride applied, at the rate of 6 pounds per Ton of aggregate.
  - 3. CONTRACTOR, at his expense, shall furnish, place and compact all materials necessary to complete the backfilling and restoration operation within the shoulder area.
- B. Driveways and Parking Areas:
  - 1. Aggregate driveway areas shall be regarded as the area from the right-of-way line to the edge of the traveled roadway and shall include the shoulder area.
  - 2. Backfilling of trenches crossing aggregate surfaced driveways and parking areas shall be carried to the bottom of the proposed base course as specified under Trench "B". The remaining depth shall be backfilled with a minimum of 6 inches of compacted 22A or 23A aggregate, with calcium chloride applied at the rate of 6 pounds per Ton of aggregate.
  - 3. Aggregate surfaced areas beyond the limits of the actual excavation which are disturbed, as determined by ENGINEER, by such operations as temporary storage of materials or passage of equipment, shall be resurfaced, at CONTRACTOR's expense.

- a) Upper 3 inches of disturbed areas shall be removed as necessary to allow the final elevation of the resurfacing course to be at the elevation of the drive or parking area which existed prior to excavation.
  - b) Disturbed area shall be resurfaced with a minimum of 3 inches of compacted 22A or 23A aggregate, with calcium chloride applied at the rate of 6 pounds per Ton of aggregate
4. CONTRACTOR, at his expense, shall furnish, place, and compact all materials necessary to complete the backfilling and restoration operations within the driveway and parking area.

C. Roads and Streets:

1. Backfilling of trenches crossing aggregate surfaced roads or streets shall be carried to within 12 inches of the existing surface as specified under Trench "B." The remaining depth shall be backfilled with two 6-inch layers of compacted 22A or 23A aggregate, with calcium chloride applied at the rate of 6 pounds per Ton of aggregate.
2. CONTRACTOR, at his expense, shall furnish, place, and compact all materials necessary to complete the backfilling and restoration operations within the roadway or street area.
3. Also, any settlement of the aggregate surface shall be restored by placing additional aggregate, up to the original grade, and shall be done at the CONTRACTOR's expense.

D. Compaction:

1. Compaction of all aggregate shall be performed by a pneumatic-tired roller or a vibratory compactor until the material forms a stable surface.

### **3.21 RESTORATION OF PAVED SURFACES**

- A. CONTRACTOR, at his expense, shall provide the materials necessary to complete the backfilling and restoration operations, which shall include furnishing, compacting, forming, placing, rolling, floating, jointing, finishing, curing and providing protection against elements.
  - B. Restoration of any roadways that are partially damaged shall include a minimum replacement of one (1), full width lane of roadway. The length of replacement shall be at least equal to the width.
- C. Concrete:
1. Backfilling of trenches crossing concrete driveways, sidewalks, roads, streets or parking areas shall be carried to the bottom of the proposed pavement as specified under Trench "B"
  2. Unless otherwise specified on the Plans or as determined by ENGINEER, the concrete removed shall be replaced with 3,500 psi concrete of the thickness removed and shall include reinforcing equal to the existing, if the existing pavement was reinforced.

- a) The construction of concrete pavements shall be in accordance with Section 32 1313, Concrete Paving.
  3. Restoration of sidewalks shall also include the construction of sidewalk ramps at the intersection of the curb and shall conform to the current rules and regulations of Act 8, Michigan PA 1973, as amended and to Section 32 1315, Sidewalks and Driveways, and unless otherwise indicated in the Proposal, shall be considered incidental to the Project.
- D. Bituminous:
1. Backfilling of trenches crossing bituminous driveways, sidewalks, roads, streets or parking areas shall be carried to the bottom of the base course as specified under Trench "B."
  2. Bituminous pavement or bituminous surface course with an aggregate base shall be replaced in accordance with Section 32 1216, Bituminous Paving.
  3. Bituminous surfaced areas beyond the limits of the actual excavation which are disturbed by such operations, as temporary storage of materials or passage of equipment, shall be resurfaced with an approved bituminous mixture the same thickness as removed, but in no case less than 2 inches in thickness. Replacement material shall extend to smooth-cut edges, shall be uniform in direction and shall be at an elevation which provides a uniform surface between the undisturbed abutting surfaces.
  4. Restoration of any bituminous chip seal shoulders that are damaged or partially damaged, as determined by ENGINEER, shall include complete replacement full width and length (extending a minimum of 25 linear feet beyond the damaged area both ways). Existing bituminous chip seal shoulders shall be brought to proper grade with compacted 22A or 23A aggregate and resurfaced with a double chip seal per Section 32 1216, Bituminous Paving.

### **3.22 SOIL EROSION AND SEDIMENTATION CONTROL**

- A. CONTRACTOR shall comply with the requirements of Section 01 5713, Temporary Erosion and Sediment Control. Prior to commencing any type of earthwork, CONTRACTOR shall obtain a Soil Erosion and Sedimentation Control permit from the local enforcing Agency.
- B. CONTRACTOR, at his expense, shall obtain all approvals, secure all permits and post all bonds and deposits required to comply with the Soil Erosion and Sedimentation Control Act, Part 91 of PA 451 of 1994, as amended, and those of the enforcing agency.
- C. CONTRACTOR shall provide ENGINEER with a copy of the soil erosion permit issued by the local enforcing agency for the Project, prior to commencing any type of earthwork on the Project.

### **3.23 EXCESS EXCAVATION**

- A. Excess excavation shall be defined as all surplus earth material realized from the construction that is free of brush, roots, stumps, broken concrete, pipe, debris, and other extraneous material.



- B. CONTRACTOR, when requested by OWNER, shall transport all excess excavation to a site(s) designated by OWNER.
  - 1. Excess excavation shall be graded by CONTRACTOR to provide positive surface drainage of the site(s).
  - 2. Grading shall be done such that adjacent properties are not damaged or affected. The grading shall include removal of all surface irregularities to provide a smooth surface ( $\pm$  0.25 foot).
- C. When the excess excavation has not been requested by e OWNER, CONTRACTOR shall remove and properly dispose of the material at no additional cost to OWNER.
- D. Proper disposal of all excess excavation, including transportation, grading, and protection of adjacent properties shall be considered as a final cleanup item. No additional payment will be made for this item.
- E. Brush, roots, stumps, broken concrete, pipe, debris, and other extraneous material from the construction shall become the property of CONTRACTOR, and shall be disposed of per all applicable Laws, rules or regulations. Removal and disposal of this material shall be considered as part of final cleanup. No additional payment will be made for this item.
- F. OWNER approval of the final site(s) condition in writing will be required prior to final payment authorization.

### **END OF SECTION**



**SECTION 03 30 00**  
**CAST-IN-PLACE CONCRETE****PART 1 - GENERAL****1.01 SCOPE OF WORK**

- A. This section includes all cast-in-place concrete work complete with materials, mixes, installation and testing.

**1.02 RELATED WORK SPECIFIED ELSEWHERE**

- A. Section 01 2200: Unit Prices
- B. Section 03 1100: Concrete Forming
- C. Section 03 1500: Concrete Accessories
- D. Section 03 2000: Concrete Reinforcing
- E. Section 04 0511; Mortaring and Grouting
- F. Section 07 1000: Dampproofing and Waterproofing
- G. Section 31 2319: Dewatering

**1.03 REFERENCE STANDARDS**

- A. Unless otherwise specified, the Work of this Section shall conform to the applicable portions of the following Standard Specifications:
- B. ACI - American Concrete Institute
- C. ASTM - ASTM International
- D. MDOT - Michigan Department of Transportation, Standard Specifications for Construction, latest edition

**1.04 REFERENCE SPECIFICATIONS**

- A. The latest or current ACI Standards and Code Requirements for "Concrete and Reinforced Concrete" shall govern all concrete Work except where otherwise specified herein.

**1.05 TESTING AGENCY**

- A. Inspections and tests required by this Section shall be performed by organizations acceptable to ENGINEER.

**1.06 ALLOWABLE TOLERANCES**

- A. See Section 03 1100, Concrete Forming, for the allowable tolerances for concrete surfaces.

**1.07 DESIGN CRITERIA**

- A. Mixes shall be designed and tested for each size and gradation of aggregates and for each consistency intended for use. Design quantities and test results of each mix shall be submitted for review.
- B. Necessary construction joints are shown on the Plans. Modification of location or placement of construction joints not indicated on the Plans shall be subject to approval of ENGINEER. In general, they shall be located within the middle one-third of the span of slabs, beams, and girders unless a beam intersects a girder at this point, in which case the joint in the girder shall be offset a distance equal to twice the width of the beam.
- C. Joints in walls and columns shall be at the underside of floors, slabs, beams, or girders and at the tops of footings or floor slabs. Beams, girders, brackets, column capitals, haunches, and drop panels shall be placed at the same time as slabs. Joints shall be perpendicular to the main reinforcement.
- D. Expansion joint locations and details shall be as shown on the Plans. In no case shall any fixed metal be continuous through an expansion joint.
- E. Keyways shall be provided in all joints where required to provide for either shear or watertightness. Unless otherwise required, the width of keys shall be at least one-third the thickness of the section at that point and their depth at least one-third their width.

**1.08 SOURCE QUALITY CONTROL**

- A. Furnish tests of cement and aggregates. Material sampling shall conform to the following ASTM Standards:
  - 1. Cement – C183
  - 2. Aggregates – D75
- B. Testing shall be in accordance with applicable ASTM Standards to assure compliance with Specifications.
- C. Use same brand cement for any given structure produced by a single mill unless otherwise provided by authorization of ENGINEER.

**1.09 SUBMITTALS**

- A. Submit Shop Drawings showing the location of joints. Included shall be a schedule of the concrete pouring. The location of joints and pouring schedule shall be subject to approval by ENGINEER.

- B. CONTRACTOR shall submit test reports for cement and aggregates to assure compliance with the Specifications.
- C. Concrete mixture designs and test data shall be submitted for review by ENGINEER with a written request for approval. No concrete shall be placed until CONTRACTOR has received such approval in writing. Each mixture report shall include:
  - 1. Slump on which design is based.
  - 2. Total gallons of water per cubic yard (l/m<sup>3</sup>).
  - 3. Brand, type, composition, and quantity of cement.
  - 4. Brand, type, composition, and quantity of pozzolan or other mineral admixtures.
  - 5. Brand, type, composition, and quantity of ground granulated blast furnace slag.
  - 6. Specific gravity and gradation of each aggregate.
  - 7. Ratio of fine to total aggregates.
  - 8. Weight (surface dry) of each aggregate, lbs./c.y. (kg/m<sup>3</sup>).
  - 9. Brand, type, ASTM, active chemical ingredients, and quantity of each admixture.
  - 10. Air content.
  - 11. Compressive strength based on 7-day and 28-day compression tests.
  - 12. Time of initial set.
- D. Submit manufacturer's literature of abrasive wear resistant floor finish and of chemical curing compound for review by ENGINEER.
- E. Submit a sample concrete delivery ticket for review by ENGINEER.
- F. Submit tickets collected at the site of concrete placement accompanying each load of concrete. A printout system for producing these tickets in connection with automatic batching will be permitted.
  - 1. Each ticket shall be serially numbered, show the charging time, quantity and grade of concrete, location of delivery and the signatures of inspectors at the plant and site. Transit mixed concrete tickets shall also include revolution counter reading at charging and mixing completion.
- G. Submit reports of the sampling and testing of slump, air content and strength performed.
- H. Submit reports of nondestructive, core and/or liquid retention testing required for acceptance of concrete in place.

## **1.10 MATERIAL STORAGE AND HANDLING**

- A. Materials shall be stored and handled in accordance with ACI 304 and as specified below.

- B. When permission is given to store cement in the open, a floor at least six (6) inches (150 mm) above the ground and a waterproof covering shall be provided and so placed as to insure runoff in case of rain.
- C. Cement sacks shall be thoroughly shaken when emptying sacks into the batch. Cement salvaged by CONTRACTOR by cleaning sacks mechanically or otherwise, or from discarded sacks of cement, shall not be used in the Work. The use of a fractional sack of cement will not be permitted unless the fractional part is measured by weight. At the time of its use in the Work, the cement shall be free from lumps.
- D. No aggregates which have become intermixed prior to proportioning shall be used.
- E. Sufficient aggregate shall be available at the site to preclude the possibility of damaging delays while placing the concrete.
- F. Cars used for shipping aggregates shall be clean and in good repair. The use of straw, marsh, hay or other similar materials for closing cracks or holes in cars will not be tolerated.
- G. Pozzolans and other cementitious materials shall be stored and handled in the manner of cement.
- H. Store and handle curing compound in a manner to prevent contamination.

#### **1.11 ENVIRONMENTAL REQUIREMENTS**

- A. Environmental requirements shall be in accordance with ACI 305 for hot weather concreting, and ACI 306 for cold weather concreting. Specific temperature requirements are contained in Article 2.10 of this Section for mixing and Article 3.13 of this Section for placing.

### **PART 2 - PRODUCTS**

#### **2.01 MATERIALS - GENERAL**

- A. Materials shall meet the requirements of ACI 301, ACI 318, and MDOT Specification, Division 9.
- B. Concrete materials shall be tested and inspected as the Work progresses. The review and/or check-test of the proposed materials, securing of production samples of materials at plant stockpiles and/or review of the manufacturer's reports for compliance will be performed at no cost to CONTRACTOR.
- C. Testing and inspection required due to substitution or change of materials requested by CONTRACTOR shall be at CONTRACTOR's expense.

#### **2.02 CEMENT**

- A. Cement shall be the type as indicated on the Plans or as specified.

- B. Type I and IA, conforming to ASTM C150, air-entraining Portland cement when special properties are not specified.
- C. Type III and IIIA, conforming to ASTM C150, air-entraining Portland cement for use when high-early strength is specified.
- D. Type IS and IS-A, conforming to ASTM C595, air-entraining Portland blast-furnace slag cement for use in general concrete construction.
- E. Type IP and IP-A, conforming to ASTM C595, air-entraining Portland-Pozzolan cement for use in general construction. The addition of suffix (MS) signifies that moderate sulfate resistance is specified. The addition of suffix (MH) signifies that moderate heat of hydration is specified.

### **2.03 AGGREGATES**

- A. Washing will be required to eliminate the dust, clay, or silt coating. Aggregates which have been washed shall not be used sooner than 24 hours after washing, unless approved by the ENGINEER.
- B. Coarse aggregate shall be gravel or crushed rock, conforming to MDOT Section 902.03.
- C. Class 17A for members eight (8) inches (200 mm) or less in thickness and Class 6AA for other construction.
- D. Gravel shall consist of hard, clean, durable particles of rock or pebbles and shall be free from lumps of clay.
- E. Crushed rock shall consist of angular fragments of crushed hard heads or boulders or crushed igneous rock free from weathered rock and of uniform quality.
- F. Sieve and screen analyses determination of clay, silt, and dust content and percentages of objectionable particles will be based on dry weights and conform to MDOT Section 902.03, Table 902-1, "Grading Requirements for Coarse Aggregates, Dense-Graded Aggregates, and Open Graded Aggregates" and Table 902-2, "Physical Requirements for Coarse Aggregate, Dense Graded Aggregates and Open Graded Aggregates."
- G. Fine aggregates shall be 2NS in accordance with Section 902 of the Michigan Department of Transportation Standard Specifications for Construction
- H. Fine aggregates shall consist of sharp sand which shall be composed of clean, hard, durable grains and shall be free from lumps of clay and organic deleterious substances.

**2.04 ADMIXTURES**

- A. Admixtures shall be used to achieve concrete as indicated on the Plans or specified herein. Calcium chloride shall not be used.
  - 1. Air-entraining, conforming to ASTM C260.
  - 2. Pozzolan and Fly Ash, conforming to ASTM C618, Class C or F.
  - 3. Water reducing, conforming to ASTM C494.
  - 4. Retarder, conforming to ASTM C494.
  - 5. Plasticizer, conforming to ASTM C494.
  - 6. Ground granulated blast furnace slag conforming to ASTM C989, grade 100.
- B. Abrasive wear resistant floor finish shall be packaged, dry combination of Portland cement, graded Quartz aggregate and dispersing agents formulated to produce an abrasive and wear resistant monolithic surface.

**2.05 JOINT FILLER**

- A. See Section 03 1500, Concrete Accessories.

**2.06 WATER**

- A. Water shall be free from oil, acid, alkali, organic matter, and any other deleterious substances. Water approved by the Local Board of Health may be used without testing. Water from other sources shall be tested before using.

**2.07 CURING COMPOUND**

- A. Curing Agents: Comply with ASTM C309, Type 1, Class B
  - 1. Utilize Type 1D on Base Course Concrete to verify coverage.
  - 2. Provide approved products by Symons Corporation, W.R. Meadows, L & M Chemical, Master Builders or Dayton-Superior which are compatible with floor coatings or toppings specified.
  - 3. Compounds:
    - a) 1100 Clear by W.R. Meadows.
    - b) Day-Chem Rez Cure (J-11-W) by Dayton Superior.
    - c) Resi-Chem Clear Cure by Symons.
    - d) Confilm by Master Builders.
    - e) L & M Cure by L & M Chemical.

**2.08 CONCRETE MIXTURES**

- A. General
  - 1. Concrete shall consist of a mixture of air-entraining Portland cement, coarse and fine aggregate, and water with admixtures if required. Admixtures shall not be



used without ENGINEER's review. The mixture, combined in proportions, shall meet the requirements of Section 701 of the Michigan Department of Transportation Standard Specifications for Construction, and ACI 211.1.

2. Concrete shall be classified and proportioned on the basis of minimum compressive strength at 28 days when cured in a moist room at a temperature within the range of 65° to 75°F (18° to 24°C). The desired strength of the concrete shall be shown on either the Plans or in the Specifications.
3. Aggregates shall be proportioned by weight, except for small structures and for incidental Work requiring less than 10 cubic yards (7 m<sup>3</sup>) of concrete, in which case they may be proportioned by volume when approved by ENGINEER.
4. Cement in bulk, when permitted, shall be proportioned by weight.
5. When proportioned by volume, the amount of each aggregate required for a single batch shall be measured separately and accurately. Shovel methods of measuring will not be permitted. The unit of volumetric measurement shall be 1 cubic foot or 1 cubic meter.
6. When proportioned by weight, the amount of each aggregate required for a single batch shall be weighed in a separate container. The equipment for weighing shall be of an approved type, and of such accuracy that there shall not be an error of more than 1 percent in any one batch.

#### B. Concrete Mix Design – By Strength Grade

1. Table 1 shows for each grade of concrete the minimum compressive strength, cement content, and the modulus of rupture. Concrete shall be 3,500 psi, Grade 3.5, unless otherwise shown on the plans.

**TABLE 1 - CONCRETE MIXTURES**

Concrete Grade	Coarse Aggregate	Min Cement Content				Min. Comprehensive Strength at 28 Days (PSI/MPa)	Min Modulus of Rupture at 28 Days	% Air
		Type of Cement	lbs/yd <sup>3</sup>	Sacks/yd <sup>3</sup>	kg/m <sup>3</sup>			
4.5	6AA	I, IA, IS, IS-A	658	7.0	390	4,500 / 31.0	725 / 5.0	4 - 6
4.0	6AA or 17A	I, IA, IS, IS-A	611	6.5	362	4,000 / 28.0	700 / 4.8	4 - 6
3.5	6AA or 17A	IS, IS-A, IP, IP-A	564	6.0	335	3,500 / 24.0	650 / 4.5	4 - 6

**Notes:**

Maximum water cement ration shall be 0.45

Structural concrete for walls and slabs shall be placed with a slump of four (4) inches (100 mm) maximum. Ground granulated blast furnace slag (GGBFS) may be substituted for cement on a pound for pound basis from a minimum of 25% up to a maximum of 40% GGBFS and 60% cement

Fly ash may be substituted for cement on a pound for pound basis up to a maximum of 15% fly ash and

#### C. Concrete Mix Design – By Prescriptive Criteria

1. Mix and deliver concrete in accordance with Section 601 of the Michigan Department of Transportation Standard Specifications for Construction, latest edition.
2. Provide structural concrete mixtures as specified on the plans in accordance with Michigan Department of Transportation Standard Specifications for Construction Table 701-1A and 701-1B.

**D. Batching Admixtures**

1. The batching of admixtures to achieve and maintain production of the mix design of concrete shall be in accordance with ACI 212.
2. If the air content is found to be less or greater than the specified amount, CONTRACTOR shall immediately discontinue Work and correct the air content.
3. Decreasing the air content may be accomplished by blending air-entraining Portland cement with Portland cement, manufactured at the same mill, in a ratio which will reduce the air content to a value within the specified limits, this blending shall be reviewed by ENGINEER.
4. Increasing the air content may be accomplished by adding to each batch a sufficient amount of air-entraining admixture to bring the air content up to the designed amount.
5. Pozzolan and ground granulated blast furnace slag shall be proportioned based on the mix design approved by ENGINEER per Article 1.09 of this Section to produce watertight concrete.
6. Water Reducer can be used to reduce the water requirement of concrete to obtain consistency of slump, modify workability, increase strength or any other approved use.
7. Use accelerating admixtures in cold weather when temperatures are below 45 degrees F. Use of admixtures will not relax cold weather placement requirements.
  - a) Set accelerating admixtures shall be non-chloride (non-corrosive) type to prevent damage to steel reinforcement. Do not use calcium chloride.
8. Use set retarding admixtures during hot weather when temperatures are above 90 degrees F.

**2.09 TEMPERATURE LIMITS OF MIXTURE**

- A. The temperature of the cement, at the time of delivery to the mixer, shall not exceed 165 degrees F (74°C). It may be required that it be stored at CONTRACTOR's expense until cooled to that temperature.

- B. The temperature limits of aggregates and water entering the mixer shall be as follows:

Limits of Temperature		
Component	Minimum	Maximum
Water	75°F (24°C)	140°F (60°C)
Fine Aggregate	65°F (18°C)	140°F (60°C)
Coarse Aggregate	65°F (18°C)	110°F (43°C)
Concrete (resulting)	60°F (15°C)	90°F (32°C)

## 2.10 MIXERS AND MIXING

A. General:

1. Concrete mixing operations shall be in accordance with ACI 304 and MDOT, Section 701, and shall be subject to random inspection during the progress of the Work at no charge to CONTRACTOR.

B. Central Mixed Concrete:

1. Mixers shall be capable of quickly and completely discharging without segregation or loss.
2. Efficiency of the mixers shall be maintained at all times through repair or replacement of worn parts when necessary.
3. Mixers shall be provided with readily adjustable, automatic devices which will measure the cement and water within one (1) percent and admixtures within three (3) percent.
4. Drum of the mixer shall be kept free from hardened concrete and shall be completely emptied before recharging.
5. Retempering or remixing concrete that has partially set will not be permitted.
6. Mixer shall be cleaned thoroughly each time when out of operation for more than 1/2 hour.
7. Recommended mixing time is a minimum time of one (1) minute for one (1) cubic yard (or cubic meter), with an additional 15 seconds for each additional cubic yard (or cubic meter).
8. Concrete shall be delivered to the site in clean, tight truck bodies designed for this purpose and painted with paraffin if necessary for easy dumping. Concrete at the point of delivery shall have the proper consistency and shall be free from segregation. Mechanical agitators in the truck bodies will be required if the period of time from the mixing plant to the point of dumping exceeds 30 minutes.
9. No concrete shall be dumped if the elapsed time from the mixing plant to the point of dumping exceeds 60 minutes.

C. Transit Mixed Concrete:

1. Transit-mix concrete shall be in accordance with ASTM C94. If transit-mix concrete is used, it shall meet all the foregoing requirements specified for central mixed concrete and, in addition, the following:

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- a) Batched materials shall be properly proportioned and in a dry state. The proper amount of water shall be added to the mixer on the trucks, and no additional water shall be added. No admixtures or accelerators shall be added except as herein noted, without the approval of ENGINEER.
  - b) Trucks shall not be loaded beyond their rated capacity and shall have mixing drums cleaned of all set-up materials at frequent intervals while in use. Trucks with leaking water valves shall not be used.
  - c) Recommended mixing speed should be no less than 12 revolutions per minute, with a minimum of 90 revolutions or until the mix is satisfactory.
  - d) Mixing shall be continuous after water is added to the mix in the drum, but no concrete shall be placed in the forms more than 90 minutes after water is added to the mix.
  - e) Truck-mixed concrete shall be delivered to the site of the Work and discharged from the mixer within the maximum period of 1-1/2 hours from the first introduction of water to the mix. Concrete which remains in the mixer after this period and any concrete which appears too stiff to be properly workable or which appears to have begun to take its initial set shall be rejected and removed from the site of the Work.
- D. OWNER may employ an independent testing laboratory to provide a qualified inspector to be present at the plant where batching of concrete occurs. The inspector shall verify the compliance of the mix with the Specifications and shall sign a form indicating the quantity of concrete and the concrete mixture of each load.

## **2.11 CHANGE OF MIXTURE**

- A. If CONTRACTOR requests a change or substitution of approved batch proportioning, mixing, or delivery operations additional testing and/or inspection shall be at CONTRACTOR's expense.

## **2.12 ACCEPTABLE MANUFACTURERS**

- A. Acceptable manufacturers of abrasive wear resistant floor finish include: Master Builders Company "Mastercon Aggregate," Sonneborn Building Products "Harcol," or equal.

# **PART 3 - EXECUTION**

## **3.01 VERIFICATION OF FORMWORK, REINFORCING, AND SUBGRADES**

- A. CONTRACTOR shall inspect formwork, reinforcement and subgrades to confirm compliance with the related Work specified elsewhere.

## **3.02 EMBEDDED ITEMS**

- A. CONTRACTOR shall verify the location, from certified vendor or applicable engineering drawings, of all embedded items including anchor bolts, wall sleeves,

wall casting, railing post sleeves and miscellaneous pipes and conduits and shall install the items accurately at the locations determined.

### **3.03 BUILDING IN OTHER WORK**

- A. CONTRACTOR shall make all necessary provisions in concrete Work for other Work installed by this or other contractors, and build in all required steel beams, frames, curbs, expansion joints, inserts, hangers, pipes, floor drains, pipe trench covers and frames, anchors, sleeves, floor ducts, fiber and steel conduit, pipe hanger sockets, and all other Work furnished by either this or other contractors.
- B. CONTRACTOR shall build in all anchors, ties, etc., specified under brick and other Work, in faces of concrete Work which are to be faced with masonry, and any other Work shown or noted to be built into concrete. In addition, CONTRACTOR shall provide all openings and holes in concrete Work as shown or as needed to accommodate other Work.

### **3.04 SPECIAL CONCRETE**

- A. CONTRACTOR shall verify the use and/or locations of watertight concrete and/or high-early strength concrete.

### **3.05 PREPARATION**

- A. CONTRACTOR shall notify ENGINEER two (2) working days prior to placement of concrete.
- B. Before depositing new concrete on or against existing concrete the existing concrete shall be roughened, thoroughly cleaned of foreign matter and laitance and saturated with water. The cleaned and saturated surface of the hardened concrete, including vertical and inclined surfaces, shall be coated with a bonding agent or slushed with a minimum 2-inch (50 mm) thick coating of concrete without coarse aggregate grout against which the new concrete shall be placed before the mixture has attained its initial set.
- C. Before concrete is placed in any unit, the forms and the placing and fixing of all steel and incidental items shall be complete, and the forms, steel and adjacent concrete shall be thoroughly cleaned and wetted down.
- D. Where indicated on the Plans, CONTRACTOR shall bridge the subgrade with at least 2,000 psi (13.8 MPa), 3-inch (75 mm) thick lean concrete before placing the reinforcement. This shall be at no extra cost.
- E. No concrete shall be deposited in any unit until the area has been completely dewatered in accordance with Section 31 2319, Dewatering, and not until after CONTRACTOR has made satisfactory provisions to eliminate all possibility of water entering or flowing through the concrete while it is being poured or is taking its set. No concrete shall be placed under or on water.

### **3.06 CONVEYING**

- A. Concrete handling equipment shall be of such a nature and shall be so located that the concrete after leaving the mixer will reach its destination with a minimum lapse of time, with no segregation, and loss of slump. Use of drop chutes, except at or in the forms, is prohibited.
- B. Interior hopper slope of concrete buckets shall be not less than 60 degrees from the horizontal, the minimum dimension of the clear gate opening shall be at least 5 times the nominal maximum size aggregate and the area of the gate opening shall be not less than 2 square feet (0.2 m<sup>2</sup>).
  - 1. Maximum dimension shall not be greater than twice the minimum dimension.
  - 2. Bucket gates shall be essentially grout tight when closed and may be manually, pneumatically or hydraulically operated except for buckets larger than 2 cubic yards (1.5 m<sup>3</sup>) shall not be manually operated.
  - 3. Design of the bucket shall provide means for positive regulation of the amount and rate of deposit of concrete in each dumping position.
- C. Belt conveyors shall be designed and operated to assure a uniform flow of concrete from mixer to final place of deposit without segregation of ingredients or loss of mortar and shall be provided with positive means for preventing segregation of the concrete at the transfer points and the point of placing.
- D. Concrete may be conveyed by positive displacement pump when authorized by ENGINEER. Pumping equipment shall be piston or squeeze pressure type. Pipeline shall be rigid steel pipe or heavy duty flexible rubber hose. Inside diameter of the pipe shall be at least 3 times the nominal maximum size coarse aggregate in the concrete mixture to be pumped. Maximum size coarse aggregate shall not be reduced to accommodate the pumps.
- E. Distance to be pumped shall not exceed limits recommended by the pump manufacturer. Concrete shall be supplied to the pump continuously. When pumping is completed, concrete remaining in the pipeline shall be ejected without contamination of concrete in place. After each operation, equipment shall be thoroughly cleaned, and flushing water shall be wasted outside of the forms.

### **3.07 PLACING**

- A. Concrete shall be so deposited as to maintain the top surface level, unless otherwise shown on the Plans, and also as to avoid any appreciable flow in the mass.
- B. Where placing operations involve dropping the concrete more than 3feet (1 m) in the forms, it shall be deposited through sheet metal or other approved spouts or pipes. These spouts or pipes shall have suitable receiving hoppers at the upper ends, and the lower ends shall be kept within 6 inches (150 mm) of the newly placed concrete so as to prevent segregation and avoid spattering the reinforcing steel with mortar. Under no circumstances shall concrete that has partly hardened be deposited in the Work.
- C. Each layer of concrete shall be plastic when covered with the following layer and the forms shall be filled at a rate of vertical rise of not less than 2 feet (600 mm) per hour. Concrete vibrators shall penetrate the initial layer when placing the following layer.

Vertical construction joints shall be provided as necessary to comply with these requirements.

- D. Concrete shall be placed and compacted in wall or column forms before any reinforcing steel is placed in the system to be supported by such walls or columns. The portion of any wall or column placed monolithically with a floor or roof slab shall not exceed 6 feet
- E. (1.8 m) of vertical height. Concrete in walls or columns shall set at least 2 hours before concrete is placed in the structural systems to be supported by such walls or columns.
- F. Concrete shall be set when top finished. Laitance, debris, and surplus water shall be removed from concrete surfaces at tops of forms by screeding, scraping, or other effective means. Wherever the top of a wall will be exposed to weathering, the forms shall be overfilled and after the concrete has settled, the excess shall be screeded off.
- G. No concrete shall be placed in contact with frozen ground. Time between charging and placement of concrete shall not exceed 1-1/2 hours.
- H. Concrete shall be compacted by continuous vibrating, tamping, spading or slicing. Care shall be taken to eliminate all voids and to provide full bond on reinforcing steel and embedded fixtures. Mechanical vibration shall be employed. Concrete shall be compacted and thoroughly worked with suitable tools combined with the use of vibrators applied internally and providing a frequency not less than 7,000 revolutions per minute. All such vibrating, including the methods and equipment, shall be subject to the review of ENGINEER.
- I. The time of vibrating in any area shall only be sufficient to get efficient compaction, but shall in no case be carried to the point where there is segregation of the fine and coarse materials of the mix. There shall be an absolute minimum of direct vibration of the steel or forms during the process of vibrating. Vibrators shall be inserted and withdrawn from the concrete at numerous locations, from 18 to 30 inches (450 to 750 mm) apart, but shall not be used to transport concrete within the forms. CONTRACTOR shall have a standby vibrator on the job site during all concrete pouring operations.

### **3.08 FINISHING UNFORMED SURFACES**

- A. The unformed surfaces of all concrete shall be screeded and given an initial float finish followed by steel troweling.
- B. Screeding shall provide a concrete surface conforming to the proper elevation and contour with all aggregates completely embedded in mortar. All screeded surfaces shall be free of surface irregularities with a height or depth in excess of 1/4 inch (5 mm) as measured from a 10-foot (3 m) straightedge.
- C. Screeded surfaces shall be given an initial float finish as soon as the concrete has stiffened sufficiently for proper working. Any piece of coarse aggregate which is disturbed by the float or which causes a surface irregularity shall be removed and

replaced with mortar. Initial floating shall produce a surface of uniform texture and appearance with no unnecessary working of the surface. Floating shall be performed with hand floats or suitable mechanical compactor floats.

- D. Troweling shall be performed after the second floating when the surface has hardened sufficiently to prevent an excess of fines being drawn to the surface. Troweling shall produce a dense, smooth, uniform surface free from blemishes and trowel marks. The top surface of driveways, and sidewalks and splash pad shall be given a broomed finish after troweling.
- E. Unless specified to be beveled, exposed edges of floated or troweled surfaces shall be edged with a tool having 1/4 inch (5 mm) corner radius.

### **3.09 FINISHING FORMED SURFACES**

- A. After removal of forms, the finishing of all concrete surfaces shall be started as soon as its condition will permit.
- B. Grind all seams, fins or projections flush with the concrete surface.
- C. Fill and point all honeycomb, tie holes and voids.
- D. Dampen the surface with water and apply a cement and silica sand slurry to the entire surface to fill small defects and air voids.
- E. Remove excess slurry from concrete. Surfaces to be finished shall receive an application of dry Portland cement which shall be rubbed into the slightly dampened surface with a suitable cloth.
- F. After pointing and removal of projections as specified herein, exposed surfaces of concrete, including walls, columns, beams, pilasters and the undersides of slabs, shall be given a rubbed surface finish.

### **3.10 FLOORS**

- A. Concrete floor finish shall be applied to all building floors not receiving further floor finish. At these locations, the concrete shall be brought to the proper elevation and screeded. The surface shall be given two (2) steel trowelings when the concrete has set sufficiently to finish smoothly. Floors shall be sloped uniformly toward floor drains at a slope of 1/8 inch per foot (10 mm per meter).
- B. Concrete finish on steps and loading platforms shall be wood troweled to true and uniform surface and then steel troweled. The surface shall then be slightly roughened with a broom or by dragging burlap across the surface.
- C. Concrete floors shall be finished with an abrasive resistant floor finish in the areas noted on the finish schedule on the Plans. Premixed floor hardener shall be applied to the surface of the freshly floated concrete floor, in strict accordance with the manufacturer's directions. Color to be selected by OWNER.



### 3.11 EXPANSION JOINTS

- A. Comply with the requirements of Section 03 1500, Concrete Accessories. Expansion joints shall have removable polystyrene joint caps secured to the top thereof and shall be accurately positioned and secured against displacement to clean, smooth concrete surfaces.
- B. Joint caps shall be of the size required to install filler strips at the desired level below the finished concrete surface and to form the groove for the joint sealant to the size shown on the Plans.
- C. Joint caps shall not be removed until after the concrete curing period.

### 3.12 CONCRETE CURING

- A. Concrete shall be cured for a period not less than 7 consecutive days. CONTRACTOR shall have adequate equipment and curing material on the job site before concrete placement begins, and it shall be adequate to prevent checking and cracking and loss of moisture from all the surfaces of the concrete. Concrete shall be protected from rain, flowing water, wind and the direct rays of the sun. Openings in concrete shall be sealed to prevent drying of the concrete during the curing period.
- B. Curing compounds shall not be used on surfaces to which additional concrete or other material are to be bonded.
- C. Curing compounds when used shall be applied in strict accordance with the manufacturer's recommendations.
- D. Concrete cured with water shall be kept wet by covering with ponded water or fog spraying to keep all surfaces continuously wet.
- E. Horizontal construction joints and finished surfaces cured with sand shall be covered a minimum thickness of 1-inch (25 mm), uniformly, and kept saturated during the curing period.
- F. Burlap used for curing shall be treated to resist rot and fire and free of sizing or any substances that are injurious to Portland cement or cause discoloration. Strips shall be lapped by half widths. The burlap shall be saturated with water after placement and during the curing period.
- G. Straw or hay shall be in a layer no less than 6 inches (150 mm) thick and held in place by screens, wire or other means to prevent dispersion by the wind. Care shall be observed to avoid discoloration of the concrete surface from the vegetable fibers and for the flammability of the material. The straw shall be saturated with water after placement and during the curing period.

### 3.13 ENVIRONMENTAL CONDITIONS

#### A. General:

1. CONTRACTOR shall provide cold or hot weather protection in accordance with ACI and as specified herein. There shall be no additional cost for hot or cold weather protection of the concrete.

#### B. Cold Weather Protection:

1. When placing concrete in cold weather, CONTRACTOR shall plan and prosecute his Work in a manner which shall assure results free from damage through freezing, contraction, and loss of concrete strength.
2. No concrete shall be poured when the surrounding temperature is below 40°Fahrenheit (4°Celsius), unless the aggregates and water are properly heated. Concrete which has been poured at higher temperatures but has not attained a strength equal to 75% of the required strength of the class of concrete involved, shall be housed and protected in accordance with the provisions of this Section whenever the surrounding temperature falls below 40° Fahrenheit (4°Celsius).
3. Application of heat to the materials shall be made in a manner which will keep these materials clean and free from injurious substances.
4. Aggregates may be heated only by steam coils or steam jets, except in the case of small quantities of concrete when other methods may be approved by the ENGINEER. A sufficient quantity of properly heated aggregates shall be on hand prior to starting the pouring of any unit.
5. Concrete shall be properly housed with canvas, burlap, or other windproof material in such a manner that any necessary removal of the forms or finishing of the concrete can proceed without undue damage to the concrete from the elements.
6. Heating of the housing shall be done in a manner which will maintain a temperature between 50° and 70° Fahrenheit (10° and 20°Celsius), at all times for at least 5 days after the pour is complete and 12 hours before the pour begins.
7. Supplemental heating units shall have exhaust vented to the exterior and shall not cause deleterious reactions or deposits to occur to concrete.

#### C. Hot Weather Protection:

1. Concrete deposited in hot weather shall not have a placing temperature that will cause difficulty from loss of slump, flash set, or cold joints. Concrete temperature shall be less than 90°Fahrenheit (32°Celsius).
2. In hot weather, suitable precautions shall be taken to avoid drying of the concrete prior to finishing operations. Use of windbreaks, sunshades, fog sprays, or other devices shall be provided.

### 3.14 ADDITION OF WATER

- A. To increase workability, adding water to the mix shall be limited to a one time addition of 1 gallon of water per cubic yard of concrete (5 liters per cubic meter) and

mixed with a minimum of 30 revolutions at a rate of 12 to 15 revolutions per minute. Addition of water shall be within the slump requirements.

### **3.15 CONCRETE DELIVERY TICKET**

- A. A ticket system shall be used for recording the transportation of concrete from the batching plant to point of delivery. This ticket shall be issued to the truck operator at the point of loading and given to ENGINEER upon delivery. Ticket shall as a minimum indicate the time of mixer charging, quantity of concrete, type of mixture including amount of cement, and the plant where the concrete was batched.

### **3.16 CONCRETE DELIVERY REJECTION**

- A. Concrete not permitted for inclusion in the Work by ENGINEER shall be removed from the site. Rejection of concrete will be determined through concrete testing and elapsed time from mixer charging to delivery.

### **3.17 CONCRETE TESTING AT PLACEMENT**

#### **A. General:**

- 1. Tests shall be made of fresh concrete for each 50 cubic yards (40 m3), or whenever consistency appears to vary. Sampling and testing of slump, air content and strength will be performed at no cost to CONTRACTOR.
- 2. Composite samples shall be secured in accordance with the Method of Sampling Fresh Concrete, ASTM C172.

#### **B. Slump Test:**

- 1. Slump Test shall be in accordance with ASTM C143. CONTRACTOR shall use the least slump possible consistent with workability for proper placing of the various classifications of concrete.
- 2. A tolerance of up to 1-inch (25 mm) above the indicated maximum slump shall be allowed for individual batches provided the average for all batches or the most recent 10 batches tested, whichever is fewer, does not exceed the maximum limit.

#### **C. Air Content:**

- 1. Air content of normal weight concrete will be determined in accordance with Method of Test for Air Content of Freshly Mixed Concrete by the Pressure Method, ASTM C231.

#### **D. Compressive Strength:**

- 1. A set of cylinders for compressive strength tests will consist of four cylinders per each set.
- 2. Molding and curing specimens from each set shall be in accordance with Method of Making and Curing Concrete Test Specimens in the Field, ASTM C31. Any deviations from the requirements of this Standard shall be recorded in the test report.

3. Testing specimens will be in accordance with Method of Test for Compressive Strength of Cylindrical Concrete Specimens, ASTM C39. One (1) specimen shall be tested at 7 days for information and 2 shall be tested at 28 days for acceptance.
  - a) The acceptance test results shall be the average of the strengths of the 2 specimens tested at 28 days. If 1 specimen in a test manifests evidence of improper sampling, molding or testing, it shall be discarded and the strength of the remaining cylinder shall be considered the test result.
4. The strength level of the concrete will be considered satisfactory so long as the averages of all 28 day strength test results equal or exceed the specified 28-day strength and no individual strength test result falls below the specified 28-day strength by more than 500 psi (3.4 MPa).
5. If the strength test is not acceptable, further testing shall be performed to qualify the concrete.

### **3.18 TESTING OF CONCRETE IN PLACE**

- A. Additional testing of materials or concrete occasioned by their failure by test or inspection to meet specification requirements shall be at the expense of CONTRACTOR.
- B. Testing by impact hammer, sonoscope, or other nondestructive device may be permitted by ENGINEER to determine relative strengths at various locations in the structure as an aid in evaluating concrete strength in place or for selecting areas to be cored. Such tests, unless properly calibrated and correlated with other test data, shall not be used as a basis for acceptance or rejection.
- C. When required by ENGINEER, cores at least two (2) inches (50 mm) in diameter shall be obtained and tested in accordance with Methods of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete, ASTM C42.
- D. If the concrete in the structure will be dry under service conditions, the cores shall be air dried (temperature 60° to 80°Fahrenheit (15°-25°Celsius), relative humidity less than 60%) for 7 days before test and shall be tested dry.
- E. If the concrete in the structure will be more than superficially wet under service conditions, the cores shall be tested after moisture conditioning in accordance with ASTM C42.
- F. At least 3 representative cores shall be taken from each member or area of concrete in place that is considered potentially deficient. The location of cores shall be determined by ENGINEER so as to least impair the strength of the structure. If, before testing, one or more of the cores shows evidence of having been damaged subsequent to or during removal from the structure, it shall be replaced.
- G. Concrete in the area represented by a core test will be considered adequate if the average strength of the cores is equal to at least 85% of and if no single core is less than 75% of the specified 28-day strength.
- H. Core holes shall be filled by low slump concrete or mortar.

**3.19 RETENTION TESTING**

- A. Tanks or structures designed to hold or retain water, wastewater or other liquids shall be retention tested.
- B. To test a tank or structure for leakage, CONTRACTOR shall clean, disinfect (if required) and fill the tank or structure with water to its maximum level.
- C. The water shall be allowed to remain 24 hours with all associated valves and appurtenances tightly closed.
- D. During this 24-hour period, the water level as measured by a hook gage shall show no measurable loss.
- E. If this test fails, CONTRACTOR shall dewater the tank or structure, make such repairs as necessary to achieve a watertight tank or structure, clean, disinfect (if required), and retest.
- F. Tests and repairs shall be repeated until the tank or structure is accepted by ENGINEER.

**3.20 DEFECTIVE CONCRETE**

- A. If, in the opinion of ENGINEER, the defects in the concrete are of such a nature as to warrant condemnation, that portion of the pour may be ordered replaced in its entirety and CONTRACTOR shall promptly replace same without additional compensation.
- B. Defective concrete shall be repaired by cutting out the defective area and placing new concrete which shall be formed with keys, dovetails or anchors to attach it securely in place.

**PART 4 - MEASUREMENT AND PAYMENT****4.01 BASIS OF PAYMENT**

- A. Payment for the following item(s) of work shall cover all materials, equipment and labor necessary to install the following pay items in accordance with the plans and these specifications.

**4.02 METHOD OF MEASUREMENT**

<b>Description</b>	<b>Unit Price</b>
Curb and Gutter, Conc, Det __, Modified .....	Foot
Stand Up Concrete Curb .....	Foot
Sidewalk, Conc, (reinf/nonreinf), __ inch .....	Square Foot
Detectable Warning Surface .....	Foot

Measurement shall be made in accordance with Section 601, 801, 802 and 803 of the Michigan Department of Transportation Standard Specifications for Construction, latest edition.

**END OF SECTION**

**SECTION 10 14 53**  
**TRAFFIC SIGNAGE****PART 1 - GENERAL****1.01 SUMMARY****A. Section Includes:**

1. Traffic Signs, supports, and hardware

**1.02 REFERENCES****A. ASTM International:**

1. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
2. ASTM D4956 - Standard Specification for Retroreflective Sheeting for Traffic Control

**B. Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD)**

1. Michigan MUTCD, Current Edition
2. Standard Highway Signs, Current Edition

**C. Michigan Department of Transportation**

1. Standard Specifications for Construction, latest edition
2. MDOT Sign Support Standard Plans

**1.03 QUALIFICATIONS**

- A. Sign Installer:** Company specializing in performing work of this section with minimum three years documented experience.

**1.04 QUALITY ASSURANCE**

- A. Single Source Responsibility:** Obtain sign faces, posts, mounting brackets and bolts from single source or manufacturer.

**PART 2 - PRODUCTS****2.01 SIGNS****A. Panel Material:** ASTM B209 aluminum sheet

1. Thickness: 080 in.

- B. Sheeting: ASTM D4956 Type IV or Type IX as determined according to Michigan Department of Transportation 2012 Standard Specifications for Construction Table 919-3.
- C. Dimensions and layout of letters and symbols: according to FHWA Standard Highway Signs
  - 1. Sign dimensions, symbols, letters, and reflectorization shall conform to standards outlined in the current version of The Michigan Manual of Uniform Traffic Control Devices.
  - 2. Lettering of guide signs shall be Clearview font.

## **2.02 SUPPORTS AND HARDWARE**

- A. Sign Posts: Standard weight, 3 pounds per foot steel channel posts according to Michigan Department of Transportation 2012 Standard Specifications for Construction section 919.04.A
- B. Mounting Hardware, including brackets, bolts, nuts, washers, and strapping:
  - 1. Stainless steel
  - 2. Michigan Department of Transportation 2012 Standard Specifications for Construction section 919.02C
  - 3. Brackets for extruded D3-1 street name signs: minimum length 12 inches.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify all work requiring trenching and rough grading is complete.

### **3.02 PREPARATION**

- A. Call MISS DIG at 1-800-482-7171 or 811 not less than three full working days before installing sign posts. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Review sign plan, verify sign locations are in conformance with Michigan MUTCD.
- C. Review sign sizes to verify number of posts
- D. Required number of posts to support signs shall be in accordance with the Michigan Department of Transportation Sign Support Typical Plans

### **3.03 INSTALLATION**

- A. Install required number of posts.



- B. Drive sign posts 42-inches minimum below grade or to a depth as specified in the MDOT Sign Support Standard Plans.
- C. Install posts plumb and facing direction of sign face in accordance with Schedules.
- D. Install posts in paved areas through round opening in pavement
  - 1. Core drill and remove pavement
  - 2. Install post
  - 3. Fill void space sand, level to two inches below pavement surface. Fill remaining void space with a low strength (max 500 psi) non-shrink grout flush with pavement surface.
  - 4. Prior to grouting, apply an approved release agent to cored pavement edges to prevent bonding.
- E. Attach signs securely to sign posts with hardware.

### **3.04 SCHEDULES**

- A. Sign selection, arrangement, and location:
  - 1. Michigan MUTCD.
- B. Orientation:
  - 1. Align signs at a 90 degree angle to the street, facing the direction of approaching traffic.
  - 2. Exception: No Parking signs aligned at 30 to 45 degree angle to the street, unless mounted with other signs at 90 degree angles.
- C. Mount Height
  - 1. Michigan MUTCD
  - 2. Michigan Department of Transportation Sign Support Typical Plan Series 120-A.
  - 3. Standard minimum clearance above ground: 7 feet.
  - 4. Mount double signs with 2-inch space between signs and with bottom of lower sign at 6 feet minimum above grade.
  - 5. Minimum clearance above ground for object markers: 4 feet
- D. Offset
  - 1. Edge of sign minimum 2 feet from face of curb
  - 2. Edge of sign minimum 1 foot from sidewalks designated for pedestrian use only.
  - 3. Edge of sign minimum 2 feet from edge of pathways open to bicycle travel.

**PART 4 - MEASUREMENT AND PAYMENT.****4.01 BASIS OF PAYMENT**

- A. Payment for the following item(s) of work shall cover all materials, equipment and labor necessary to install the following pay items in accordance with the plans and these specifications.

**4.02 METHOD OF MEASUREMENT**

Description	Unit
Post, Steel, __ lb.....	Foot
Sign, Type __A.....	Square Foot

**Post, Steel \_ lb** includes furnishing and installing steel U-channel posts, including pavement coring and patching as needed.

**Sign, Type \_\_A** includes furnishing and installing traffic signage (with reflectorized legend on reflectorized background) of the types and sizes specified on the plans, including all mounting hardware and assembly in the field.

**END OF SECTION**

**SECTION 26 05 00**  
**COMMON WORK RESULTS FOR ELECTRICAL****PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. This Section includes general administrative and procedural requirements for electrical installations. The following administrative and procedural requirements are included in this Section to expand the requirements specified in Division 01:
  - 1. Submittals.
  - 2. Supporting devices for electrical components.
  - 3. Maintenance manuals.
  - 4. Concrete equipment bases.
  - 5. Electrical installations.
  - 6. Owner training sessions.
- B. Related sections:
  - 1. Division 22 and 23 sections for factory-installed motors, controllers, accessories, and connections.

**1.02 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this and the other sections of Division 26.
- B. Refer to civil, architectural, structural, and mechanical drawings for coordination of actual dimensions, building construction methods, and additional requirements for Division 26.
- C. If a conflict occurs between drawings and specifications, contractor shall include the most costly means depicted in their bid or bring the conflict to the Architect/Engineer's attention prior to bid.

**1.03 MATERIAL SUBSTITUTIONS**

- A. In addition to the requirements of Division 01, the following definitions, procedures and requirements shall pertain to Division 26 work.
- B. The materials, equipment and specialty items shown on the drawings and/or in these specifications are, in all cases, specified around a list of brand names known and performance proven to the Engineer. Only those manufacturers named on the drawings or in their specifications will be approved for this project.
- C. Additional Manufacturers: During the bidding period, the Engineer will consider written requests for material substitutions. The Engineer will evaluate the request, and if acceptable, will issue a written Addendum to the Contract Documents. Verbal approval will not be considered binding.

- D. Approved Equal: The terms "or equal" and "approved equal" are meant to apply only to those manufacturers and brand names listed in these specifications or noted on the drawings. It does not imply "or equal" outside of the limits of the list of manufacturers named for each item.
- E. The Engineer reserves the sole right for the approval of proposed additional manufacturers, materials, or equipment.
- F. Requesting approvals: In order to facilitate the evaluation, the Engineer will require the following of each request for approval of material substitution.
- G. Time: Requests for material substitutions shall be submitted, in writing, at least 14 calendar days prior to bid opening time.
- H. Product Data: Request shall include manufacturer's name and address, brochures, catalog literature, performance and test data and reference standards.
- I. Installation: Provide detailed description of methods of installation as appropriate.
- J. Benefits: Identify the differences in alternate material or equipment as compared to that specified and indicate the benefits to the project as a result of approving the alternate.
- K. Samples: Furnish to the Engineer, when requested, samples of proposed material or equipment substitutions. These samples shall remain with the Engineer as long as he deems necessary.
- L. Costs: All changes required by material substitutions or alternate equipment shall be made at no additional cost to the Owner. All costs incurred by other trades, public utilities or the Owner as a result of the use of such equipment shall be the responsibility of the Contractor.

#### **1.04 SUBMITTALS**

- A. General: Follow the procedures specified in Division 01 Section "Submittal Procedures."
- B. Increase, by the quantity listed below, the number of electrical related shop drawings, product data, and samples submitted, to allow for required distribution plus two copies of each submittal required, which will be retained by the Electrical Consulting Engineer.
  - 1. Shop Drawings - Initial Submittal: 1 additional blue- or black-line prints.
  - 2. Shop Drawings - Final Submittal: 1 additional blue- or black-line prints.
  - 3. Product Data: 1 additional copy of each item.
  - 4. Samples: 1 addition as set.
- C. Additional copies may be required by individual sections of these Specifications.

#### **1.05 QUALITY ASSURANCE**

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

**1.06 COORDINATION**

- A. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.
- B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.
- C. Coordinate electrical and telephone service connections to components furnished by utility companies and perform all specific duties they require.
  - 1. Comply with requirements of authorities having jurisdiction and of utility company providing services including any service demolition or build-up charges.
- D. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces. Access doors and panels are specified in Division 08.
- E. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.
- F. Where electrical identification markings and devices will be concealed by acoustical ceilings and similar finishes, coordinate installation of these items before ceiling installation.

**1.07 MAINTENANCE MANUALS**

- A. Prepare maintenance manuals in accordance with Division 01 Section "Closeout Procedures." In addition to the requirements specified in Division 01, include the following information for equipment items:
  - 1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
  - 2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
  - 3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
  - 4. Servicing instructions and lubrication charts and schedules.

**1.08 DELIVERY, STORAGE, AND HANDLING**

- A. A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

**1.09 OWNER TRAINING SESSIONS**

- A. Comply with the requirements of Division 01 and contractor shall video record all training sessions and provide discs to owner with Operation and Maintenance Manuals.

**PART 2 - PRODUCTS****2.01 SUPPORTING DEVICES**

- A. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.
- B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized or #312 stainless steel.
- C. Slotted-Steel Channel Supports: Flange edges turned toward web, and 9/16-inch-diameter slotted holes at a maximum of 2 inches o.c., in webs.
- D. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C- clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click- type hangers.
- E. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.
- F. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for non-armored electrical cables in riser conduits. Plugs have number and size of conductor gripping holes as required to suit individual risers. Body constructed of malleable-iron casting with hot-dip galvanized finish.
- G. Expansion Anchors: Carbon-steel wedge or sleeve type.
- H. Toggle Bolts: All-steel springhead type.
- I. Powder-Driven Threaded Studs: Heat-treated steel.

**2.02 CONCRETE BASES**

- A. Concrete Forms and Reinforcement Materials: As specified in Division 03.
- B. Concrete Grade S2 in accordance with Section 701 of the Michigan Department of Transportation Standard Specifications for Construction.

**2.03 TOUCHUP PAINT**

- A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.
- B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

**PART 3 - EXECUTION****3.01 ELECTRICAL EQUIPMENT INSTALLATION**

- A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom.
- B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.

- C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.
- D. Right of Way: Give to raceways and piping systems installed at a required slope.

### **3.02 ELECTRICAL INSTALLATIONS**

- A. General: Sequence, coordinate, and integrate the various elements of electrical systems, materials, and equipment. Comply with the following requirements:
  - 1. Install temporary electrical power. Lighting and equipment hook-up as required per Division 01 specification section including "Specialty Systems."
  - 2. Coordinate electrical systems, equipment, and materials installation with other building components.
  - 3. Verify all dimensions by field measurements.
  - 4. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for electrical installations.
  - 5. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
  - 6. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
  - 7. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
  - 8. Coordinate connection of electrical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service including all changes.
  - 9. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Architect.
  - 10. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
  - 11. Install electrical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
  - 12. Install access panel or doors where units are concealed behind finished surfaces. Access panels and doors are specified in Division 08 and Division 26 Section "Common Work Results for Electrical."

13. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

### **3.03 ELECTRICAL SUPPORTING METHODS**

- A. Damp Locations and Outdoors: Hot-dip galvanized materials or non-metallic, U-channel system components.
- B. Dry Locations: Steel materials.
- C. Support Clamps for PVC Raceways: Click-type clamp system.
- D. Conform to manufacturer's recommendations for selecting supports.
- E. Strength of Supports: Adequate to carry all present and future loads, times a safety factor of at least 4; 200-lb- minimum design load.
- F. Mounting Heights:
  1. Mounting heights to bottom of box and above finished floor for the below named items shall be as follows, unless otherwise shown. All other devices' mounting heights shall be as shown on drawings.
    - a. Switches - 44"
    - b. Receptacles - 16" mounted vertically with ground prong slot at bottom.
    - c. Safety switches - 54".
    - d. Motor controllers - 54".
    - e. Panelboards to top - 72".
    - f. Receptacles in mechanical, electrical, janitor and elevator machine rooms - 44"
    - g. Telephone terminal boards - 72" to top.
    - h. Exterior W.P. convenience - 24" above grade mounted horizontally.
    - i. Open-close-stop or ADA push button - 44".
    - j. Fire alarm pull station - 44".
    - k. Fire alarm horn/strobe or strobe only - 80".
  2. Contractor shall check all equipment and casework layouts with released shop drawings and verify exact mounting heights before rough-in.

### **3.04 SUPPORT INSTALLATION**

- A. Install support devices to securely and permanently fasten and support electrical components.
- B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.
- C. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.
- D. Size supports for multiple raceway installations so capacity can be increased by a 25 percent minimum in the future.
- E. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.
- F. Install 3/8-inch diameter or larger threaded steel hanger rods, unless otherwise indicated 1/4- inch is acceptable for single conduit runs.



- G. Spring-steel fasteners specifically designed for supporting single conduits or tubing may be used instead of malleable-iron hangers for 1-1/2-inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings and for fastening raceways to slotted channel and angle supports.
- H. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.
- I. Simultaneously install vertical conductor supports with conductors.
- J. Separately support cast boxes that are threaded to raceways and used for fixture support. Support sheet-metal boxes directly from the building structure or by bar hangers. If bar hangers are used, attach bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 24 inches from the box.
- K. Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength.
- L. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.
- M. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:
  - 1. Wood: Fasten with wood screws or screw-type nails.
  - 2. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.
  - 3. New Concrete: Concrete inserts with machine screws and bolts.
  - 4. Existing Concrete: Expansion bolts.
  - 5. Instead of expansion bolts, threaded studs driven by a powder charge and provided with lock washers may be used in existing concrete.
  - 6. Steel: Welded threaded studs or spring-tension clamps on steel.
    - a. Field Welding: Comply with AWS D1.1.
  - 7. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or other items.
  - 8. Light Steel: Sheet-metal screws.
  - 9. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.

### **3.05 FIRESTOPPING**

- A. Apply firestopping to electrical component penetrations of fire-rated floor and wall assemblies to achieve fire-resistance rating of the assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Firestopping."

**3.06 CONCRETE BASES**

- A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger, in both directions, than supported unit. Follow supported equipment manufacturer's anchorage recommendations and setting templates for anchor-bolt and tie locations, unless otherwise indicated. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 03.

**3.07 FIELD QUALITY CONTROL**

- A. Inspect installed components for damage and faulty work, including the following:
1. Supporting devices for electrical components.
  2. Electricity-metering components.
  3. Concrete bases.

**3.08 REFINISHING AND TOUCHUP PAINTING**

- A. Refinish and touch up paint. Paint materials and application requirements are specified in Division 09 Section "Painting and Coating."
1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.
  2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.
  3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
  4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

**3.09 CLEANING AND PROTECTION**

- A. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.
- B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

**PART 4 - MEASUREMENT AND PAYMENT****4.01 BASIS OF PAYMENT**

- A. Payment for the following item(s) of work shall cover all materials, equipment and labor necessary to install the following pay items in accordance with the plans and these specifications.

**4.02 METHOD OF MEASUREMENT**

Description	Unit Price
Electrical Cabinet, Relocate .....	Lump Sum

## Electrical Service .....Ea

Electrical Cabinet, Relocate shall be measured and paid by the lump sum, Payment includes all work to remove and salvage existing electrical cabinet and related equipment and reinstallation at the locations shown on the plans, including new 8 inch concrete pad. Handholes and conduit will be paid separately.

Electrical Service shall be measured and paid by the each unit price. Payment includes all work and materials to install new electrical services in the locations shown on the plans. Handholes and conduit will be included in this item.

**END OF SECTION**



**SECTION 26 05 19**  
**LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS****PART 1 - GENERAL****1.01 SUMMARY****A. Section Includes:**

1. Building wires rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

**1.02 REFERENCES**

- A. The publications listed in this section form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation. In the event a referenced publication has been replaced or superseded, the current version shall govern.

**1.03 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit manufacturer's submittal data for Engineer review and approval.
- C. Manufacturer's Certificate: Certify products meet or exceed specified requirements

**1.04 QUALITY ASSURANCE**

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

**PART 2 - PRODUCTS****2.01 CONDUCTORS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Alpha Wire.
  2. Belden Inc.
  3. Encore Wire Corporation.
  4. General Cable Technologies Corporation.
  5. Southwire Incorporated.
- B. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.
- C. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THW Type THHN- THWN.

**2.02 CONNECTORS AND SPLICES**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. AFC Cable Systems, Inc.
  - 2. Gardner Bender.
  - 3. Hubbell Power Systems, Inc.
  - 4. Ideal Industries, Inc.
  - 5. Ilsco; a branch of Bardes Corporation.
  - 6. NSi Industries LLC.
  - 7. O-Z/Gedney; a brand of the EGS Electrical Group.
  - 8. 3M; Electrical Markets Division.
  - 9. Tyco Electronics.
- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

**2.03 SYSTEM DESCRIPTION**

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.

**PART 3 - EXECUTION****3.01 CONDUCTOR MATERIAL APPLICATIONS**

- A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger, except VFC cable, which shall be extra flexible stranded.

**3.02 CONDUCTOR INSULATION APPLICATIONS AND WIRING METHODS**

- A. Service Entrance: Type THHN-THWN, single conductors in raceway.
- B. Exposed Feeders: Type THHN-THWN, single conductors in raceway.
- C. Branch Circuits: Type THHN-THWN, single conductors in raceway.

**3.03 INSTALLATION OF CONDUCTORS**

- A. Complete raceway installation between conductor termination points according to Division 16 "Raceways and Boxes for Electrical Systems" prior to pulling conductors.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage conductors or raceway.

### **3.04 CONNECTIONS**

- A. Tighten electrical connectors and terminals according to manufacturer's published torque- tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches 12 inches of slack.

### **3.05 IDENTIFICATION**

- A. Identify and color-code conductors according to Division 16 "Identification for Electrical Systems."

### **3.06 FIELD QUALITY CONTROL**

- A. Perform the following tests and inspections:
  - 1. After installing conductors and before electrical circuitry has been energized, test for compliance with requirements.
  - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
- B. Cables will be considered defective if they do not pass tests and inspections.

**END OF SECTION**





**SECTION 26 05 23**  
**RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS****PART 1 - GENERAL****1.01 SUMMARY****A. Section Includes:**

1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Metal wireways and auxiliary gutters.
4. Boxes and enclosures.
5. Handholes and boxes for exterior underground cabling.

**B. Related Sections**

1. Section 31 23 33 – Trenching and Backfilling
2. Section 26 56 00 – Exterior Lighting
3. Section 34 41 13 – Traffic Signals

**1.02 REFERENCES****A. The publications listed in this section form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation. In the event a referenced publication has been replaced or superseded, the current version shall govern.****B. (Publisher Name):**

1. (Document Number) - (Document Title)
2. (Document Number) - (Document Title with English units and separate corresponding standard with metric units)

**1.03 SUBMITTALS****A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.****B. Product Data: Product Data: For conduits, wireways, and fittings, hinged-cover enclosures, and cabinets.****PART 2 - PRODUCTS****2.01 METAL CONDUITS, TUBING, AND FITTINGS****A. Unless otherwise specified, conduits of this type shall conform to the following requirements.****B. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.**

- C. GRC: Comply with ANSI C80.1 and UL 6.
- D. IMC: Comply with ANSI C80.6 and UL 1242.
- E. EMT: Comply with ANSI C80.3 and UL 797.
- F. FMC: Comply with UL 1; zinc-coated steel.
- G. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- H. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
  - 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
  - 2. Fittings for EMT:
    - a. Material: Steel.
    - b. Type: Setscrew.
  - 3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
- I. Joint Compound for IMC or GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

## **2.02 NONMETALLIC CONDUITS, TUBING, AND FITTINGS**

- A. Unless otherwise specified, conduits of this type shall conform to the following requirements.
- B. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
- D. LFNC: Comply with UL 1660.
- E. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
- F. Fittings for LFNC: Comply with UL 514B.

## **2.03 METAL WIREWAYS AND AUXILIARY GUTTERS**

- A. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 unless otherwise indicated, and sized according to NFPA 70.
- B. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

## **2.04 BOXES, ENCLOSURES, AND CABINETS**

- A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- D. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
- E. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- F. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- G. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.
- H. Gangable boxes are prohibited.
- I. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.
  - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
  - 2. Nonmetallic Enclosures: Fiberglass.
  - 3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

## **PART 3 - EXECUTION**

### **3.01 RACEWAY APPLICATION**

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
  - 1. Exposed Conduit: GRC or IMC.
  - 2. Underground Conduit: RNC, Type EPC-40-PVC.
  - 3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
  - 4. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Indoors: Apply raceway products as specified below unless otherwise indicated.
  - 1. Exposed: EMT.
  - 2. Concealed in Interior Walls and Partitions: EMT.
  - 3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
  - 4. Damp or Wet Locations: GRC or IMC.
  - 5. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.
- C. Minimum Raceway Size: 3/4-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
  2. EMT: Use setscrew, steel fittings. Comply with NEMA FB 2.10.
  3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- E. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

### 3.02 INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Comply with requirements in Section 26 05 00 for hangers and supports.
- D. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- E. Install no more than the equivalent of three 90-degree bends in any conduit run. Support within 12 inches of changes in direction.
- F. Conceal conduit and EMT within finished walls, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- G. Support conduit within 12 inches of enclosures to which attached.
- H. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- I. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- J. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- K. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 36 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- L. Expansion-Joint Fittings:
  1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet.
  2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:

- a. Outdoor Locations Not Exposed to Direct Sunlight: 125°F temperature change.
  - b. Outdoor Locations Exposed to Direct Sunlight: 155°F temperature change.
  - c. Indoor Spaces Connected with Outdoors without Physical Separation: 125°F temperature change.
3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per degree F of temperature change for PVC conduits.
  4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
  5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
- M. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 36 inches of flexible conduit for luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
1. Use LFMC in damp or wet locations subject to severe physical damage.
  2. Use LFMC in damp or wet locations not subject to severe physical damage.
- N. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to bottom of box unless otherwise indicated.
- O. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between the box and cover plate or the supported equipment and box.
- P. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- Q. Locate boxes so that cover or plate will not span different building finishes.
- R. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

### **3.03 INSTALLATION OF UNDERGROUND CONDUIT**

#### **A. Direct-Buried Conduit:**

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 31 23 33 – Trenching and Backfilling for pipe less than 6 inches in nominal diameter.
2. Install backfill in accordance with MDOT Trench Detail G and as specified in Section 31 23 33 – Trenching and Backfilling. Class IIIb granular material may be substituted for Class IIIa granular material.
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing

controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 31 23 33 – Trenching and Backfilling

4. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
  - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
5. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems."

### **3.04 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS**

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

### **3.05 FIRESTOPPING**

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies.

### **3.06 PROTECTION**

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
- B. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
- C. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

## **PART 4 - MEASUREMENT AND PAYMENT – NOT USED**

## **SECTION 26 05 26**

### **GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**

#### **PART 1 - GENERAL**

##### **1.01 SUMMARY**

- A. Section Includes: Grounding systems and equipment.

##### **1.02 REFERENCES**

- A. The publications listed in this section form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation. In the event a referenced publication has been replaced or superseded, the current version shall govern.
- B. National Fire Protection Association (NFPA)
  - 1. NFPA 70: National Electrical Code (NEC)
- C. Underwriters Laboratories (UL):
  - 1. UL 467 Grounding and Bonding Materials and Equipment

##### **1.03 QUALITY ASSURANCE**

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
  - 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Comply with UL 467 for grounding and bonding materials and equipment.

#### **PART 2 - PRODUCTS**

##### **2.01 CONDUCTORS**

- A. Insulated Conductors: Copper wire insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
  - 1. Solid Conductors: ASTM B 3.
  - 2. Stranded Conductors: ASTM B 8.
  - 3. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
  - 4. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
  - 5. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

- C. Bare Grounding Conductor: Soft-drawn copper.

## **2.02 CONNECTORS**

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
  - 1. Pipe Connectors: Clamp type, sized for pipe.

## **2.03 GROUNDING ELECTRODES**

- A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet in diameter.

# **PART 3 - EXECUTION**

## **3.01 APPLICATIONS**

- A. Conductors: Install solid conductor for No. 10 AWG and smaller, and stranded conductors for No. 8 AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 AWG minimum.
  - 1. Bury at least 24 inches below grade.
- C. Conductor Terminations and Connections:
  - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
  - 2. Underground Connections: Welded connectors.

## **3.02 EQUIPMENT GROUNDING**

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.

## **3.03 INSTALLATION**

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
  - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
  - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
  - 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- C. Grounding and Bonding for Piping:



1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system upstream from equipment shutoff valve.

### **3.04 LABELING**

- A. Comply with requirements in Division 16 "Identification for Electrical Systems" for instruction signs. The label or its text shall be green.

### **3.05 FIELD QUALITY CONTROL**

- A. Tests and Inspections:
  1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
  2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
- B. Grounding system will be considered defective if it does not pass tests and inspections.
- C. Report measured ground resistances that exceed the following values:
  1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.

### **END OF SECTION**



**SECTION 31 10 00**  
**SITE CLEARING AND DEMOLITION****PART 1 - GENERAL****1.01 DESCRIPTION****A. Section Includes:**

1. Removing surface debris.
2. Removing designated pavement and curb and gutter for site improvements.
3. Removing designated trees, shrubs, and other plant life.
4. Removing abandoned utilities.
5. Excavating topsoil.

**1.02 RELATED SECTIONS:**

- A. Section 31 22 13 - Rough Grading.

**1.03 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Disposal Site and Tracking Documentation: The Contractor shall furnish a disposal plan including the disposal site and any necessary agreements or certifications for acceptance of materials generated from the job site. Disposal of hazardous or regulated materials shall be in accordance with all federal, state, and local requirements.

**PART 2 - PRODUCTS - NOT USED****PART 3 - EXECUTION****3.01 EXAMINATION**

- A. Section 01300 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify existing plant life designated to remain is tagged or identified.
- C. Identify waste areas and salvage areas for placing removed materials.

**3.02 PREPARATION**

- A. Call Miss Dig at 1-800-482-7171 or 811 not less than three full working days before performing any portion of the Work that involves any soil disturbance.
  - 1. Request underground utilities to be located and marked within and surrounding construction areas.
  - 2. Verify all utility companies have responded before commencing Work.

**3.03 PROTECTION**

- A. Locate, identify, and protect utilities indicated to remain, from damage.
- B. Protect curbs or roadway pavement indicated to remain, from damage.
- C. Protect trees, plant growth, and features designated to remain, as final landscaping.
- D. Protect bench marks, survey control points, and existing structures from damage or displacement.

**3.04 CLEARING**

- A. Trees, stumps, brush, hedges, and other vegetation occurring within the contract limits as defined on the Plans or as directed by Engineer shall be cut off flush with the ground and shall be completely removed.

**3.05 CLEARING AND GRUBBING**

- A. Trees, stumps, brush, shrubs, hedges, roots, corduroy, logs, matted roots, other vegetation and debris occurring within the contract limits as defined on the Plans or as directed by Engineer, shall be completely removed. Depth of removal shall be in accordance with Article 3.04 or 3.05.
- B. Where thinning is shown, it shall consist of removing and disposing of dead, diseased, poorly formed, or otherwise undesirable trees, undergrowth, stumps, uprooted trees and debris. Trees to be removed will be marked and the area where the undergrowth is to be removed will be indicated on the Plans or designated by Engineer.
  - 1. Selective Thinning, Type I:
    - a) Trees and stumps shall be cut off at an elevation not more than four (4) inches (100 mm) above the existing ground level.
  - 2. Selective Thinning, Type II:
    - a) Trees and stumps shall be chipped or ground down to an elevation approximately four (4) inches (100 mm) below proposed ground level.

**3.06 TREE AND STUMP REMOVAL**

- A. Tree removals shall be performed on individual trees measuring 6 inches in diameter or larger located outside of designated clearing limits shown on the plans. Conduct this work in accordance with Section 202 of the Michigan Department of Transportation Standard Specifications for Construction.
- B. The size of the tree shall be determined by measurement of the trunk diameter at a point 4 ½ feet above the ground line at the base of the tree. Measure trees with major limbs lower than 4 ½ feet above the ground surface at the smallest diameter below the limbs.
- C. Stump size shall be determined by measuring the diameter at the top of the stump.

### **3.07 DEPTH OF REMOVAL IN EXCAVATION AREA**

- A. For excavation areas within roadways, parking lots, and other paved areas, the trees, stumps, and roots shall be removed to a depth of not less than 12 inches (300 mm) below the subgrade elevation.
- B. In all other excavation areas, the trees, stumps, and roots shall be removed to a depth of not less than 12 inches (300 mm) below the finish surface elevation, or as indicated on the Plans or as designated by Engineer.

### **3.08 DEPTH OF REMOVAL IN EMBANKMENT AREAS**

- A. Within embankment areas for roadways, parking lots, and other paved areas where the top of road material is five (5) feet (1.5 m) or less in height above the existing ground, the trees, stumps, and roots shall be removed to a depth of not less than 12 inches (300 mm) below the existing ground.
- B. Within embankment areas for roadways, parking lots, and other paved areas where the top of road material is more than five (5) feet (1.5 m) in height above existing ground, the trees and stumps shall be cut off flush with the existing ground surface.
- C. For embankment areas other than roadways, parking lots, and other paved areas, the trees and stumps shall be cut off flush with the existing ground surface, or as indicated on the Plans or as designated by Engineer.

### **3.09 REMOVAL OF TREES, STUMPS, AND OTHER VEGETATION**

- A. Where trees cannot be felled without danger to traffic or injury to other trees, structures or property, they shall be cut down in sections.
- B. Removal of stumps and roots may be accomplished by the use of a shredding machine meeting the approval of Engineer.

### **3.10 REMOVING CORDUROY**

- A. Logs, stumps, poles, brush, and other unsatisfactory material occurring in the contract limits at or below the surface of the ground and within the depth of four (4) feet (1.2 m) below the proposed plan grade shall be removed and shall be disposed of by the Contractor.

- B. When material is disposed of outside of the contract limits, disposal shall be as specified in Section 01 89 00, Site Construction Performance Requirements.
- C. Burial of trees, stumps and other vegetation, will not be permitted, except at disposal areas indicated on the Plans or as determined by Engineer. Trees and stumps buried in these areas shall have a minimum cover of two (2) feet (0.6 m).

### **3.11 HOLES AND TRENCHES**

- A. Holes and trenches remaining after the clearing or grubbing operations in embankment areas, shall have the sides broken down or leveled, and shall be refilled with acceptable material.
  - 1. Material shall be moistened and properly compacted in layers by tampers or rollers to the density required under roadways, parking areas, and other special areas, as determined by Engineer.
  - 2. The same construction procedure shall be applied to all holes and trenches remaining in excavation areas where the depth of holes exceeds the depth of proposed excavation.

### **3.12 SALVAGING TIMBER**

- A. Trees required to be removed and having a diameter of four (4) inches (100 mm), or more, are classed as merchantable timber. On right-of-way, fee simple, merchantable timber shall become the property of Contractor, unless otherwise specified in the Contract Documents. When such material is placed outside of the right-of-way, Contractor shall obtain and provide Engineer with written permission from owner of the property on which the timber is to be placed.
- B. Merchantable timber to be removed from areas outside of right-of-ways, fee simple, shall be cut and piled for the use of property owner, except where Contractor provides Engineer with a written agreement from the property owner that he does not desire the salvaged timber. Where the property owner has signed such an agreement, the salvaged timber will become the property of Contractor.
- C. When such material is placed outside the contract limits, Contractor shall obtain and provide Engineer with written permission from the owner of the property on which the timber is to be placed. Timber from 4 to 12 inches (100 to 300 mm) in diameter may be left in full tree lengths or cut to commercial lengths, at the option of Contractor. Timber 12 inches (300 mm), or more, in diameter shall be cut into commercial lengths and piled separately from other timber.

### **3.13 CONTRACTOR'S USE OF SITE**

- A. Continuously clean-up and remove waste materials from site. Do not allow materials to accumulate on site.
- B. Do not burn or bury materials on site.
- C. Leave site in clean condition.

**3.14 COORDINATION**

- A. Various environmental clearance contracts may be underway concurrently with the demolition. The Contractor shall coordinate all work so that the properties can be cleared from environmental restrictions prior to demolition.

**3.15 DISPOSAL SITE**

- A. The Contractor shall provide the Owner with documentation and a written agreement for the disposal of the removed items from the site so that it can be received and approved prior to use. The Contractor shall not disrupt environmental features at the disposal site from debris and equipment. The Contractor shall use proper soil erosion and sedimentation control measures and shall supply an SESC Permit from the designated agency.

**3.16 FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements: Testing and Inspections by Owner.
- B. Owner's representative will perform laboratory testing of material to determine gradation in accordance with ASTM C117 and ASTM C136.
- C. Owner's representative will perform testing to determine maximum density in accordance with ASTM D 1557 or Michigan Cone Method.
- D. Provide Owner with samples or access to stockpiles upon request.
- E. Owner's representative will perform in place compaction tests in accordance with the following:
  - 1. Density Tests: ASTM D2922 and the procedures described in the MDOT Density Testing and Inspection Manual. Where conflicts arise, the ASTM standard shall prevail.
  - 2. Moisture Tests: ASTM D3017 and the procedures described in the MDOT Density Testing and Inspection Manual. Where conflicts arise, the ASTM standard shall prevail.
  - 3. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

**PART 4 - MEASUREMENT AND PAYMENT****4.01 BASIS OF PAYMENT**

- A. Payment for the following item(s) of work shall cover all materials, equipment and labor necessary to install the following pay items in accordance with the plans and these specifications.

**4.02 METHOD OF MEASUREMENT**

<b>Pay Item</b>	<b>Unit</b>
Tree, Rem, ___ inch to ___ inch.....	Each

**Tree, Rem** of the sizes specified shall be paid at the unit price per each. Payment includes felling and removal of the tree and disposal of the lumber. Lumber removed from within the Right-of-Way shall become the property of the Contractor and shall be properly disposed of in a timely manner.

**END OF SECTION**



**SECTION 33 10 01**  
**PAVEMENT AND UTILITIES REMOVAL****PART 1 - GENERAL****1.01 DESCRIPTION****A. Section Includes:**

1. Removing surface debris.
2. Removing designated paving, curbs, sidewalks, and driveways.
3. Removing abandoned utilities.
4. Removing utility poles.

**1.02 RELATED SECTIONS:**

- A. Section 01 74 19 – Construction Waste Management and Disposal.
- B. Section 02 41 16 – Structure Demolition.
- C. Section 31 22 13 – Rough Grading.
- D. Section 31 23 17 – Trenching.
- E. Section 31 25 13 – Erosion Controls

**1.03 DEFINITIONS**

- A. HMA: Hot Mix Asphalt
- B. Composite Pavement: A pavement which is constructed of more than one paving material, most commonly found as HMA over concrete pavement.
- C. Utility Structure: A structure having an inside diameter of at least 24 inches, which provides access to an underground utility. Common examples include catch basins, manholes, valve chambers, and vaults. Valve boxes, cleanouts, and other utility risers shall not be considered Utility Structures.

**1.04 QUALITY ASSURANCE**

- A. Conform to applicable code for environmental requirements, disposal requirements, and safety requirements.

**PART 2 - PRODUCTS**

**2.01 MASONRY UNITS**

- A. Furnish masonry units for bulkheading pipes in accordance with Section 913 of the Michigan Department of Transportation Standard Specifications for Construction, latest edition.

**2.02 MORTAR AND GROUT**

- A. Furnish mortar and grout for bulkheading pipes in accordance with Section 702 of the Michigan Department of Transportation Standard Specifications for Construction, latest edition.
- B. Constituent materials shall be in accordance with Section 901, 902, 903, and 911 of the Michigan Department of Transportation Standard Specifications for Construction, latest edition.

**2.03 FLOWABLE FILL MATERIAL**

- A. Furnish flowable fill material in accordance with Section 31 32 33 – Trenching and Backfilling

**PART 3 - EXECUTION****3.01 EXAMINATION**

- A. Verify location of right of way and property lines.
- B. Verify all necessary easements and grading permits have been secured.
- C. Identify location of all pavement saw cuts and removals.
  - 1. Limits of removals for trenching and excavation shall be determined by contractor in accordance with all federal, state, and local regulations. Any pavement removals for trenching and excavation which may be shown on plans are shown as approximate and are for estimating purposes only.
- D. Verify that all needed removals match the plans.
- E. Verify that all removals will be adequate to perform all Work.
- F. Notify Engineer of any needed removals which were not identified on the plans.

**3.02 PREPARATION**

- A. Call MISS DIG at 1-800-482-7171 or 811 not less than three full working days before performing any portion of the Work that involves any soil disturbance.
  - 1. Request underground utilities to be located and marked within and surrounding construction areas.

- B. Relocate mailboxes to ensure United States Postal Service mail delivery.

### **3.03 PROTECTION OF ITEMS TO REMAIN**

- A. Section 01 30 00 Administrative Requirements
- B. Locate, identify, and protect utilities indicated to remain, from damage.
- C. Protect trees, plant growth, and features designated to remain.
- D. Protect bench marks, survey control points, and existing structures from damage or displacement.
- E. Protect signage affixed to utility pole and return to City of Allegan for reuse.

### **3.04 PAVEMENT, SIDEWALKS AND CURBS**

- A. Perform Work in accordance with Section 204 of the Michigan Department of Transportation Standard Specifications for Construction.
- B. Neatly saw cut all edges at right angle to surface.
- C. Saw cut pavement in straight line parallel with or perpendicular to road centerline.
- D. Partially remove paving, curbs, and other site improvements as indicated on drawings.
- E. Removal limits for sidewalks, curbs, and driveways shall be to an existing joint unless otherwise specified.
- F. Protection of Pavement Edges
  - 1. After completion of removals, protect exposed edges of pavement until subsequent paving is completed.
  - 2. Joints between existing improvements (pavement, driveways, curbs, sidewalk, etc.) and the new construction shall be neat and free from defects caused during construction of the project.
    - a) Where joints between existing and new construction have deteriorated during the course of construction, the Contractor shall perform any additional saw cutting and removals necessary to furnish a neat joint. The cost of this work shall be borne by the contractor.
    - b) Where saw cut edges will be subject to vehicular traffic (construction or public traffic) the Contractor may elect to provide secondary saw cut near the removal limits in order to retain a sacrificial edge during construction. This sacrificial strip should be removed prior to placement of abutting construction.
  - 3. Removed damaged edges in accordance with paragraph 3.4 above, at Contractor's expense.

### **3.05 UTILITIES**

- A. Perform trenching in accordance with Section 31 23 33 – Trenching and Backfilling.
- B. Remove designated utilities. Indicate removal termination point for underground utilities on Record Documents.
- C. Where utilities are designated for removal, the CONTRACTOR shall perform the work as follows:
  - 1. Coordinate with utility owner for removal or relocation of electrical, telephone, and cable television by and all other utilities as shown on the plans.
  - 2. Sanitary Sewer and Related Structures:
    - a) Perform this work in accordance with Section 203 of the Michigan Department of Transportation Standard Specifications for Construction.
    - b) Conduct removals to the limits designated on the plans, otherwise from the building structure(s) to the sewer main shall be capped with a watertight plug at the limits of removal.
  - 3. Storm Sewer and Related Structures:
    - a) Perform this work in accordance with Section 203 of the Michigan Department of Transportation Standard Specifications for Construction.
    - b) Conduct removals to the limits designated on the plans, otherwise from the building structure(s) to the sewer main shall be capped with a watertight plug at the limits of removal.
  - 4. Water Distribution:
    - a) Perform this work in accordance with Section 823 of the Michigan Department of Transportation Standard Specifications for Construction.
    - b) Conduct removals to the limits designated on the plans, otherwise from the building structure(s) to the property line shall be capped with water pressurized plug on the downstream side of the water service corporation valve.
  - 5. Bulkheading and Abandoning Pipes:
    - a) Bulkhead pipes in accordance with Section 402 of the Michigan Department of Transportation Standard Specifications for Construction, latest edition.
    - b) Abandon sewers in place by bulkheading ends and filling completely with flowable fill material at specified in Section 31 23 33 – Trenching and Backfilling.
    - c) Provide venting at regular intervals as needed to ensure complete filling of pipeline.
- D. Backfill trenches and excavations in accordance with Section 31 23 33 – Trenching and Backfilling.
- E. Remove rock, rubble, and debris from site.

**3.06 UTILITY POLE**

- A. Perform Work in accordance with Section 204 of the Michigan Department of Transportation Standard Specifications for Construction.
- B. Remove poles, parts, and connections attached to utility poles.

**3.07 DEMOLITION**

- A. The CONTRACTOR shall use any means necessary to prevent dust from becoming a nuisance to the public, neighbors, or other work being performed on-site.
- B. The CONTRACTOR shall notify the respective water authority(s) on scheduling and ordering water for use during construction. CONTRACTOR shall include all costs for water usage and equipment rental fees in the Lump Sum bid amount.
- C. Backfill areas of excavated open pits, basements and holes resulting from demolition with clean sand structural fill up to rough grade elevation.
- D. Rough grade and compact areas affected by demolition to maintain site grades and contours.
- E. All underground items shall be removed and disposed off site and not buried on site.

**3.08 SALVAGE**

- A. Materials and equipment that are designated to be salvaged, shall be carefully removed and neatly placed at a site as noted on the drawings.
- B. Protection of any trees or other site amenities not identified for removal shall be protected during construction. The CONTRACTOR at no additional cost to the OWNER shall replace these and other site amenities damaged.

**3.09 DISPOSAL OF REFUSE MATERIALS**

- A. The CONTRACTOR shall be responsible for the removal of all debris, rubbish, equipment and demolished materials from the site. Refuse materials resulting from the structure demolition shall become the property of the CONTRACTOR and shall be removed from the site. Burning of materials from demolition work shall not be permitted on the site.
- B. Cleanup of debris shall be done on a daily basis. Continuously clean up and remove demolished materials from site. Do not allow materials to accumulate in buildings or on site.
- C. Do not burn or bury materials on site.
- D. Leave site in clean condition.
- E. The CONTRACTOR shall notify ENGINEER upon the discovery of hazardous materials.

**3.10 COORDINATION**

- A. The CONTRACTOR shall arrange with utility companies for removing meters and capping gas and water lines. Should any utilities, which are active, be accidentally uncovered, the CONTRACTOR, shall contact the utility company immediately and postpone work at that location if necessary until the utility company has made the proper disconnection. The CONTRACTOR shall call Miss Dig before performing any site work.
- B. The CONTRACTOR shall coordinate with utility companies and coordinate the removal of utility mains.
- C. Various environmental clearance contracts may be underway concurrently with the demolition. The CONTRACTOR shall coordinate all work so that the properties can be cleared from environmental restrictions prior to demolition.

**3.11 DISPOSAL SITE**

- A. The CONTRACTOR shall provide the OWNER with documentation and a written agreement for the disposal of the removed items from the site so that it can be received and approved prior to use. The CONTRACTOR shall not disrupt environmental features at the disposal site from debris and equipment. The CONTRACTOR shall use proper soil erosion and sedimentation control measures and shall supply an SESC Permit from the designated agency.

**3.12 FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements: Testing and Inspections by Owner.
- B. Owner's representative will perform laboratory testing of material to determine gradation in accordance with ASTM C117 and ASTM C136.
- C. Owner's representative will perform testing to determine maximum density in accordance with ASTM D 1557 or Michigan Cone Method.
- D. Provide Owner with samples or access to stockpiles upon request.
- E. Owner's representative will perform in place compaction tests in accordance with the following:
  - 1. Density Tests: ASTM D2922.
  - 2. Moisture Tests: ASTM D3017.
- F. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- G. Protect pavement edges
  - 1. Protect exposed edges of pavement until subsequent paving is completed.

2. Remove damaged edges in accordance with paragraph 3.4 above, at Contractor's expense.

## **PART 4 - MEASUREMENT AND PAYMENT**

### **4.01 BASIS OF PAYMENT**

- A. Payment for the following item(s) of work shall cover all materials, equipment and labor necessary to install the following pay items in accordance with the plans and these specifications.

### **4.02 METHOD OF MEASUREMENT**

<b>Pay Item</b>	<b>Unit</b>
Curb and Gutter, Rem.....	Foot
Pavt, Rem .....	Square Yard
Sidewalk, Rem .....	Square Yard
Light Pole, Rem .....	Ea

**Curb and Gutter, Rem**, where included as a separate pay item, and not removed in conjunction with pavement or driveway removal shall be measured along the base of the curb face or along the flowline of the gutter.

**Pavt, Rem** and **Sidewalk, Rem** will be paid by the square yard as measured in-place along the surface.

**Light Pole, Rem** shall include removal of poles, parts, conduit, and connections attached to light poles and removal.

Payment for all clearing and removal items of work shall include sawcutting, removal, and disposal of the items in accordance with all applicable local state and federal laws in regulations.

Payment for **removal items of work** shall be made on a Lump Sum basis and shall include performing the work described within this section in accordance with all applicable local state and federal laws in regulations.

**END OF SECTION**





**SECTION 31 23 33**  
**TRENCHING AND BACKFILLING****PART 1 - GENERAL****1.01 DESCRIPTION**

- A. Excavating trenches for utilities.
  - 1. Compacted fill from top of utility bedding to subgrade elevations.
  - 2. Backfilling and compaction.

**1.02 RELATED SECTIONS:**

- A. Section 31 22 13 - Rough Grading
- B. Section 33 05 13 - Manholes and Structures
- C. Section 33 41 00 - Storm Utility Drainage Piping

**1.03 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 D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
  - 3. 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. Manual for the Michigan Test Methods: MTM 107 - Sampling Aggregates
  - 2. Manual for the Michigan Test Methods: MTM 108 - Percent Loss by Washing
  - 3. Manual for the Michigan Test Methods: MTM 109 - Sieve Analysis
  - 4. Density Testing and Inspection Manual: One Point T-99 Test
  - 5. Density Testing and Inspection Manual: Michigan One Point Cone Test
  - 6. Density Testing and Inspection Manual: Density In-Place (Nuclear) Test
- D. Michigan Occupations Safety and Health Administration (MiOSHA)
  - 1. Construction Safety Standards Part 9: Excavation, Trenching, and Shoring.

**1.04 QUALITY ASSURANCE**

- A. Perform Work in accordance with MDOT Standard Specifications for Construction, latest edition.
- B. Maintain one copy on site.

**1.05 QUALIFICATIONS**

- A. Where shoring systems are necessary to retain excavations, prepare excavation protection plan under direct supervision of Professional Engineer experienced in design of this Work and licensed in the State of Michigan.

#### **1.06 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**

#### **2.01 DENSE-GRADED CRUSHED STONE**

- A. Crushed, angular, natural stone material, meeting the requirements of 21AA as defined by the Michigan Department of Transportation Standard Specifications for Construction, Section 902.
- B. Crushed concrete and slag are not allowed.

#### **2.02 GRANULAR MATERIALS**

- A. Granular material Class II, IIa, III, or IIIa as defined by the Michigan Department of Transportation Standard Specifications for Construction, Section 902.
- B. Select Granular Materials shall be in accordance with the requirements for Class II, IIa, III, and IIIa materials as defined by the Michigan Department of Transportation Standard Specifications for Construction, Section 902 except as follows. Select Granular material shall have a maximum particle size of 1 ½ inches.
- C. Suitable on site material may be utilized as trench backfill with approval of Engineer.

#### **2.03 CONCRETE**

- A. Concrete shall conform to the requirements of grade S3 in accordance with the Michigan Department of Transportation Standard Specifications for Construction, Section 701.

#### **2.04 FLOWABLE FILL FOR BACKFILLING**

- A. Materials:
  - 1. Fly Ash: Fly Ash shall have a maximum loss on ignition of 12% and meet the other requirements of ASTM C618 (Class F).
  - 2. Water: Water shall meet the requirements of ASTM C94.
  - 3. Cement: ASTM C150 or C595, Type I or IA.
- B. Mixture (Strength 100 - 120 psi, (690 - 825 kPa)):
  - 1. Fly Ash: 2000 lbs/c.y. (1190 kg/m3) min
  - 2. Cement: 70 lbs/c.y. (40 kg/m3) min
  - 3. Water: Sufficient water to produce desired flowability, 700 lbs/c.y. (415kg/m3) ±

- C. Temperature of the flowable fill mix as manufactured and delivered shall be at least 50 degrees Fahrenheit (10 degrees Celsius). Flowable fill can be mixed by pugmill, central concrete mixer, ready mix truck, turbine mixer, or other acceptable equipment or method.

## **2.05 ACCESSORIES**

- A. Geotextile Fabrics shall conform to Section 910 of the 2012 MDOT Standard Specifications for Construction.

## **PART 3 - EXECUTION**

### **3.01 LINES AND GRADES**

- A. Lay pipes to lines and grades indicated on Drawings.
- B. Architect/Engineer reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.
- C. Use laser-beam instrument with qualified operator to establish lines and grades.

### **3.02 PREPARATION**

- A. Call Miss Dig at 1-800-482-7171 or 811 not less than three full working days before performing any portion of the Work that involves any soil disturbance.
- B. Request underground utilities to be located and marked within and surrounding construction areas.
- C. Verify all utility companies have responded before commencing Work.
- D. Identify required lines, levels, contours, and datum.
- E. Notify utility company to remove and/or relocate utilities.
- F. Protect utilities indicated to remain from damage.
- G. Protect plant life, lawns, rock outcropping and other features remaining as portion of final landscaping.
- H. Protect bench marks, survey control point, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- I. Review and follow all construction safety standards set forth in MIOSHA Std. 1306 Part 9 "Excavation, Trenching, and Shoring".

### **3.03 TRENCHING**

- A. Excavate subsoil required for utilities.
- B. Remove lumped subsoil, boulders, and rock. Provide a minimum of 4" clearance between pipe and rock, boulders, and large stones.
- C. Cut trenches sufficiently wide to enable installation and allow inspection. Remove water or materials that interfere with Work in accordance with Section 31 23 19 - Dewatering.

- D. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material and pipe.
- E. Do not interfere with bearing splay of foundations. Generally, a 45 degree slope is suitable for most soil types; however, certain soils may require flatter slopes or shoring.
- F. When Project conditions permit, slope side walls of excavation. When side walls can not be sloped, provide sheeting and shoring to protect excavation as specified in this section.
- G. When subsurface materials at bottom of trench are loose or soft, notify Architect/Engineer, and request instructions for undercutting the trench bottom.
- H. Cut out soft areas of subgrade not capable of compaction in place. Backfill with Granular Material Type A1 or Coarse Aggregate 4AA as directed by the Architect/Engineer. Compact to density equal to or greater than requirements for subsequent backfill material.
- I. Hand trim for bell and spigot pipe joints. Remove loose matter.
- J. Correct areas over excavated areas with compacted backfill as specified for authorized excavation or replace with fill concrete as directed by Architect/Engineer.
- K. Remove excess subsoil not intended for reuse, from site.
- L. Stockpile excavated material in area designated on site in accordance with Section 32 05 13 - Soils for Exterior Improvements and Section 32 05 16 - Aggregates for Exterior Improvements.

### **3.04 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 4 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.
- 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.

### **3.05 PIPE BEDDING**

- A. General:
  - 1. Unless otherwise specified, bed pipe in accordance with the specified trench detail in accordance with MDOT Standard Plan R-83 Series. Where special pipe bedding is specified on the plans, bed pipes in accordance with the following Special Pipe Bedding Classifications.
- B. Special Pipe Bedding (where specified)
  - 1. Rigid Pipe
    - a. Bed Rigid Pipe in accordance with ASTM C12, with the following exceptions:
      - 1) Class A:

- a) Pipe shall be bedded in crushed stone bedding material placed on the trench bottom. Bedding shall have a minimum thickness beneath the pipe of four (4) inches (100 mm) or 1/4 of the outside diameter of the pipe, whichever is greater, and shall extend up the sides of the pipe to the horizontal centerline. The top half of the pipe shall be covered with a monolithic plain concrete arch having a thickness of at least four (4) inches (100 mm) or 1/4 of the inside diameter of the pipe, whichever is greater, at the pipe crown and a minimum width equal to the outside diameter of the pipe plus eight (8) inches (200 mm) or 1-1/4 of the diameter of the pipe, whichever is greater.
- 2) Class B:
  - a) Pipe shall be bedded in crushed stone bedding material placed on the trench bottom. Bedding shall have a minimum thickness beneath the pipe of four inches (100 mm) or 1/8 of the outside diameter of the pipe, whichever is greater, and shall extend up the sides of the pipe to the horizontal centerline. Backfill from pipe horizontal centerline to a level not less than 12 inches (300 mm) above the top of the pipe shall be Class II granular material. This material shall be placed in 6-inch (150 mm) layers with each layer thoroughly compacted by mechanical means with the finished compacted material a minimum of 12 inches (300 mm) above the top of pipe.
- 3) Class C:
  - a) Pipe shall be bedded in Class II granular material, placed on the trench bottom. Bedding shall have a minimum thickness beneath the pipe of four (4) inches (100 mm) or 1/8 of the outside diameter of the pipe, whichever is greater, and the bedding shall extend to a level not less than 12 inches (300 mm) above the top of the pipe. This material shall be placed in 6-inch (150 mm) layers with each layer thoroughly compacted by mechanical means with the finished compacted material a minimum of 12 inches (300 mm) above the top of pipe.
- 2. Flexible Pipe Bedding:
  - a. Flexible pipe bedding shall conform to ASTM D2321, except as noted. Continuous and uniform bedding shall be provided in the trench for all buried pipe.
    - 1) Class I:
      - a) Pipe shall be bedded in crushed stone bedding material placed on the trench bottom. Bedding shall have a minimum thickness beneath the pipe of four (4) inches (100 mm), and shall extend up the sides of the pipe until the top of pipe is covered by a minimum thickness of 12 inches (300 mm).
      - b) Where allowable trench widths are exceeded, Class F-I bedding shall be used to the full width between undisturbed trench walls. Concrete cradle bedding shall not be used.
    - 2) Class II:
      - a) Pipe shall be bedded in crushed stone bedding material placed on the trench bottom. Bedding shall have a minimum thickness beneath the pipe of four (4) inches (100 mm), or 1/8 of the outside diameter of the pipe, whichever is greater, and shall extend up the sides of the pipe to the horizontal centerline. Backfill from pipe horizontal centerline to a level not less than 12 inches (300 mm) above the top of the pipe shall be Class II granular material. This material shall be placed in 6-inch

- (150 mm) layers with each layer thoroughly compacted by mechanical means with the finished compacted material a minimum of 12 inches (300 mm) above the top of pipe.
- b) Where allowable trench widths are exceeded, Class F-I bedding shall be used to the full width between undisturbed trench walls. Concrete cradle bedding shall not be used.
- 3) Class III:
- a) Pipe shall be bedded in Class II granular material, placed on the trench bottom. Bedding shall have a minimum thickness beneath the pipe of four (4) inches (100 mm) or 1/8 of the outside diameter of the pipe, whichever is greater, and the bedding shall extend to a level not less than 12 inches (300 mm) above the top of the pipe. This material shall be placed in 6-inch (150 mm) layers with each layer thoroughly compacted by mechanical means with the finished compacted material a minimum of 12 inches (300 mm) above the top of the pipe.
  - b) Where allowable trench widths are exceeded, Class F-I bedding shall be used to the full width between undisturbed trench walls. Concrete cradle bedding shall not be used.

### **3.06 HAUNCHING INITIAL BACKFILL**

- A. Place and compact haunching material and initial backfill in 6 inch layers in accordance with the specified trench detail or special bedding detail.
- B. Utilize dense-graded crushed stone or select granular materials with a maximum particle size of 1 ½ inches for haunching and initial backfill within 12 inches of the top of the pipe.

### **3.07 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 and compact backfill material in continuous 12 inch layers and compact in accordance with MDOT Standard Plans R-83 Series
- D. Employ placement method that does not disturb or damage foundation perimeter drainage, utilities in trench, and other underground facilities.
- E. Maintain optimum moisture content of fill materials to attain required compaction density.
- F. Mark end of pipe and fully backfill the trench at the end of each working day or protect open trench in Accordance with MDOT Standard Specifications for Construction.

### **3.08 FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements: Testing and Inspections by Owner.
- B. Owner's representative will perform laboratory testing of material to determine gradation in accordance with ASTM C136 and MTM 108 and MTM 109.
- C. Owner's representative will perform testing to determine maximum density in accordance with ASTM D 1557 or Michigan One-Point Cone Method.

- D. Provide Owner with samples or access to stockpiles upon request.
- E. Owner's representative will perform in place compaction tests in accordance with the following:
  - 1. Density Tests: ASTM D2922 and the procedures described in the MDOT Density Testing and Inspection Manual. Where conflicts arise, the ASTM standard shall prevail.
  - 2. Moisture Tests: ASTM D3017 and the procedures described in the MDOT Density Testing and Inspection Manual. Where conflicts arise, the ASTM standard shall prevail.
- F. Frequency of Tests: At each compacted bedding and backfill layer, conduct one test for each 100 feet or less of trench length. Additional testing may be required at the discretion of the Architect/Engineer
- G. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

### **3.09 PROTECTION OF FINISHED WORK**

- A. Reshape and re-compact fills subjected to vehicular traffic during construction.

### **END OF SECTION**





**SECTION 31 25 13**  
**EROSION CONTROLS**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

- A. Section Includes:
- B. Silt Fence
- C. Inlet protection devices

**1.02 RELATED SECTIONS:**

- A. Section 02 41 16 - Structure Demolition.
- B. Section 31 10 00 - Site Clearing.
- C. Section 31 10 00 - Pavement and Utilities Removal.
- D. Section 31 22 13 - Rough Grading
- E. Section 31 23 17 - Trenching
- F. Section 31 23 19 - Dewatering
- G. Section 32 91 19 - Surface Restoration

**1.03 REFERENCES**

- A. American Association of State Highway and Transportation Officials:
  - 1. AASHTO T88 - Standard Specification for Particle Size Analysis of Soils.
  - 2. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications
- B. ASTM International:
  - 1. ASTM D3786 - Standard Test Method for Bursting Strength of Textile Fabrics - Diaphragm Bursting Strength Tester Method
  - 2. ASTM D4355 - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus
  - 3. ASTM D4491 - Test Methods for Water Permeability of Geotextiles by Permittivity

4. ASTM D4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles
5. ASTM D4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
6. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile
7. ASTM D4833 - Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products

#### **1.04 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Product Data: Submit data on geotextile fabric, inlet protection devices, and silt fencing.

### **PART 2 - PRODUCTS**

#### **2.01 SILT FENCING**

A. Manufacturer/Supplier	Product Name
1. Belton Industries, Inc., Norcross, SC	Belton 940
2. CSI Geoturf, Highland, MI	Geoturf S1200
3. CSI Geoturf, Highland, MI	Geoturf S1400
4. Geoproducts, Inc., Birmingham, MI	Kintex SF-3
5. LinQ Industrial Fabrics	GTF-180
6. Propex Fabrics, Inc., Austell, GA	Propex 2130
7. Skaps Industries, Athens, GA	SKAPS W100
8. Hanes Geo Components, Winston-Salem, NC	TerraTex SC
9. Willacoochee, GA      Willacoochee,	Style 1210
10. Substitutions: Section 01 60 00 - Product Requirements: Substitution Procedures	

#### **2.02 INLET PROTECTION DEVICES**

- A. Removable inlet protection device constructed of geotextile material sewn to dimensions that allow for drop in installation in catch basin inlets.

**B. Geotextile material:**

Grab Tensile ASTM D4632 lbs 255 x 275  
Grab Elongation ASTM D-4632 % 20 x 15  
Trap Tear ASTM D-4533 lbs 40 x 50  
Puncture ASTM D-4833 lbs 135  
Mullen Burst ASTM D-3786 psi 420  
Permittivity ASTM D-4491 sec-1 1.5  
Water Flow ASTM D-4491 gpm/ft<sup>2</sup> 200  
AOS ASTM D-4751 U.S. Std 20  
UV Resistance ASTM D-4355 %/hrs 90/500

**C. Frame: metal or wood insert(s) to prevent device from dropping in catch basin and to allow for attachment of removal straps****D. Manufacturers:**

1. ACF Environmental: Siltsack®
2. Substitutions: Section 01 60 00 - Product Requirements: Substitution Procedures.

**2.03 ROCK AND GEOTEXTILE MATERIALS****A. Stone**

1. Stabilized Construction Access: Stone materials shall be Coarse Aggregate, 3 x 1 conforming to Section 916 of the 2012 MDOT Standard Specifications for Construction.
2. Energy Dissipator: Stone shall be Plain Rip-Rap conforming to Section 916 of the 2012 MDOT Standard Specifications for Construction.

**B. Geotextile Fabric: Non-biodegradable, non-woven.**

- C. Drainage Geotextile:** Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods reference:
- Survivability: Class 2; AASHTO M 288.
  - Apparent Opening Size: No. 40 (0.425-mm) sieve, Maximum; ASTM D 4751.
  - Permittivity: 0.5 per second, minimum; ASTM D 4491.
  - UV Stability: 50 percent after 500 hours exposure; ASTM D 4355

**PART 3 - EXECUTION****3.01 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements:** Verification of existing conditions before starting work.

- B. Verify compacted subgrade is acceptable and ready to support devices and imposed loads.
- C. Verify gradients and elevations of base or foundation for other work are correct.

### **3.02 SILT FENCING**

- A. Install silt fencing.
  - 1. Align silt fence perpendicular to the direction of runoff with stakes on the downhill side of the fabric.
  - 2. Excavate shallow trench, install silt fence and backfill. Bottom of fabric to extend minimum 6 inches below grade
  - 3. Install silt fence at an even grade. Avoid low spots in silt fence.
  - 4. At ends of silt fence run, extend fencing up slope at a 45 degree angle to the main run for a minimum distance of 10 feet.
- B. Maintain silt fencing.
  - 1. Remove accumulated sediment when sediment level reaches one third the height of the fabric.
  - 2. Repair or replace damaged silt fencing immediately.
- C. Remove silt fencing
  - 1. Upon completion of the work, and sufficient stabilization of disturbed soils, remove accumulated sediment.
  - 2. Remove silt fencing.
  - 3. Restore disturbed soils with seed and mulch.

### **3.03 INLET PROTECTION**

- A. Installation
  - 1. Install inlet protection devices in existing storm sewers prior to soil disturbance.
  - 2. Install inlet protection devices in new storm sewers immediately after storm sewer is constructed.
  - 3. Install inlet protection devices at all storm sewer inlets within site and beyond site which may receive construction site storm water runoff.
  - 4. Obtain approval from authority having jurisdiction for catch basins within public streets.
- B. Maintenance

1. Remove accumulated sediment when sediment level reaches one third of depth of the device.
2. Repair or replace damaged geotextile immediately.
3. Continue maintenance until soil in contributing area is stabilized.

C. Removal

1. Remove inlet protection device upon sufficient stabilization of disturbed soils within contributing area after approval by Engineer.

### **3.04 SITE STABILIZATION**

- A. Incorporate erosion control devices indicated on the Drawings into the Project at the earliest practicable time.
- B. Construct, stabilize and activate erosion controls before site disturbance within tributary areas of those controls.
- C. Stabilize any disturbed area on which activity has ceased and which will remain exposed for more than 20 days.
  1. During non-germinating periods, apply mulch at recommended rates.
  2. Stabilize disturbed areas which are at finished grade in accordance with Section 32 91 19.
  3. Stabilize disturbed areas which will not be disturbed within one year in accordance with Section 32 91 19.
- D. Stabilize diversion channels, sediment traps, and stockpiles immediately.

### **3.05 FIELD QUALITY CONTROL**

- A. Inspect erosion control devices on a daily basis and after each runoff event. Make necessary repairs to ensure erosion and sediment controls are in good working order.

### **3.06 CLEANING/MAINTENANCE AND REPLACEMENT**

- A. When sediment accumulation in sedimentation structures has reached a point one-third depth of sediment structure or device, remove and dispose of sediment.
- B. Do not damage structure or device during cleaning operations.
- C. Do not permit sediment to erode into construction or site areas or natural waterways.
- D. All costs for cleaning/maintenance or replacement of non-functional Soil Erosion and Sedimentation Control Measures shall be borne by the Contractor.

1. **Note on Removal of Soil Erosion and Sedimentation Control Measures:**  
The Contractor may maintain SESC Measures in place during post construction surveys/inspection and prior to final acceptance of the Work.

No additional compensation will be made for reinstallation of SESC Measures to perform necessary corrective action or to perform additional work within the original project site.

## **PART 4 - MEASUREMENT AND PAYMENT**

### **4.01 BASIS OF PAYMENT**

- A. Payment for the following item(s) of work shall cover all materials, equipment and labor necessary to install the following pay items in accordance with the plans and these specifications.

### **4.02 METHOD OF MEASUREMENT**

<b>Description</b>	<b>Unit Price</b>
Erosion Control, Inlet Protection Fabric Drop .....	Each
Erosion Control, Silt Fence .....	Foot

The unit price for **Erosion Control, Inlet Protection Fabric Drop** includes the cost of providing, maintaining, and removing inlet protection fabric drops.

The unit price for **Erosion Control, Silt Fence** includes the cost of providing, maintaining, and removing silt fence.

**END OF SECTION**

**SECTION 32 11 16**  
**SUBBASE COURSES****PART 1 - GENERAL****1.01 DESCRIPTION**

A. Section Includes:

1. Prepared Subbase.

**1.02 RELATED SECTIONS:**

- A. Section 31 22 13 - Rough Grading.
- B. Section 31 23 17 - Trenching.
- C. Section 31 23 19 - Dewatering.
- D. Section 31 25 13 - Erosion Controls.
- E. Section 32 11 24 - Aggregate Base Courses
- F. Section 32 12 16 - Asphalt Paving.
- G. Section 32 13 13 - Concrete Paving

**1.03 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 D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
3. 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 Specifications for Construction, Latest Edition

2. Manual for the Michigan Test Methods
  - a) MTM 107 - Sampling Aggregates
  - b) MTM 108 - Percent Loss by Washing
  - c) MTM 109 - Sieve Analysis
3. Density Testing and Inspection Manual
  - a) One Point T-99 Test
  - b) Michigan One Point Cone Test
  - c) Density In-Place (Nuclear) Test

#### **1.04 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 material to testing laboratory.
- C. Materials Source: Submit source location and name of materials suppliers.
- D. Manufacturer's Certificate: Certify material meets or exceeds specified requirements.

#### **1.05 QUALITY ASSURANCE**

- A. Furnish each material from single source throughout the Work.
- B. Notify Engineer minimum two weeks prior to scheduled delivery of material.
- C. Allow Owner's representative access to material source for sampling and testing.
- D. Confirm test results indicate conformance with specifications prior to delivery to site.
- E. Owner reserves the right to collect and test additional samples of material after delivery to site.

### **PART 2 - PRODUCTS**

#### **2.01 MATERIALS**

- A. Subbase Aggregate: Granular material Class II conforming to MDOT Standard Specifications for Construction Section 902, Tables 902-3 and 902-4
- B. Suitable on-site material meeting the gradation requirements of MDOT Class II material may be utilized as subbase aggregate with approval of Engineer.
  1. On-site materials shall be collected and stockpiled in accordance with Section 32 05 16 – Aggregates for Exterior Improvements.



**PART 3 - EXECUTION****3.01 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 heavy, pneumatic tired rollers in minimum two perpendicular passes to identify soft spots.
  - 2. Remove soft substrate and replace with compacted fill as specified in Section 31 22 13 - Rough Grading
- C. Verify substrate has been inspected, gradients and elevations are correct.

**3.02 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.

**3.03 AGGREGATE PLACEMENT**

- A. Place subbase aggregate in equal thickness layers to total compacted thickness indicated on Drawings. Maximum Layer Compacted Thickness: 12 inches.
- B. Roller compact subbase to 95 percent maximum density as defined by ASTM D1557.
- C. Level and contour surfaces to elevations, profiles, and gradients indicated.
- D. Maintain optimum moisture content of fill materials to attain specified compaction density.
- E. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

**3.04 TOLERANCES**

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation from Flat Surface: 1/2 inch measured with 10 foot straight edge.
- C. Maximum Variation from Thickness: 1/2 inch.
- D. Maximum Variation from Elevation: 1/2 inch.

**3.05 FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements
- B. Owner's representative will perform laboratory testing of material to determine gradation in accordance with ASTM C117 and ASTM C136.
- C. Owner's representative will perform testing to determine maximum density in accordance with ASTM D1557 or Michigan Cone Method.
- D. Owner's representative will perform in place compaction tests in accordance with the following:
  - 1. Density Tests: ASTM D2922 and the procedures described in the MDOT Density Testing and Inspection Manual. Where conflicts arise, the ASTM standard shall prevail.
  - 2. Moisture Tests: ASTM D3017 and the procedures described in the MDOT Density Testing and Inspection Manual. Where conflicts arise, the ASTM standard shall prevail.
- E. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- F. Frequency of Tests: One test for every 250 square yards of each layer compacted aggregate. Additional testing may be required at the discretion of the engineer.

**PART 4 - MEASUREMENT AND PAYMENT****4.01 BASIS OF PAYMENT**

- A. Payment for the following item(s) of work shall cover all materials, equipment and labor necessary to install the following pay items in accordance with the plans and these specifications.

**4.02 METHOD OF MEASUREMENT**

Description	Unit Price
Subbase, CIP .....	Cubic Yard

The unit price for **Subbase, CIP** shall be made by the cubic yard in place. The unit price for **Subbase, CIP** shall include the cost of providing, hauling, placing, compacting, and shaping the material.

**END OF SECTION**

**SECTION 32 11 23**  
**AGGREGATE BASE COURSES****PART 1 - GENERAL****1.01 DESCRIPTION****A. Section Includes:**

1. Aggregate base course.

**B. Related Sections:**

1. Section 31 22 13 - Rough Grading.
2. Section 31 23 17 - Trenching.
3. Section 31 23 19 - Dewatering.
4. Section 31 25 13 - Erosion Controls.
5. Section 32 11 16 – Subbase Courses.
6. Section 32 12 16 - Asphalt Paving.
7. Section 32 13 13 - Concrete Paving

**1.02 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 D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort
3. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
4. 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. Manual for the Michigan Test Methods: MTM 107 - Sampling Aggregates
2. Manual for the Michigan Test Methods: MTM 108 - Percent Loss by Washing
3. Manual for the Michigan Test Methods: MTM 109 - Sieve Analysis
4. Density Testing and Inspection Manual: One Point T-99 Test
5. Density Testing and Inspection Manual: Michigan One Point Cone Test
6. Density Testing and Inspection Manual: Density In-Place (Nuclear) Test

**1.03 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 material to testing laboratory.
- C. Materials Source: Submit name and location of aggregate materials suppliers.
- D. Manufacturer's Certificate: Certify materials meet or exceed specified requirements.

**1.04 QUALITY ASSURANCE**

- A. Furnish each material from single source throughout the Work.

**PART 2 - PRODUCTS****2.01 AGGREGATE MATERIALS**

- A. Aggregate Base: Dense-graded aggregate 22A conforming to Section 902, Tables 902-1 and 902-2 of the 2012 MDOT Standard Specifications for Construction.
- B. Aggregate Surface Cse: Dense-graded aggregate 22A conforming to Section 902, Tables 902-1 and 902-2 of the 2012 MDOT Standard Specifications for Construction.
- C. Shoulders: Dense-graded aggregate 23A conforming to Section 902, Tables 902-1 and 902-2 of the 2012 MDOT Standard Specifications for Construction.
- D. Granular Materials, Select Granular Materials, and Fine Aggregates as specified on the plans shall be in accordance with Section 32 05 16 Aggregates for Exterior Improvements.
- E. Crushed Stone Fines (Limestone Screenings or Decomposed Granite) shall be in accordance with Section 32 05 16 Aggregates for Exterior Improvements.

- F. Maintenance Gravel shall be 22A, conforming to Section 902, Tables 902-1 and 902-2 of the 2012 MDOT Standard Specifications for Construction or HMA millings

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify subbase has been inspected, gradients and elevations are correct.

### **3.02 PREPARATION**

- A. Complete the work of section 32 11 16 Subbase Courses.
- B. Correct irregularities in subbase gradient and elevation by scarifying, reshaping, and recompact.
- C. Do not place fill on soft, muddy, or frozen surfaces.

### **3.03 AGGREGATE PLACEMENT**

- A. Place aggregate in equal thickness layers to total compacted thickness indicated on Drawings. Maximum Layer Compacted Thickness: 6 inches.
- B. Compact Aggregate Materials with a vibratory roller to the following minimum target densities based on their application:
  - 1. Aggregate beneath Asphalt Pavement: 98 percent maximum density.
  - 2. Aggregate beneath Concrete Pavement: 95 percent maximum density.
  - 3. Aggregated Surface Courses: 98 percent maximum density.
  - 4. Aggregate Shoulders: 98 percent maximum density.
  - 5. Aggregate Bases beneath structures, walls, or footings: 100 percent maximum density.
- C. Level and contour surfaces to elevations, profiles, and gradients indicated.
- D. Maintain appropriate moisture content of fill materials to attain specified compaction density.
  - 1. Proper moisture levels shall be not less than 5% by weight and not more than optimum (saturation) moisture content as determined by ASTM D-1557 or the Michigan One-Point Cone Method.

2. Add water as necessary to maintain the specified moisture content uniformly distributed throughout the material.

E. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

### **3.04 TOLERANCES**

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Variation From Flat Surface: 1/4 inch measured with 10 foot straight edge.

C. Maximum Variation From Thickness: 1/4 inch.

D. Maximum Variation From Elevation: 1/4 inch.

### **3.05 FIELD QUALITY CONTROL**

A. Section 01 40 00 - Quality Requirements.

B. Owner's representative will perform laboratory testing of material to determine gradation in accordance with ASTM C117 and ASTM C136.

C. Owner's representative will perform testing to determine maximum density in accordance with ASTM D 1557 or Michigan Cone Method.

D. Owner's representative will perform in place compaction tests in accordance with the following:

1. Density Tests: ASTM D2922 and the procedures described in the MDOT Density Testing and Inspection Manual. Where conflicts arise, the ASTM standard shall prevail.
2. Moisture Tests: ASTM D3017 and the procedures described in the MDOT Density Testing and Inspection Manual. Where conflicts arise, the ASTM standard shall prevail.

E. Corrective Actions

1. When tests indicate the materials do not conform to the specified gradation, remove Work, replace with new material and retest.
2. When tests indicate Work does not meet specified requirements for grade, slope or compaction, regrade and/or recompact material. If subsequent tests fail to meet the specified requirements, remove Work, replace and retest.
3. When necessary, the contractor shall furnish and apply a sufficient amount of potable water as necessary to provide adequate moisture to achieve the specified density and perform the necessary testing.

F. Frequency of Tests: One test for every 250 square yards of each layer of compacted aggregate. Additional testing may be required at the discretion of the engineer.

**PART 4 - MEASUREMENT AND PAYMENT****4.01 BASIS OF PAYMENT**

- A. Payment for the following item(s) of work shall cover all materials, equipment and labor necessary to install the following pay items in accordance with the plans and these specifications.

**4.02 METHOD OF MEASUREMENT**

Description	Unit Price
Aggregate Base, ____ inch .....Square Yard	

**Aggregate Base, \_\_\_\_ inch** will be measured by width and length, for the specified depth, as shown on the plans. The unit price includes the cost of providing, hauling, placing, compacting, and shaping the material.

**END OF SECTION**





**SECTION 32 12 16**  
**ASPHALT PAVING****PART 1 - GENERAL****1.01 SUMMARY**

- A. Section Includes:
- B. Asphalt materials.
- C. Asphalt paving base course, leveling course, and top course.
- D. Asphalt Base Course Crushing and Shaping.
- E. Cold Milling Asphalt Pavement.
- F. Asphalt Curbs.

**1.02 RELATED SECTIONS:**

- A. Section 31 22 13 - Rough Grading: Preparation of site for paving [and base].
- B. Section 31 23 23 - Fill: Compacted subbase for paving.
- C. Section 32 01 16 - Flexible Paving Rehabilitation.
- D. Section 32 05 16 - Aggregates for Exterior Improvements: Product requirements for aggregate for placement by this section.
- E. Section 32 11 23 - Aggregate Base Courses: Compacted subbase for paving.
- F. Section 32 17 23 - Pavement Markings: Painted pavement markings, lines, and legends.
- G. Section 33 05 13 - Manholes and Structures: Manholes and Catch Basins, including frames.
- H. Section 32 13 13 - Concrete curbs.

**1.03 REFERENCES**

- A. American Association of State Highway and Transportation Officials:
  - 1. AASHTO M17 - Standard Specification for Mineral Filler for Asphalt Paving Mixtures.
  - 2. AASHTO M29 - Standard Specification for Fine Aggregate for Asphalt 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 Asphalt Paving Mixtures.
  4. ASTM D692 - Standard Specification for Coarse Aggregate for Asphalt 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 Asphalt Paving Mixtures.
  8. ASTM D1188 - Standard Test Method for Bulk Specific Gravity and Density of Compacted Asphalt Mixtures Using Paraffin-Coated Specimens.
  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 Asphalt Mixtures.
  12. ASTM D2950 - Standard Test Method for Density of Asphalt 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 Asphalt Paving Mixtures.
15. ASTM D3549 - Standard Test Method for Thickness or Height of Compacted Asphalt 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.

D. Michigan Department of Transportation:

1. Standard Specifications for Construction, latest edition

#### **1.04 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.

#### **1.05 QUALITY ASSURANCE**

- A. Mixing Plant: Certified by Michigan Department of Transportation.
- B. Obtain materials from same source throughout.
- C. Perform Work in accordance with Michigan Department of Transportation, Standard Specifications for Construction, latest edition.
- D. Maintain one copy of each document on site.

#### **1.06 QUALIFICATIONS**

- A. Installer: Company specializing in performing work of this section with minimum 10 years documented experience.

#### **1.07 ENVIRONMENTAL REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Unless otherwise approved by the Engineer in writing, do not place asphalt mixture between November 15 and May 5.
- C. Do not place asphalt mixture when ambient air or base surface temperature is less than 40 degrees F, or surface is wet or frozen.
- D. Place asphalt mixture when temperature is greater than 250 degrees F and not more than  $\pm 20$  degrees F from the maximum mixing temperature as specified by the binder producer.
- E. Loads falling outside of these temperature limits shall be rejected.

## **PART 2 - PRODUCTS**

### **2.01 ASPHALT BINDER**

- A. Asphalt Binder: In accordance with Section 904 of the Michigan Department of Transportation Standard Specifications for Construction, latest edition. Table 904-2.
  - 1. Performance Grade:
    - a) PG 58-22 for all mixtures placed greater than 4 inches from the proposed asphalt surface.
    - b) PG 58-28 for mixture types 13A, 36A, and LVSP
    - c) PG 64-28 for mixture types 2C, 3C, 4C, 4E1, 5E1, 4E3, 5E3, 4E10 and 5E10 unless specified otherwise on the HMA Application Table
    - d) PG70-28P for mixture Types 4E30, 5E30 and applications warranting High Stress HMA Pavement within 1000 feet of intersections and on roadways with intersections spaced less than 1 mile apart.
- B. Bond Coat: SS-1h or CSS-1h in accordance with Michigan Department of Transportation 2012 Standard Specifications for Construction Table 904-4 or 904-5.

### **2.02 AGGREGATE MATERIALS**

- A. Coarse Aggregate: In accordance with Michigan Department of Transportation 2012 Standard Specifications for Construction Section 902.09.
- B. Fine Aggregate: In accordance with Michigan Department of Transportation 2012 Standard Specifications for Construction Section 902.09
- C. Mineral Filler: Finely ground mineral particles, free of foreign matter, in accordance with Michigan Department of Transportation 2012 Standard Specifications for Construction Section 902.11.
- D. Blended aggregate used for the asphalt wearing course on this project shall have an Aggregate Wear Index (AWI) of 260, or higher.

**2.03 ANTI-FOAMING AGENTS**

- A. Utilize anti-foaming agents in accordance with Section 904 of the Standard Specifications for Construction, latest edition.

**2.04 ASPHALT PAVING MIXTURES:**

- A. General:
  - 1. Superpave Mixtures: Designed and tested in accordance with Michigan Department of Transportation 2012 Standard Specifications for Construction Section 501.
  - 2. Marshall Mixtures: Designed and tested in accordance with Michigan Department of Transportation Special Provision for Marshall Hot Mix Asphalt Mixture 12SP501F.
  - 3. Required mixture types for each paving course shall be as specified on Plans.
- B. Use dry material to avoid foaming. Mix uniformly
- C. Asphalt paving mixtures shall be mixed and placed in accordance with Section 501 of the Michigan Department of Transportation Standard Specifications for Construction, except as otherwise specified in this Section.
- D. Aggregates, mineral filler (if required), and asphalt binder shall be combined as necessary to produce a mixture proportioned within the master gradation range limits shown in Table A and meeting the uniformity tolerance limits shown in Table C.
- E. Composition limits in Table A are shown in percent by weight, based on the total aggregate, including mineral filler, in the mixture.
- F. Asphalt mixture specified on the Plans or in the Proposal, when tested at optimum asphalt content (determined in accordance with MDOT Procedures Manual for Mix Design Processing), shall meet the requirements for stability, flow, voids in mineral aggregate (VMA), air voids, fines/binder ratio, fine aggregate angularity, L.A. Abrasion loss, and soft particles as specified in Table B, Mix Design Criteria.
- G. Mixtures failing to meet the requirements specified in Table B will be rejected and the CONTRACTOR will be required to submit additional samples of asphalt mixtures until a combination of material is found which will produce a mixture meeting the Table B requirements.
- H. If there is a change in the source of any of the aggregates, a new job-mix formula will be required.
- I. After the job-mix formula is established, the aggregate gradation and the asphalt binder content of the asphalt mixture furnished for the Work shall be maintained within the Range 1 uniformity tolerance limits permitted for the job-mix formula as specified in Table C.
  - 1. If two (2) consecutive aggregate gradations on one (1) sieve, or asphalt binder contents as determined by the field extractions are outside the Range 1 but

- within the Range 2 uniformity tolerance limits, CONTRACTOR shall suspend all operations. (Work days will be charged during the down time.)
2. Before resuming any production, CONTRACTOR shall make all necessary alterations to the materials or plant so that the job-mix formula can be maintained within the deviations permitted under Table C.
- J. CONTRACTOR shall provide uniformity in the gradations of the aggregates placed in the cold feed bins so that the combination of aggregates produced for the mixture by blending the aggregates from two (2) or more cold feed bins will be uniformly fed by means of adjustable feeders onto a belt supplying the asphalt plant.
1. Feeders shall be equipped with cutoffs which will automatically stop the operations to the asphalt plant at any time the flow of any aggregate fraction is changed so as to affect the uniformity of the finished product.
- K. CONTRACTOR has the option of using hot bins for proportioning the aggregates to meet the specified tolerances.
- L. Aggregate gradation tests will be made on aggregate extracted from samples of asphalt mixture taken from the trucks as directed by ENGINEER. As a general guideline, samples will be taken at initial start of production and at other times when tests indicate that the aggregate gradation is fluctuating; truck samples will be taken at a frequency of one (1) sample per 250 Tons (225 metric tons) of mixture, but not more than four (4) samples per day. During other periods where tests indicate the aggregate gradation is stable, truck samples will be taken at a frequency of one (1) sample per 500 Tons (450 metric tons) of mixture, but no more than two (2) samples per day.
1. Mixtures exceeding the maximum tolerances listed in Range 2 under Table C, or exceeding the maximum limits specified for the master gradation range will be rejected and CONTRACTOR may be required to remove and replace any asphalt pavements which ENGINEER determines were constructed with mixtures in the excess of these tolerances.
  2. Exact mixture proportions will be based on composite samples of aggregate and the particular asphalt material called for on the Plans and in the Proposal.

## **2.05 RELEASE AGENTS**

- A. Use an approved release agent that does not harm the properties of the HMA mixture or the environment. Do not use fuel oil or distillate derivatives.

## **2.06 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. Owners Representative will test samples in accordance with Michigan Department of Transportation standards.

**PART 3 - EXECUTION****3.01 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify utilities indicated under paving are installed with excavations and trenches backfilled and compacted.
- C. Verify compacted aggregate base material is properly compacted, dry and ready to support paving and imposed loads.
  - 1. Proof roll aggregate base with pneumatic tired rollers in minimum two perpendicular passes to identify soft spots.
  - 2. Remove soft aggregate base and replace with compacted fill as specified in Section 32 11 23 – Aggregate Base Courses.
- D. Verify gradients and elevations of base are correct.
- E. Verify manhole frames are installed in correct position and elevation.

**3.02 PREPARATION OF AGGREGATE BASE**

- A. Aggregate Base: Prepare aggregate base in accordance with Section 32 11 23 – Aggregate Base Courses

**3.03 PREPARATION OF EXISTING PAVEMENT**

- A. Saw cut and notch existing pavement to permit firm bond between existing and new pavement in accordance with Section 31 10 01 – Pavement and Utilities Removal.
- B. Conduct additional preparation and cleaning to remove loose or deleterious material from the surface and joints in existing paving to provide clean and suitable surface to receive new paving. Perform this work in accordance with Section 501 of the Michigan Department of Transportation Standard Specifications for Construction, latest edition.

**3.04 ASPHALT BASE COURSE CRUSHING AND SHAPING**

- A. Perform this work in accordance with Section 305 of the of the Michigan Department of Transportation Standard Specifications for Construction, latest edition.
- B. This Work consists of scarifying, pulverizing, milling, crushing, adding new material if required, shaping, rolling, compacting, and proof rolling the crushed base to the proper elevation and slope.
- C. Additional materials required to fill holes and voids shall be furnished at CONTRACTOR's expense. Additional aggregate, if required shall be 20A or 22A aggregate.

- D. The material shall be scarified and uniformly pulverized to a maximum size of two inches (50 mm), in addition, 95 to 100 percent of the material shall have a particle size of 1-1/2 inches (40 mm) or smaller.
- E. The material shall be scarified and uniformly pulverized, in one or more passes, to the depth specified on the Plans or as determined by ENGINEER.
- F. The maximum length or width of roadbed to be scarified and pulverized at any one time shall be as specified on the Plans or as determined by ENGINEER.
- G. The crushed material shall be rough graded to within 3/4 of an inch (20 mm) of the grade called for on the Plans, or as directed by ENGINEER. Additional aggregate shall be placed, if necessary, to attain the required cross sections.
- H. After the material has been balanced, it shall be thoroughly mixed. In restrictive areas, the material to be mixed may be bladed into a windrow to provide working room for the mixer.
- I. The mixed material shall be shaped and compacted in reasonably close conformity with the lines, grades, and cross sections shown on the Plans or as established by ENGINEER. Excess material shall be removed and disposed of by CONTRACTOR at his expense.
- J. Finished rolling shall be done with a vibratory steel wheel roller.
- K. Aggregate-bituminous pavement mixture shall be compacted to not less than 95 percent of the unit weight obtained by the AASHTO T180 test method. The test shall be made on the aggregate-bituminous mixture at the field moisture content existing during the compacting operation. Required density shall be maintained until the material has been surfaced.
- L. Prior to the placing of any surface courses, the pulverized material shall be proof rolled. Proof rolling shall be accomplished with an 18,000 pound (82 000 kg) single axle load. Unstable areas shall be removed and backfilled.

### **3.05 COLD MILLING CONCRETE OR BITUMINOUS PAVEMENT**

- A. Conduct cold milling in accordance with Section 501 of the Michigan Department of Transportation Standard Specifications for Construction, latest edition.
- B. Where cold milling concrete or bituminous pavement is specified, the pavement shall be milled to the shape and cross section as shown on the plans. Immediately after cold milling, the surface shall be cleaned. CONTRACTOR shall remove and dispose of any resulting debris.
- C. When allowed by ENGINEER, milling materials may be used for temporary wedging.
  - 1. Prior to placing pavement, temporary wedging materials shall be removed and disposed of.
  - 2. Wedging with milled materials is incidental to the Project.



**3.06 BOND COAT**

- A. Apply bond coat to existing surfaces being overlaid, between each layer of asphalt and on vertical edges of adjacent pavement at a uniform rate between 0.05 gal/sq. yd. and 0.15 gal/sq. yd. in accordance with Section 501 of the Michigan Department of Transportation Standard Specifications for Construction, latest edition.
- B. Apply tack coat to contact surfaces of curbs, gutters and adjacent concrete pavements.
- C. Coat surfaces of manholes, catch basins, water valve box frames, and monument boxes with release agent to prevent bond with asphalt paving. Do not bond coat these surfaces.

**3.07 ASPHALT PAVING**

- A. Install asphalt pavement in accordance with Section 501 of the Michigan Department of Transportation Standard Specifications for Construction, latest edition.
- B. Construct asphalt pavement section in courses, using the specified mixes and thicknesses as shown on the plans.
- C. Place asphalt leveling course over asphalt base course.
- D. Place asphalt top course over asphalt leveling course.
- E. Clean surface and apply bond coat between each successive asphalt course. Place asphalt within 24 hours of applying bond coat. If successive layers within an asphalt course are placed on different days, clean surface and place bond coat on previously placed layer.
- F. Limit traffic on surface once bond coat has been placed to prevent off-tracking of bond coat material.
- G. Place base, leveling, and wearing courses to the compacted thicknesses indicated on the drawings.
- H. Compact paving by rolling to specified density. Do not displace or extrude paving from position. Hand compact in areas inaccessible to rolling equipment.
- I. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.

**3.08 SLURRY SEAL COAT**

- A. Install slurry seal coat in accordance with Section 506 of the Michigan Department of Transportation Standard Specifications for Construction, latest edition.
- B. Apply slurry seal coat to sections using the specified mixes and thicknesses as shown on the plans.

**3.09 BITUMINOUS CONCRETE CURB**

- A. Bituminous concrete curb shall be constructed to the design specified on the Plans or as approved by ENGINEER and shall include the conditioning and treating of the surface on which the curb is to be placed.
- B. Place asphalt curb in accordance with Section 501 and 805 of the Michigan Department of Transportation Standard Specifications for Construction, latest edition.
- C. Materials used in the construction and installation of asphalt curbing shall be in accordance with Section 904 of the Michigan Department of Transportation Standard Specifications for Construction, latest edition.
- D. Asphalt concrete curb mixture shall match the wearing course mixture.
- E. Bituminous mixture shall be thoroughly compacted by a curbing machine to the cross section shown on the Plans, or as determined by ENGINEER. The curb shall be formed to the density to produce a tight surface texture. Curbs showing segregation, slumping, or misalignment shall be removed and replaced at CONTRACTOR's expense.
- F. When specified on the Plans or as directed by ENGINEER, an application of asphalt emulsion or other approved bituminous coating shall be applied to the finished curb at the joint of the curb and pavement, or to the inside face of the curb, or to both, as a protective seal.
- G. Backfilling behind the curb shall not commence until the bituminous mixture has cured.
- H. Backfill material shall be placed and thoroughly tamped and compacted to the satisfaction of ENGINEER, without disturbing the curb, and shall be left in a neat and workmanlike condition.

### **3.10 BITUMINOUS APPROACHES, SIDEWALKS, AND SHOULDERS**

- A. This Work shall consist of constructing an asphalt surface course as specified on the Plans, or as approved by ENGINEER.
- B. Materials used in the construction and installation of asphalt curbing shall be in accordance with Section 904 of the Michigan Department of Transportation Standard Specifications for Construction, latest edition.
- C. Furnish asphalt mixture(s) and place to the thickness specified on the Plans or as determined by ENGINEER.
- D. Preparation of existing pavements, aggregate bases, and joints shall be as specified in this Section.
- E. When approved by ENGINEER, the paver used for placing asphalt approaches and sidewalks will not be required to have an automatically controlled or activated screed or strike-off assembly or the corresponding grade referencing equipment. Also, with approval from ENGINEER, only one (1) roller may be used with each paver.

**3.11 ERECTION TOLERANCES**

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Flatness: Maximum variation of 3/8 inch for base course, 1/4 inch for leveling course, and 1/8 inch for top course measured with 10 foot straight edge.
- C. Scheduled Compacted Thickness:
  - 1. Base and Leveling Courses: Within 1/4 inch.
  - 2. Top Course: Within 1/8 inch.
- D. Variation from Indicated Elevation: Within 1/4.

**3.12 FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements.
- B. Owner's representative will take samples and perform tests, including validation of supplied aggregate gradation, and physical properties, binder content, compaction or density to verify conformance with specification.
- C. Asphalt Paving Mix Temperature: Measure temperature at time of placement.
- D. Asphalt Pavement Density:
  - 1. Control Density shall be the Theoretical Maximum Density indicated on the Contractor's JMF submitted for this project.
  - 2. Goal of the compactive effort will be to establish a rolling procedure which will achieve between 92% and 96% of the control density.
  - 3. Density values less than 92% will be sufficient cause for ENGINEER to require an adjustment in the number or type of rollers being used or in the rolling pattern.
  - 4. Once the procedure has been established on the start-up section, the procedure shall be used for the remainder of the mixture to be placed, unless subsequent tests indicate a need to change the number of rollers or the rolling pattern.
  - 5. If difficulties are encountered or if there is a significant change in aggregate or bitumen content, ENGINEER will determine the control density for the new mixture and require CONTRACTOR to again establish the number and type of rollers and the rolling pattern required on the new mixture to attain the control density. Compactive procedures thus determined shall be used when placing the remainder of that mixture.
  - 6. Density checks will be made at the discretion of ENGINEER to determine if the compactive procedure being used is achieving the required density, or if a change in procedure is necessary.
- E. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

**3.13 PROTECTION OF FINISHED WORK**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Immediately after placement, protect paving from mechanical injury for 24 hours or until surface temperature is less than 140 degrees F

## **PART 4 - MEASUREMENT AND PAYMENT.**

### **4.01 BASIS OF PAYMENT**

- A. Payment for the following item(s) of work shall cover all materials, equipment and labor necessary to install the following pay items in accordance with the plans and these specifications.

### **4.02 METHOD OF MEASUREMENT**

<b>Description</b>	<b>Unit</b>
HMA, ( <u>mixture</u> ).....	Ton

**HMA, (mixture)** includes cleaning and tack coating surfaces, furnishing, placing, and compacting the asphalt paving course. This pay item shall apply to all HMA paving within the site.

**END OF SECTION**

**SECTION 32 17 23**  
**PAVEMENT MARKING****PART 1 - GENERAL****1.01 SUMMARY****A. Section Includes:**

1. Traffic lines and markings.
2. Legends.
3. Paint.
4. Glass beads.

**1.02 RELATED SECTIONS:**

- A. Section 32 12 16 - Asphalt Paving.
- B. Section 32 13 13 - Concrete Paving.

**1.03 REFERENCES****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 Using the Stormer 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.

#### **1.04 PERFORMANCE REQUIREMENTS**

- A. Paint Adhesion: Adhere to road surface forming smooth continuous film one minute after application.
- B. Paint Drying: Tack free by touch so as not to require coning or other traffic control devices to prevent transfer by vehicle tires within two minutes after application.

#### **1.05 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data:
  1. Submit paint formulation for each type of paint, tape or thermoplastic material.
  2. Submit data on surface preparation and adhesives used for application of
- C. Test Reports: Submit source and acceptance test results in accordance with AASHTO M247.
- D. Manufacturer's Installation Instructions: Submit instructions for application temperatures, eradication requirements, application rate, line thickness, type of glass beads, bead embedment and bead application rate, and any other data on proper installation.
- E. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

#### **1.06 QUALITY ASSURANCE**

- A. Perform Work in accordance with:
  1. Michigan Department of Transportation Standard Specifications for Construction, latest edition.
  2. Michigan Manual on Uniform Traffic Control Devices, latest edition.

#### **1.07 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum 5 years documented experience.

- B. Applicator: Company specializing in performing work of this section with minimum 10 years documented experience.

#### **1.08 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.

#### **1.09 ENVIRONMENTAL REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- 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.

#### **1.10 WARRANTY**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties.
- B. Furnish one year manufacturer's warranty for traffic paints.

### **PART 2 - PRODUCTS**

#### **2.01 PAVEMENT MARKING MATERIALS**

- A. Furnish pavement marking materials in accordance with Section 920 and 922 of the Michigan Department of Transportation Standard Specifications for Construction, latest edition.
  - 1. Temporary Longitudinal Pavement Markings:

- a) Paint: 4 and 6 inch longitudinal pavement markings shall be fast dry waterborne paint, unless otherwise specified on the plans. When necessitated by weather, utilize products approved for cold-weather application.
- b) Tape: 4 and 6 inch removable (Type R) or non-removable (Type NR) tapes as specified on the plans.
- 2. Permanent Pavement Markings:
  - a) All permanent 4 and 6 inch longitudinal pavement markings shall be regular dry, unless otherwise specified on the plans.
  - b) All transverse pavement markings and legend markings shall be Overlay Cold Plastic Tape
- B. Glass Beads: AASHTO M247, Type 1, coated to enhance embedment and adherence with paint.
  - 1. Physical Requirements: Glass bead physical characteristics shall be in accordance with Table 920-1 of the Michigan Department of Transportation Standard Specifications for Construction, latest edition.
  - 2. Standard Size Gradation: Standard gradation shall be in accordance with Table 920-1 of the Michigan Department of Transportation Standard Specifications for Construction, latest edition.
  - 3. Large Size Gradation: Large glass bead gradation in accordance with federal specification TTB-1325 for Type 4 glass beads.
- C. Manufacturers
  - 1. Selected from the Qualified Product Lists for their respective product as published by the Michigan Department of Transportation Materials Source Guide, latest edition.
  - 2. Substitutions: Not permitted

## **2.02 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 manufacturer's specified temperature for fast dry and cold weather 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.

**C. Bead Guns:**

1. Double-drop type system as specified in Section 920 of the Michigan Department of Transportation Standard Specifications for Construction; latest edition.
2. 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.

**D. Recessing Equipment:**

1. Use self-propelled equipment with on-board grinding heads and self-vacuuming equipment capable of grinding existing pavement surface and markings using a method approved by the manufacturer of the recessed pavement marking material to be recessed for forming grooves in pavement surfaces.
2. The equipment shall be capable of grinding grooves in the pavement surface to the following tolerances.

**Table 1: Longitudinal Pavement Recessing Tolerances**

Type	Tolerance
Groove Width:	±1/8 inch
Groove Depth:	± 5 mils
Groove Position:	± 1/8 inch

**Table 2: Transverse and Legend Recessing Tolerances**

Type	Tolerance
Groove Width:	±1/8 inch
Groove Depth:	± 5 mils
Groove Position:	n/a

**E. 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.

**2.03 SOURCE QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements: Testing, inspection and analysis requirements.

- B. Pavement marking materials shall be selected from the Qualified Product Lists published by the Michigan Department of Transportation Materials Source Guide, latest edition.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Do not apply paint to concrete surfaces until concrete has cured for 28 days.

### **3.02 PREPARATION**

- A. 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.
- B. Surface Preparation.
  - 1. Clean and dry paved surface prior to painting.
  - 2. Remove curing compound from Portland Cement Concrete Pavement Surface prior to placement of permanent pavement markings.
  - 3. Blow or sweep surface free of dirt, debris, oil, grease or gasoline.
  - 4. Spot location of final pavement markings as specified and as indicated on Drawings by applying pavement spots at the start and end of each solid or skip line.
  - 5. Notify Architect/Engineer after placing pavement spots and minimum 3 days prior to applying traffic lines.

### **3.03 EXISTING WORK**

- 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.

### 3.04 APPLICATION

#### A. General:

1. Install Work in accordance with Section 811 of the Michigan Department of Transportation Standard Specifications for Construction, latest edition.
  - a) Follow requirements for application rate specified in Table 811-1 of the Michigan Department of Transportation Standard Specifications for Construction, latest edition.
  - b) Follow temperature and seasonal limitations specified in Table 811-2 of the Michigan Department of Transportation Standard Specifications for Construction, latest edition.

#### B. Symbols and Legends: Place symbols and legends in accordance with Michigan Department of Transportation Pavement Marking Standard Plans PAVE-900 Series.

#### C. Layout:

1. Lay out pavement markings in accordance with the latest edition of the Michigan Department of Transportation Pavement Marking Standard Plans, and as shown on the plans.
2. If there are any discrepancies between the plans and the Standard Plans referenced above, notify the Engineer prior to placement and submit written request for clarification.

### 3.05 APPLICATION TOLERANCES

#### A. Section 01 40 00 - Quality Requirements: Tolerances.

#### B. Installation Tolerances:

1. Maximum Variation from Wet Film Thickness: 1 mil.
2. Maximum Variation from Wet Paint Line Width: Plus or minus 1/8 inch.
3. 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.
4. Maximum Variation from Specified Application Temperature: Plus or minus 5 degrees F.

#### C. Tracing/Reapplication Tolerances:

1. Retrace lines at a width no greater than ¼ inch wider than the existing pavement marking. If existing pavement widths exceed nominal 4, 6, and 8 inch widths, retrace lines at a width no greater than 1 inch wider than the original marking (5, 7, and 9 inches respectively).
2. Retrace lines at a length no greater than 4 inches longer than the existing line. If existing skips exceed 12.5 feet in length, ensure retraced lines do not exceed 13 feet.

**3.06 RECESSING PAVEMENT MARKINGS**

- A. Place temporary tracer lines using the specified temporary pavement marking material in the exact locations and configuration shown on the plans for permanent pavement markings. At the sole discretion of the Engineer, reflective glass or ceramic beads may be omitted from temporary tracer lines.
- B. Dry-cut the grooves in a single pass using stacked diamond cutting heads on self-vacuuming equipment capable of producing a finished groove ready for marking material installation. Recess pavement in accordance with the following table.

**Table 3: Longitudinal Recessing Dimensions:**

Type:	Dimension:
Groove Width:	Material width +1 inch, ( $\pm 1/8$ inch)
Groove Depth:	Per manufacturer, not to exceed $1/4$ inch, ( $\pm 5$ mils)
Groove Position:	On the lane, 4 inches in from the joint line, ( $\pm 1/8$ inch)

**Table 4: Transverse and Legend Recessing Dimensions:**

Type:	Dimension:
Groove Width:	Material width +1 inch, ( $\pm 1/8$ inch)
Groove Depth:	Per manufacturer, not to exceed $1/4$ inch, ( $\pm 5$ mils)
Groove Position:	In the exact location where the transverse marking (crosswalk or stop bar) or legend will be placed.

- C. Ensure that the bottom of the groove has a fine corduroy finish. If a coarse tooth pattern results, increase the number of blades and decrease the spaces on the cutting head until the required finish is achieved.
- D. Following grooving and vacuuming, clean groove with compressed air to remove accumulated debris and moisture immediately preceding placement of permanent pavement marking.
- E. Place permanent pavement markings within 24 hours of grooving. Ensure grooves are clean and dry prior to placement of pavement markings. Ensure groove is located and sized such that the entire pavement marking can be placed within the groove.

**3.07 FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect for incorrect location, insufficient thickness, line width, coverage, retention, uncured or discolored material, and insufficient bonding.
- C. Repair lines and markings, which after application and curing do not meet following criteria:
  - 1. Incorrect Location: Remove and replace incorrectly placed patterns.
  - 2. Insufficient Thickness, Line Width, Paint Coverage, Glass Bead Coverage or Retention: Prepare defective material by acceptably grinding or blast cleaning to remove substantial amount of beads and to roughen marking surface. Remove

- loose particles and debris. Apply new markings on cleaned surface in accordance with this Section.
3. Uncured or Discolored Material, Insufficient Bonding: Remove defective markings in accordance with this Section and clean pavement surface one foot (300 mm) beyond affected area. Apply new markings on cleaned surface in accordance with this Section.
- D. Prepare list of defective areas and areas requiring additional inspection and evaluation to decide where material may need replaced. Provide traffic control as necessary if markings require more detailed evaluation.
- E. Replace failed or defective markings in entire section of defective markings within 30 days after notification when any of the following exists during warranty period:
1. Average retroreflectivity within any 528 foot section is less than 1225 mcd/m<sup>2</sup>/1x for white pavement markings and 100 mcd/m<sup>2</sup>/1x for yellow pavement markings.
  2. Marking is discolored or exhibits pigment loss, and is determined to be unacceptable by three member team based on visual comparison with beaded color plates.
  3. More than 15 percent of area of continuous line, or more than 15 percent of combined area of skip lines, within any 528 foot section of roadway is missing.
- F. Replace pavement marking material under warranty using original or better type material. Continue warranty to end of original 1 year period even when replacement materials have been installed as specified.
- G. When eradication of existing paint lines is necessary, eradicate by shot blast or water blast method. Do not gouge or groove pavement more than 1/16 inch during removal. Limit area of removal to area of marking plus 1 inch on all sides. Prevent damage to transverse and longitudinal joint sealers, and repair any resulting damage.
- H. Maintain daily log showing work completed, results of above inspections or tests, pavement and air temperatures, relative humidity, presence of any moisture on pavement, and any material or equipment problems. Make legible entries in log in ink, sign and submit by end of each work day. Enter environmental data into log prior to starting work each day and at two additional times during day.

### **3.08 PROTECTION OF FINISHED WORK**

- 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.

**PART 4 - MEASUREMENT AND PAYMENT.****4.01 BASIS OF PAYMENT**

- A. Payment for the following item(s) of work shall cover all materials, equipment and labor necessary to install the following pay items in accordance with the plans and these specifications.

**4.02 METHOD OF MEASUREMENT**

Description	Unit
Pavt Mrkg, ( <u>material</u> ), __ inch, ( <u>color</u> ).....	Foot
Pavt Mrkg, ( <u>material</u> ), __ inch, ( <u>legend</u> ).....	Foot
Pavt Mrkg, ( <u>material</u> ), ( <u>legend</u> ) .....	Each

**Pavt Mrkg, (material), \_\_ inch, (color)** includes furnishing and installing longitudinal pavement markings of the material, width, and color specified on the plans.

**Pavt Mrkg, (material), \_\_ inch, (legend)** includes furnishing and installing transverse linear pavement markings of the material, width, and color specified on the plans.

**Pavt Mrkg, (material), (legend)** includes furnishing and installing white text or symbolic legend pavement markings of the specified material.

**END OF SECTION**

**SECTION 33 05 14**  
**PUBLIC MANHOLES AND STRUCTURES****PART 1 - GENERAL****1.01 DESCRIPTION****A. Section Includes:**

1. Modular precast concrete manholes and structures with tongue-and-groove joints with precast concrete transition to cover frame, covers, anchorage, and accessories.
2. Bedding and cover materials.

**B. Related Sections:**

1. Section 31 10 01 - Pavement and Utilities Removal.
2. Section 31 23 17 - Trenching.
3. Section 32 12 16 - Asphalt Paving.
4. Section 32 13 13 - Concrete Paving.
5. Section 33 01 32 - Sewer and Manhole Testing.
6. Section 33 11 32 - Water Utility Distribution Piping.
7. Section 33 31 13 - Sanitary Utility Sewerage Piping.
8. Section 33 41 13 - Storm Utility Drainage Piping.
9. Section 33 46 00 - Subdrainage.

**1.02 REFERENCES****A. ASTM International:**

1. ASTM A48/A48M - Standard Specification for Gray Iron Castings.
2. ASTM C55 - Standard Specification for Concrete Brick.
3. ASTM C443 – Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
4. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.

5. ASTM C497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.
  6. ASTM C891 - Standard Practice for Installation of Underground Precast Concrete Utility Structures.
  7. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures.
  8. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals.
- B. Michigan Department of Transportation
1. Standard Specifications for Construction, latest edition.
  2. Standard Road Plans
- C. Society for Protective Coatings:
1. SSPC-Paint 16 - Coal Tar Epoxy-Polyamide Black (or Dark Red) Paint.

### **1.03 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures.
- B. Shop Drawings: Indicate structure locations, elevations, piping, sizes and elevations of penetrations, and configuration of precast components. Provide drawings for each precast structure.
- C. Product Data: Submit product data showing component construction, features, configuration, and dimensions for all manhole and structure components including the following:
1. Joint gaskets.
  2. Frames and covers.
  3. Resilient connectors.
  4. Adjusting rings.
  5. Access steps.
- D. Manufacturer's Certification: Certify products meet or exceed specified requirements.

### **1.04 QUALITY ASSURANCE**

- A. Obtain precast concrete utility structures from a single source.



- B. Perform work in accordance with National Precast Concrete Association Quality Control Manual for Precast and Prestressed Concrete Plants.
- C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section with minimum three years documented experience.
- D. Installer: Company specializing in performing work of this section.

## **1.05 DELIVERY, STORAGE AND HANDLING**

- A. Section 01 60 00 - Product Requirements.
- B. Comply with precast concrete manufacturer's instructions and ASTM C913 for unloading, storing and moving precast manholes and drainage structures.
- C. Do not deliver products until concrete has cured 5 days or attained minimum of 75 percent of specified 28 day compressive strength.
- D. Store precast concrete manholes and drainage structures to prevent damage to Owner's property or other public or private property. Repair property damaged from materials storage.
- E. Mark each precast structure by indentation or waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers shown on Drawings to indicate its intended use.

## **PART 2 - PRODUCTS**

### **2.01 MANHOLES AND STRUCTURES**

- A. Manhole and Structure Sections: Reinforced precast concrete in accordance with ASTM C478 with gaskets in accordance with ASTM C443.
- B. Manholes and structures shall be in accordance with Section 403 of the Michigan Department of Transportation Standard Specifications for Construction and Standard Plan R-1 Series, latest edition.
- C. Grease Traps shall be Reinforced precast structures consisting of a minimum of three (3) settling chambers with offset orifice connections. Their design shall prohibit short-circuiting or back-siphoning. Each chamber shall be provided with access by means of a standard sanitary sewer manhole frame and cover.
- D. All structure tops shall be rated for a minimum H-20 vehicular load.

### **2.02 FRAMES AND COVERS**

- A. Manufacturers:
  - 1. EJ Co.

2. Neenah Foundry Co.
  3. Substitutions: Not Permitted.
  4. Where cover type is expressed in letter form, refer to the MDOT Standard Road Plans. Otherwise, East Jordan Iron Works covers are identified by the prefix "EJ Co." followed by the model number. Neenah Foundry Co. covers are identified by the Prefix "NFC" followed by the model number
- B. Product Description: ASTM A48/A48M, Class 35B gray cast iron or ASTM A536 ductile iron construction. Machined flat bearing surfaces. Live load rating of 40,000 lbs.
1. Sanitary Sewer
    - a) Roadway Application: Cover and Frame: E.J. Co. #3024 series or equal; frame compatible with specified paving surface otherwise in accordance with Cover Q as specified in Standard Plan R-18 Series.
    - b) Sidewalk or Non-roadway Application: Cover and Frame: E.J. Co. #1040A series or equal; frame compatible with specified paving surface otherwise in accordance with Cover Q as specified in Standard Plan R-18 Series.
    - c) Solid Cover, closed pick slot and neoprene gasket; 24 inch clear opening, cast with the name of the utility.
    - d) Covers shall bear the Allegan City Logo in addition to the name of the utility.
  2. Storm Sewer:
    - a) Roadway Application: Cover and Frame: E.J. Co. #3024 series or equal; frame compatible with specified paving surface otherwise in accordance with Cover Q as specified in Standard Plan R-18 Series.
    - b) Sidewalk or Non-roadway Application: Cover and Frame: E.J. Co. #1040A series or equal; frame compatible with specified paving surface otherwise in accordance with Cover Q as specified in Standard Plan R-18 Series.
    - c) Solid Cover and closed pick slot; 24 inch clear opening, cast with the name of the utility.
    - d) Covers shall bear the Allegan City Logo in addition to the name of the utility.
  3. Catch Basins:
    - a) Cover and Frame: Cover Type as specified plans in accordance with in MDOT Standard Plans.
    - b) Removable grate with short sinusoidal drainage openings; adjustable height back to match curb cross section. Include "Dump No Waste - Drains to Water Ways" legend on back of frame.
- C. Painting: Black Asphalt Dip.
- D. Where cover type is expressed in letter form, refer to the MDOT Standard Road Plans. Otherwise, the EJ Co. model numbers are shown to demonstrate the

required type, style, configuration, and quality. Corresponding products by Neenah Foundry Co. shall be considered for approval by the Architect/Engineer.

## **2.03 COMPONENTS**

- A. Manhole and Structure Steps: Polypropylene plastic step with 1/2 inch steel reinforcement designed to prevent slippage off step. Required for all structures with 48 inch or larger inside diameter.
- B. Foundation Slab: Reinforced, precast concrete in accordance with ASTM C478 with gaskets in accordance with ASTM C443. Required for all structures.
- C. Shaft Construction and Top Section: Reinforced precast concrete pipe sections, lipped male/female joints, sleeved to receive pipe sections.
- D. Top Section: Eccentric cone wherever possible. Flat top for shallow pipe connections will be permitted with approval of Engineer.
- E. Flow Channel: grouted in place.
  - 1. Sanitary Sewer: Required for all manholes used for sanitary sewer service.
  - 2. Storm Sewer: Required for all main line storm manholes where both an incoming and outgoing pipe is present.
- F. Sump: minimum depth 2 feet measured from lowest pipe invert to structure floor.
  - 1. Required for all leaching basins
  - 2. Required for all storm sewer catch basins, except those located on the main line.

## **2.04 CONFIGURATION**

- A. Shape: Cylindrical.
- B. Top Bearing Surface Diameter: Outside diameter no smaller than outside diameter of adjusting rings.
- C. Top Bearing Surface Width: Minimum 6 inches continuous width around circumference of adjusting rings.
- D. Wall Thickness: Sufficient to provide required top bearing surface and in accordance with ASTM C478.
- E. Clear Inside Dimensions: As indicated on Drawings.
- F. Design Depth: As indicated on Drawings.
- G. Pipe Entry: Furnish openings as indicated on Drawings and as required for all pipe connections.

- H. Steps: 10 inches wide, 16 inches on center vertically, cast into structure wall. Distance from cover opening to first step shall not exceed 24 inches.

## **2.05 ACCESSORIES**

- A. Structure Joint Gaskets: ASTM C443; rubber. Required for all structure joints.
- B. Standard Adjusting Materials:
1. Precast Fiber reinforced adjusting rings or masonry block set in mortar bed.
  2. Sealant for Adjusting Rings:
    - a) Mortar Type R-2 in accordance with Section 702 of the Michigan Department of Transportation Standard Specifications for Construction, latest edition.
- C. Resilient Adjusting Rings (where specified):
1. Products:
    - a) American Highway Products Ltd.: Flex-O-Ring.
    - b) East Jordan Iron Works, Inc.: Infra-Riser®.
    - c) Substitutions: Section 01 60 00 - Product Requirements.
  2. Recycled rubber composite, round rings of 1/2-inch to 3-inch thickness or tapered thickness.
  3. Sealant for Adjusting Rings:
    - a) ASTM C920 type S
    - b) Products:
      - I) Project 1 ® Polyurethane Sealant
      - II) Substitutions: Section 01 60 00 - Product Requirements.
- D. Exterior Manhole Coating: ASTM D 1227, Type III, Class 1, cold-applied, emulsified-asphalt dampproofing applied at a rate of 3 gallons per 100 square feet. Applied to all exterior surfaces of manhole. Required on all manholes used for sanitary sewer service.
- E. Concrete: Grade S3 in accordance with Table 701-1 of the Michigan Department of Transportation Standard Specifications for Construction, latest edition.
- F. Hydraulic-Cement Grout: ASTM C1107, premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days. Required for all connections to concrete pipe.
- G. Resilient Pipe Connectors: ASTM C923, resilient EPDM or polyisoprene rubber; internal stainless steel expanding band; external stainless steel pipe clamp. Required for all connections to plastic pipe.

**H. External Sealing Bands(where specified):**

1. Products:
  - a) Cretex Specialty Products: Cretex Wrap.
  - b) Pipeline Seal & Insulator, Inc.: Riser-Wrap™.
  - c) Press-Seal Gasket Corporation: EZ-Wrap.
  - d) Substitutions: Section 01 16 00 - Product Requirements.
2. ASTM C877, waterproof and flexible, Type I, II, or III.
3. Width of wrap shall be sufficient to provide 6" of overlap on each side of joint.

**I. Internal Drop Connections (where specified):**

1. Products:
  - a) Duran Inc.: Reliner® Inside Drop System.
  - b) Substitutions: Not permitted.
2. Plastic composite collection device and stainless steel clamping brackets.
3. Required only where specified plans.

**2.06 PVC DRAINAGE STRUCTURES AND GRATES****A. Manufacturers**

1. Nyloplast, Inc.
2. Substitutions: Section 01 60 00 - Product Requirements.

- B. The drain basins required for this contract shall be manufactured from PVC pipe stock, utilizing a thermo-molding process to reform the pipe stock to the specified configuration. The drainage pipe connection stubs shall be manufactured from PVC pipe stock and formed to provide a watertight connection with the specified pipe system. This joint tightness shall conform to ASTM D3212 for joints for drain and sewer plastic pipe using flexible elastomeric seals.
- C. The pipe bell spigot shall be joined to the main body of the drain basin or catch basin. The pipe stock used to manufacture the main body and pipe stubs of the surface drainage inlets shall meet the mechanical property requirements for fabricated fittings as described by ASTM D3034, Standard for Sewer PVC Pipe and Fittings; ASTM F1336, Standard for PVC Gasketed Sewer Fittings.
- D. The grates furnished for all surface drainage inlets shall be ductile iron grates for sizes 8", 10", 12", 15", 18", 24" and 30" (12" and 15" frames are cast iron) shall be made specifically for each basin so as to provide a round bottom flange that closely matches the diameter of the surface drainage inlet. Grates for drain basins shall be capable of supporting H-25 wheel loading for heavy-duty traffic or H-10 loading for pedestrian traffic. 12" and 15" grates will be hinged to the frame using pins. Metal

used in the manufacture of the castings shall conform to ASTM A536 grade 70-50-05 for ductile iron and ASTM A-48-83 class 30B for 12" and 15" cast iron frames. Grates shall be provided painted black.

## **2.07 AGGREGATE BASE**

### **A. Bedding Material**

1. Above water table or dry conditions during placement:
  - a) Dense Graded Aggregate 21AA in accordance with Table 902-1 of the Michigan Department of Transportation Standard Specifications for Construction, latest edition.
2. Below Water Table or Wet Conditions during placement:
  - a) Course aggregate 6A in accordance with Table 902-1 of the Michigan Department of Transportation Standard Specifications for Construction, latest edition.
3. Suitable on site material may be utilized as bedding with approval of Engineer.

### **B. Drainage Aggregate (Leaching Basins)**

1. Open Graded Aggregate 34 R in accordance with Table 902-1 of the Michigan Department of Transportation Standard Specifications for Construction, latest edition.

### **C. Backfill Material:**

1. Granular Material Class III in accordance with Table 902-3 of the Michigan Department of Transportation Standard Specifications for Construction, latest edition.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements.
- B. Verify items provided by other sections of Work are properly sized and located.
- C. Verify built-in items are in proper location, and ready for roughing into Work.
- D. Verify correct size of manhole and structure excavation.

### **3.02 PREPARATION**

- A. Coordinate placement of inlet and outlet pipes required by other sections.

- B. Do not install manholes and structures where site conditions induce loads exceeding structural capacity of manholes or structures.
- C. Inspect precast concrete manholes and structures immediately prior to placement in excavation to verify manholes and structures are internally clean and free from damage. Remove and replace damaged units.

### **3.03 PRECAST CONCRETE MANHOLE AND STRUCTURE INSTALLATION**

- A. Install underground precast structures in accordance with ASTM C891.
- B. Excavation:
  - 1. Excavate for manholes and structures in accordance with Section 31 23 17 in location and to depth shown. Hand trim excavation for accurate placement of manholes and structures to elevations indicated on Drawings. Provide clearance around sidewalls of manhole or structure for construction operations and granular backfill.
  - 2. When groundwater is encountered, prevent accumulation of water in excavations. Place manholes or structures in dry trench.
  - 3. Where possibility exists of watertight manhole or structure becoming buoyant in flooded excavation, anchor manhole or structure to avoid flotation.
- C. Lift precast manholes and structures at lifting points designated by manufacturer.
- D. When lowering manholes and structures into excavations and joining pipe to units, take precautions to ensure interior of pipeline and manhole or structure remains clean.
- E. Set precast manholes and structures bearing firmly and fully on crushed aggregate bedding, compacted to 95% of maximum density per ASTM D1557.
- F. Assemble multi-section manholes and structures by lowering each section into excavation. Install rubber gasket joints between precast sections in accordance with manufacturer's recommendations. Lower, set level, and firmly position base section before placing additional sections.
- G. Remove foreign materials from joint surfaces and verify sealing materials are placed properly. Maintain alignment between sections by using guide devices affixed to lower section. Place manhole sections level and plumb.
- H. Install external sealing bands at all joints of manholes used for sanitary sewer service.
- I. Verify manholes and structures installed satisfy required alignment and grade.
- J. Connect plastic pipe to manhole or structure with resilient connectors.
- K. Connect concrete pipe to manhole or structure by filling annular space with hydraulic cement grout.

- L. Cut pipe to finish flush with interior of manhole or structure.
- M. Grout base of shaft section of manhole or structure used for sanitary sewer service. Form continuous flow channel of same width as connected piping with height of vertical sides to 3/4 of pipe diameter. Form curved channels with smooth, uniform radius and slope. Slope concrete benches to drain to channel.
  - 1. Invert slope: 2.5 percent minimum through manhole.
  - 2. Bench slope: 4 percent minimum.
- N. Backfill excavation in accordance with Section 31 23 17.

### **3.04 SANITARY MANHOLE DROP CONNECTIONS**

- A. Construct drop connections for sanitary sewer manholes when outlet invert is 24 inches or lower below inlet invert.
- B. Construct drop connections inside manhole or structure using plastic sewer piping, plastic composite collection device and stainless steel bands. Install components in accordance with manufacturer's instructions.

### **3.05 CASTINGS INSTALLATION**

- A. Place all asphalt courses except for top course prior to installing castings located in asphalt paving areas. Cut through lower asphalt courses and remove material as necessary to place adjusting rings and casting.
- B. Set adjusting rings of required thickness to achieve specified elevation. Select a combination of tapered rings to achieve required slope for non-level installations.
- C. Apply sealant to top and bottom surface of all adjusting rings in a continuous 1/4 inch bead forming a closed loop with no gaps.
- D. Install casting to the required elevation and slope, in full contact with top adjusting ring. Do not use shims or wedges. Do not use mortar.
- E. Apply one additional bead of sealant to joint between casting and top adjusting ring after casting is set.
- F. Fill remaining excavated space with concrete paving flush with surrounding paving

### **3.06 MONUMENT BOX INSTALLATION**

- A. Place all asphalt courses except for top course prior to installing castings located in asphalt paving areas.
- B. Obtain location mark on pavement from surveyor responsible for section corner installation.
- C. Cut through lower asphalt courses and remove material as necessary to place monument box frame and cover.



- D. Adjust location of monument box based on witness dimensions obtained from surveyor.
- E. Tolerance: center of monument box shall be within 1/2 inch of center of section corner stake, according to witness dimensions.
- F. Adjust height of monument box to match road surface prior to top course asphalt paving.
- G. Fill excavated space remaining with replacement asphalt or concrete paving.

### **3.07 VERTICAL ADJUSTMENT OF EXISTING MANHOLES AND STRUCTURES**

- A. Where required, adjust top elevation of existing manholes and structures to finished grades shown on Drawings.
- B. Carefully remove existing grates, covers, and frames; clean of remaining mortar fragments.
- C. Verify distance from final grade to top step and suitability of existing structure for adjustment.
- D. Reconstruct or replace structure top section if unsuitable for reuse and adjustment.
- E. Install frame and cover in accordance with requirements for castings installation.
  - 1. Where existing castings are suitable for reuse, reinstall removed castings.
  - 2. When new castings are installed and removed castings are suitable for reuse, salvaged castings shall remain property of City.

### **3.08 FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements.
- B. Test concrete manhole and structure sections in accordance with ASTM C497.

## **PART 4 - MEASUREMENT AND PAYMENT**

### **4.01 BASIS OF PAYMENT**

- A. Payment for the following item(s) of work shall cover all materials, equipment and labor necessary to install the following pay items in accordance with the plans and these specifications.

**4.02 METHOD OF MEASUREMENT**

<b>Description</b>	<b>Unit Price</b>
Sanitary Manhole, 48 inch dia .....	Each
Dr Structure, 48 inch dia .....	Each
Dr Structure Cover, Adj, Case ____ .....	Each
Dr Structure Cover, Type ____ .....	Each

Payment for **Dr Structure Cover, Type \_\_\_\_** for the type or model specified shall include furnishing and installing a new cast iron frame and grate on a freshly placed mortar bed.

**END OF SECTION**

**SECTION 33 11 13**  
**PUBLIC WATER UTILITY DISTRIBUTION PIPING**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

A. Section Includes:

1. Pipe and fittings for public water mains.
2. Tapping Sleeves and Valves.
3. Valves and Valve Boxes.
4. Fire Hydrants.
5. Precast concrete vault.
6. Pipe Support Systems.
7. Concrete encasement and cradles.
8. Bedding and cover materials.

B. Related Sections:

1. Section 31 10 00 – Site Clearing and Demolition.
2. Section 31 23 33 – Trenching and Backfilling.
3. Section 33 05 14 – Manholes and Structures.
4. Section 33 05 24 – Utility Horizontal Directional Drilling.
5. Section 33 13 00 – Disinfecting of Water Utility Distribution.

**1.02 REFERENCES**

A. American Society of Mechanical Engineers:

1. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.

B. ASTM International:

1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

**C. American Water Works Association:**

1. AWWA C104 - ANSI Standard for Cement Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
2. AWWA C105 - ANSI Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems.
3. AWWA C110 - ANSI Standard for Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In., for Water.
4. AWWA C111 - ANSI Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
5. AWWA C115 - ANSI Standard for Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
6. AWWA C150 - ANSI Standard for Thickness Design of Ductile Iron Pipe.
7. AWWA C151 - ANSI Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids.
8. AWWA C153 - ANSI Standard for Ductile-Iron Compact Fittings for Water Service.
9. AWWA C502 - Dry-Barrel Fire Hydrants.
10. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service.
11. AWWA C515 - Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service.
12. AWWA C550 - Protecting Epoxy Interior Coating for Valves and Hydrants.
13. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.

**D. National Fire Protection Association:**

1. NFPA 1963 - Standard for Fire Hose Connections.

**E. National Sanitation Foundation:**

1. NSF 14 - Plastic Piping System Components and Related Materials
2. NSF 61 - Drinking Water System Components - Health Effects.

**1.03 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit manufacturer's latest published literature including illustrations, installations instructions, maintenance instructions and parts lists.
- C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

**1.04 CLOSEOUT SUBMITTALS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Hydrostatic Pressure and Leakage Test Report
  1. Date

2. Start time and pressure
  3. End time and pressure
  4. Description or sketch showing configuration of equipment used
  5. Calculation of allowable leakage
  6. Record of actual leakage measured
- C. Project Record Documents: Record on as built drawings:
1. Any variations from approved plans, including but not limited to:
    - a. location of water main
    - b. location and configuration of connection to existing water main
    - c. deviations from standard depth or depth at crossings
    - d. type and configuration of components and materials
    - e. discovery of any uncharted utilities or unexpected subsoil conditions
  2. As built measurements
    - a. Main – distance measured along main between:
      - 1) Fittings (tees, bends, reducers, etc.)
      - 2) Valves
      - 3) Hydrants (including valves and fittings)
    - b. Services:
      - 1) Tap: This is the distance measured along the main from the corporation stop to nearest main fitting.
      - 2) L: This is the length of the service line from the corporation stop to the curb stop or meter pit.
      - 3) Tail: For services stubbed for future connection, this is the length of service line installed beyond the curb stop.
    - c. Witnesses:
      - 1) Curb Stop Boxes: for each curb stop box include two witness dimensions:
        - a) Use manholes, catch basins, hydrants, power poles, or property corners.
        - b) Do not witness curb stop boxes to property corners, power poles, or trees.
      - 2) Main Valves: for each water main valve, include:
        - a) One witness dimension to each other water main valve in the immediate vicinity
        - b) Two witness dimensions to other permanent structures
          - (1) Use manholes, catch basins, hydrants
          - (2) Do not witness water main valves to property corners, buildings, power poles, or trees.

D. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

- E. Provide Operation and Maintenance Data for valves and hydrants.

#### **1.05 QUALITY ASSURANCE**

- A. Pipe and Fittings: Pipe and fittings shall be marked with manufacturer's name, pipe classification, and pressure rating.
- B. Valves and hydrants: Mark valve and hydrant bodies with manufacturer's name and pressure rating.
- C. Provide independent certification that materials and coatings comply with the following NSF 14 and NSF 61 Standards. All materials shall be stamped or otherwise marked to indicate compliance with and NSF 61 (and NSF 14 for plastic pipes and fittings).
- D. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this section.

#### **1.06 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 labeling in place.
- C. Prepare hydrants, valves and accessories for shipment according to AWWA Standards. Seal hydrant and valve ends to prevent entry of foreign matter into product body.
- D. 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.
- E. Block individual and stockpiled pipe lengths to prevent moving.
- F. Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.
- G. Do not place pipe flat on ground. Cradle to prevent point stress.
- H. Store UV sensitive materials out of direct sunlight.

#### **1.07 FIELD CONDITIONS**

- A. Verify field measurements prior to fabrication.
- 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.

### **PART 2 - PRODUCTS**

#### **2.01 WATER PIPING**

- A. Ductile Iron Pipe: AWWA C150/C151.
  - 1. Bituminous Exterior coating: AWWA C110.

2. Cement Mortar Lining: AWWA C104, standard thickness.
  3. Pipe Thickness Class: AWWA C150, thickness class 52.
  4. Meet the requirements of ANSI/NSF Standard 61 and the certification must be stamped on the exterior wall of the pipe.
  5. Joints:
    - a. Mechanical and Push-On Joints: AWWA C111
    - b. Flanged Joints: AWWA C115.
    - c. Rubber Gaskets: AWWA C111.
  6. Electrical Continuity:
    - a. Wedges: Serrated silicon bronze. Two per joint.
  7. Polyethylene Encasement: AWWA C105 polyethylene jacket.
- B. Poly-Vinyl Chloride Pipe: AWWA C900
1. 4-inch through 60-inch: AWWA C900
  2. Class: SDR 18
  3. Pressure Class: 235 psi.
  4. Meet the requirements of ANSI/NSF Standard 14 and 61 and the certification must be stamped on the exterior wall of the pipe.
  5. Joints:
    - a. Mechanical Joints: AWWA C111
    - b. Push-On Joints: ASTM D3139
    - c. Flanged Joints: N/A
    - d. Rubber Gaskets: AWWA C111 and ASTM F477 and D3139
- C. Molecularly Oriented Poly-Vinyl Chloride Pipe (PVCO): AWWA C909
1. 4-inch through 12-inch: AWWA C909
  2. Class: Diameter Ratio 31 (O.D./Wall Thickness)
  3. Pressure Class: 235 psi.
  4. Meet the requirements of ANSI/NSF Standard 14 and 61 and the certification must be stamped on the exterior wall of the pipe.
  5. Joints:
    - a. Mechanical Joints: AWWA C111
    - b. Push-On Joints: ASTM D3139
    - c. Flanged Joints: N/A
    - d. Rubber Gaskets: AWWA C111 and ASTM F477 and D3139

**2.02 FITTINGS:**

- A. All fittings shall be restrained to pipe.
- B. Ductile Iron Fittings:
  - 1. 6-Inch Through 24-Inch:
    - a. ANSI/AWWA C153/A21.53, compact fittings.
    - b. Mechanical joints.
    - c. 350 psi pressure rating.
    - d. Lining:
      - 1) Standard thickness, cement mortar lining in accordance with AWWA C104.
      - 2) Fusion bonded epoxy in accordance with AWWA C550, nominal 6-8 Mils.
  - 2. 30-Inch Through 48-Inch:
    - a. ANSI/AWWA C110/A21.10.
    - b. Manufactured restrained joint.
    - c. Ductile iron glands.
    - d. 250 psi pressure rating (minimum).
    - e. Lining:
      - 1) Standard thickness, cement mortar lining in accordance with AWWA C104.
      - 2) Fusion bonded epoxy in accordance with AWWA C550, nominal 6-8 Mils.

**2.03 JOINT RESTRAINT**

- A. Push-On Joint Pipe
  - 1. Ductile Iron Pipe:
    - a. 6-Inch Through 48-Inch Pipe:
      - 1) Series 1700 Megalug Harness by EBAA Iron Sales, or Equal with stainless steel gripper gasket.
      - 2) Restrained joints, as indicated on Drawings, to match restrained joint pipe.
    - b. Electrical Continuity:
      - 1) Wedges: Serrated silicon bronze. Two per joint.
  - 2. PVC/PVCO Pipe:
    - a. 4-Inch Through 24-Inch:
      - 1) PVC
        - a) Series 1600/1900 by EBAA Iron Sales.
        - b) Series 1350/1390 by Uni-flange Corporation.
        - c) Manufactured and marked for use on PVC.
      - 2) PVCO
        - a) Series 1900 by EBAA Iron Sales



- b) Series 1350/1390 by Uni-flange Corporation.
    - c) Manufactured and marked for use on PVCO.
  - b. 14-Inch Through 24-Inch PVC pipe:
    - 1) Series 2800 by EBAA Iron Sales.
    - 2) Series 1350/1390 by Uni-flange Corporation.
    - 3) Manufactured and marked for use on PVC.
- B. Pipe to Fittings
  - 1. Ductile Iron Pipe:
    - a. 6-Inch Through 48-Inch Pipe:
      - 1) Series 1100 Megalug by EBAA Iron Sales, or Equal with stainless steel gripper gasket.
      - 2) Restrained joints, as indicated on Drawings, to match restrained joint pipe.
    - b. Electrical Continuity:
      - 1) Wedges: Serrated silicon bronze. Two per joint.
  - 2. PVC/PVCO Pipe:
    - a. 4-Inch Through 24-Inch:
      - 1) PVC
        - a) Series 2000 by EBAA Iron Sales.
        - b) Series 1350/1390 by Uni-flange Corporation.
        - c) Manufactured and marked for use on PVC.
      - 2) PVCO
        - a) Series 19MJ00 by EBAA Iron Sales
        - b) Series 1350/1390 by Uni-flange Corporation.
        - c) Manufactured and marked for use on PVCO.
    - b. 14-Inch Through 24-Inch pipe:
      - 1) Series 2000 or 2200 by EBAA Iron Sales.
      - 2) Series 1350/1390 by Uni-flange Corporation.
      - 3) Manufactured and marked for use on PVC.

## 2.04 TAPPING SLEEVES

- A. Main body and neck of the tapping sleeve shall be two-pieces, constructed from 304 stainless steel alloy secured with removable stainless steel bolts and nuts. Sleeves to be rated for the minimum working pressures listed in the following table:

**Table 1: Tapping Sleeve Pressure Rating (by Size)**

Nominal Diameter of Tapped Main (inch)	Pressure Rating (psi)
4-8	250
10-24	200
26-30	150

- B. Outlet shall be 304 stainless steel or ductile iron provided with integral mechanical joint (MJ) fitting
- C. Hardware:
  - 1. Tapping Sleeve: Bolts, nuts and washers shall be 304 stainless steel or better. Plastic washer shall also be furnished to prevent galling between stainless steel nuts and washers.
  - 2. Mechanical Joint Outlet: Compatible with specified joints/fittings.
- D. Gaskets shall be virgin SBR rubber per ASTM D 2000 MAA610 unless specified otherwise on the plans.
- E. Products:
  - 1. Ford Meter Box Company: Style FTSS-4-MJ.
  - 2. Romac Industries, Inc.: SST III-MJ.
  - 3. Mueller Co.: H-304MJ
  - 4. Substitutions: Not permitted.

## **2.05 VALVES AND APPURTENANCES:**

- A. Valves:
  - 1. 6-Inch Through 24-Inch Valves:
    - a. Manufacturer:
      - 1) American Flow Control
      - 2) Clow
      - 3) U.S. Pipe
      - 4) Substitutions: Section 01 600 00 – Product Requirements
    - b. Resilient-Seated Gate Valves; ANSI/AWWA C509 or ANSI/AWWA C515:
      - 1) Nonrising stem (NRS)
      - 2) Wrench Nut: 2 inches square
      - 3) Open left (counter clockwise)
      - 4) Mechanical joint end connections
      - 5) Stem Seal: Buna-N O-rings
      - 6) Stem and Stem Nut: Bronze.
      - 7) Body and Cover: Ductile iron only.
      - 8) Wedge: Rubber coated cast iron in accordance with ASTM D429
      - 9) Pressure Rating
        - a) 6-Inch Through 12-Inch: 200 psi.
        - b) 14-inch through 24-inch: 250 psi.
- B. Valve Boxes
  - 1. Manufacturers:
    - a. EJ Co., E3002 with No. 6 base.
    - b. Tyler Pipe, 6860 series with #6 base.

- c. Mueller 10357 with No. 160 base.
- 2. 5-1/4-inch shaft.
- 3. Three section cast iron.
- 4. Legend
  - a. Valves on Water Mains: Cast iron lid marked "WATER".
  - b. Valves on Hydrant Leads: Cast iron lid marked "HYD".
- 5. Adjustable:
  - a. By means of threaded top and center sections.
  - b. Height: 51 inches to 72 inches.
- C. Post Indicators:
  - 1. Manufacturers and Models: Waterous A240; or equal.
  - 2. Cast iron post
  - 3. Window with "OPEN" or "CLOSED" indicator
  - 4. Cast iron wrench actuator
  - 5. Depth of Bury: 6 feet

## **2.06 FIRE HYDRANTS**

- A. Products/Manufacturers:
  - 1. East Jordan Iron Works: Model 5BR250.
  - 2. Substitutions: Not Permitted.
- B. Dry-barrel Break-away Type: AWWA C502; cast-iron body, compression type valve.
  - 1. General:
    - a. Bury Depth: 5-1/2 feet.
    - b. Inlet Connection: 6 inches.
    - c. Valve Opening: 5-1/4 inches diameter.
    - d. Ends: Mechanical Joint.
    - e. Bolts and Nuts: Corrosion resistant.
    - f. Interior Coating: AWWA C550.
    - g. Drain Outlet: Tapped with bronze plug.
    - h. O-ring Seals: Buna-N.
    - i. Bolt, Studs and Nuts: Corrosion-resistant.
    - j. Traffic Flange
  - 2. Operating stem and mechanism:
    - a. Open left (counter clockwise).
    - b. Stem: Steel.

- c. Operating Nut: 1 1/2-inch pentagon brass or bronze.
  - d. Stem Coupling: Breakable steel with stainless steel cotter pins.
  - e. Weathershield: Cast iron.
  - f. Protect opening between wrench nut and bonnet with an O-ring.
3. Nozzles:
- a. Hose:
    - 1) Number: 2
    - 2) Diameter: 2-1/2 inches.
    - 3) Threads: NFPA.
    - 4) Brass.
    - 5) Fastened by mechanical means.
  - b. Pumper:
    - 1) Number: 1.
    - 2) Diameter: 4-1/2 inches.
    - 3) Threads: NFPA.
    - 4) Brass.
    - 5) Fastened by mechanical means.
    - 6) 5-inch diameter Harrington Integral Hydrant Storz.
  - c. Caps:
    - 1) Cast iron.
    - 2) Chained to hydrant barrel.
    - 3) Operating nut.
4. Exterior Finish: Primer and two coats enamel paint.
- a. Color: Yellow
- C. Accessories:
- 1. Aggregate: Aggregate for hydrant drainage shall be coarse aggregate 6A in accordance with Michigan Department of Transportation 2003 Standard Specifications for Construction, Table 902-1.

## **2.07 LINE STOPPING SYSTEM**

- A. Manufacturer: ADS L.L.C.
  - 1. Product Line: Hydra-Stop®
- B. Substitutions: 01 60 00 - Product Requirements

## **2.08 AIR RELEASE VALVES**

- A. Manufacturers: APCO/Valve and Primer Corporation
- B. Model: Appropriate for application, approved by Engineer.
- C. Cast Iron Body, stainless steel float.
- D. Substitutions: 01 60 00 - Product Requirements

**2.09 PRECAST CONCRETE GATE WELLS**

- A. Precast Concrete Gate Well: Conform to Section 33 05 14.
- B. Frames and Covers: Conform to Section 33 05 14.

**2.10 PIPE SUPPORTS AND ANCHORING**

- A. Metal for pipe support brackets: Structural steel, galvanized, thoroughly coated with bituminous paint.
- B. Metal tie rods and clamps or lugs: Galvanized steel sized in accordance with NFPA 24 thoroughly coated with bituminous paint.

**2.11 TRACING AND PIPE IDENTIFICATION**

- A. Trace Wire: Magnetic detectable conductor, 30 mil colored plastic covering, #12 AWG. Approved for type of pipe installation
- B. Color: Green.
- C. Connectors: Direct-bury type connectors approved by manufacturer of tracer wire.
- D. Access Boxes
  - 1. Test Pit Access Points shall provide direct access to tracer wire
  - 2. Lids shall be color-coded in accordance with APWA standard color scheme and contain encapsulated magnets for easy location.
  - 3. Color: Green
  - 4. Type:
    - a. Outside Paved Areas – Lite Duty Adjustable type
    - b. Within Paved Areas – Roadway Type approved for heavy traffic
    - c. Curb Stops – Curb Stops lids with integral Tracer Wire Terminations
- E. Grounding
  - 1. Drive in Magnesium Anode approved by manufacturer of tracer wire.
- F. Manufacturer:
  - a. Copperhead Industries, LLC
  - b. Substitutions: Section 01 60 00 - Product Requirements.

**2.12 CONCRETE ENCASEMENT AND CRADLES**

- A. Concrete: Concrete Grade S3 as defined by Michigan Department of Transportation Standard Specifications for Construction Table 701-1, 3000 psi 28 day compressive strength, rough troweled finish.

**2.13 WATER SERVICE MATERIALS**

- A. General:
  - 1. General: AWWA C800.
  - 2. Service Lines: Copper: B 88, Type K, annealed soft-temper.

- a. Size: Copper tube size, diameter as specified on plans.
- 3. Service Saddles:
  - a. Bronze, double strap, iron pipe thread, o-ring seal cemented in place.
  - b. Manufacturers:
    - 1) Ford Meter Box Company, Inc.
    - 2) A.Y. McDonald Mfg. Co.
    - 3) Romac Industries, Inc.
- 4. Corporation Stop Valves:
  - a. Brass or red brass alloy body conforming to ASTM B62.
  - b. Ball type valve with full port opening and EPDM seals
  - c. Pressure Rating: 300 psi.
  - d. AWWA/CC taper inlet threads by flare end CTS-22 "Mac-Pak" compression outlet.
  - e. Manufacturers:
    - 1) Ford Meter Box Company, Inc.
    - 2) A.Y. McDonald Mfg. Co.
- 5. Curb Stop Valves:
  - a. Brass or red brass alloy body conforming to ASTM B62.
  - b. Ball type valve with full port opening and EPDM seals
  - c. Pressure Rating: 300 psi.
  - d. Flare End CTS-22 "Mac-Pak" compression inlet by flare end CTS-22 "Mac-Pak" compression outlet.
  - e. Manufacturers:
    - 1) Ford Meter Box Company, Inc.
    - 2) A.Y. McDonald Mfg. Co.
- 6. Curb Boxes:
  - a. Arch Pattern Base, extension type.
  - b. Cover: Solid, Pentagon Nut with integral Tracer Wire Lid Terminations
  - c. Manufacturers:
    - 1) Ford Meter Box Company, Inc.
    - 2) A.Y. McDonald Mfg. Co.
- B. Water Service Meter Connections (Indoors):
  - 1. Copper: ASTM B88, Type K, L, hard drawn.
  - 2. Copper Horns: Ford No. 3 or 4, Copperhorn; or equal.
  - 3. Valves:
    - a. Inlet Ball Valve:
      - 1) Ford B11; or equal.

- 2) Bronze body, tee head, stem.
  - 3) O-rings: Buna-N.
  - 4) Valve Seats: Buna-N.
  - 5) Ball: Fluorocarbon-coated brass.
4. Couplings and Fittings: Brass 85-5-5-5 ( B 62), flared joints.
- C. Residential Meter Pit:
1. Manufacturer: Ford Plastic Pit Setter for moderate to cold climates.
  2. 1-inch Service
    - a. Pit Diameter and Depth: 20-inch diameter x 60-inch deep.
    - b. Setting: Standard for double lid cover.
    - c. Inlet Valve Type: Angle ball valve.
    - d. Outlet Valve Type: No outlet valve.
    - e. Meter Size: 3/4-inch meter.
    - f. Type of Inset: PET/CTS pack joint.
    - g. Type of Outlet: PET/CTS pack joint.
    - h. Yoke: None
    - i. Meter Pit Cover: Ford Wabash double lid cover, W3-T, 11-1/2-inch lid for 20- inch tile, locking electronic meter reading.

## **2.14 BEDDING, HAUNCHING AND INITIAL BACKFILL MATERIALS**

- A. Bedding and Cover: Special Granular Material Class IIIb as defined in Section 32 05 16 – Aggregates for Exterior Improvements.
- B. Backfill: Granular Material Class III as defined in Section 32 05 16 – Aggregates for Exterior Improvements.
- C. Suitable on site material may be utilized as bedding and cover with approval of Engineer.
- D. Soil Backfill from Above Pipe to Finish Grade: As specified in Section 31 23 33 – Trenching and Backfilling.

## **2.15 ACCESSORIES**

- A. Steel rods, bolt, lugs and brackets: ASTM A36/A36M or ASTM A307 Grade A carbon steel.
- B. Protective Coating: Coal tar or bituminous coating.

## **2.16 FINISHING - STEEL**

- A. Galvanizing: ASTM A123/A123M; hot dip galvanize after fabrication.

## **2.17 EQUIPMENT FOR PRESSURE TESTING**

- A. Sufficient to withstand pressures
- B. Capable of injecting water into water main during leakage test.

**2.18 EQUIPMENT FOR ELECTRICAL CONDUCTIVITY TESTING**

- A. Portable digital micro-ohm meter capable of measuring resistance to the nearest 0.1  $\mu\Omega$  (micro-ohms).

**PART 3 - EXECUTION****3.01 GENERAL**

- A. The Water Utility will operate all distribution system valves. The Contractor shall cut the water main, remove any plugs or caps, and pump the water out of the trench caused by cutting of the main or removal of the plugs or caps. All excavations required shall be made by the Contractor.
- B. The Contractor shall give a minimum of 48 hours' notice to the Water Utility for a request for water shut-off so the Utility can notify customers of any service interruption. The Water Utility shall determine the time and duration of the shut-off. The Contractor shall continue the work to completion and restore service to the interrupted main. No claim for extra compensation will be considered for overtime due to the hours of shut-off.

**3.02 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Determine exact location and size of valves and hydrants from Drawings; obtain clarification and directions from Engineer prior to execution of work.
- C. Verify that existing utility water main size, location, and invert are as indicated on Drawings.
- D. Verify invert elevations of existing work prior to excavation and installation of water main, valves, hydrant, and accessories.
- E. Identify location of existing valves, obtain confirmation from Municipal Utility of operable condition. Identify location of line stops needed for connection to existing water system. Do not utilize line stops where existing valves can be utilized without interrupting service to water customers.

**3.03 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 7 working days in advance of proposed utility interruption.
  - 2. Do not proceed without written permission from the Engineer.
- D. 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 will not be permitted. Grind edges smooth with beveled end for push-on connections.

- E. Remove scale and dirt on inside and outside before assembly.
- F. Prepare pipe connections to equipment with flanges or unions.

### **3.04 BEDDING**

- A. Excavate pipe trench in accordance with Section 31 23 33 for Work of this Section. 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 in accordance with Section 31 23 33.
- D. Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 6 inches compacted depth; compact to 95 percent maximum density per ASTM D1557.
- E. Backfill around sides and to top of pipe with cover fill; tamp in place and compact to 95 percent maximum density per ASTM D1557.
- F. Maintain optimum moisture content of fill material to attain required compaction density.

### **3.05 RECEIVING, HANDLING, LAYING PIPE AND ACCESSORIES**

- A. Receiving Pipe and Accessories
  - 1. When received from the carrier and at the time of unloading, the Contractor shall check all pipe and accessories for loss or damage in transit. No shipment of material shall be accepted by the Contractor unless proper exceptions are made on the receipt obtained by the carrier, at the time of delivery, as to loss and/or damage.
- B. Handling Pipe and Accessories
  - 1. The Contractor shall haul to, unload and distribute pipe and accessories along the site of the work. Materials shall be placed in storage if necessary and then distributed. All materials shall be handled with care to avoid damage. All material found during the progress of the work to have cracks, flaws, or other defects will be rejected by the Engineer or the authorized inspector, and the Contractor shall promptly remove such defective materials from the site of the work.
  - 2. The interior of pipe shall be thoroughly cleaned of all foreign matter before being lowered into the trench. Before lowering, and while still suspended, the pipe shall be inspected for defects and rung with a light hammer to detect cracks. Any defective or damaged pipe shall be rejected.
- C. Lowering Pipe and Accessories into Trench
  - 1. The Contractor shall have sufficient and adequate equipment on the site of the work for unloading and lowering pipe and fittings into the trench. Extreme care shall be exercised by the Contractor in handling all pipe, fittings and special castings so as to prevent breakage and coating damage. Any significant

damage to coating shall be repaired before installation. Under no circumstances shall pipe or fittings be dropped into the trench or so handled as to receive hard blows or jolts.

2. All mud or concentration of dirt shall be removed prior to installation.
3. Pipe shall be lowered only with the use of non-metallic slings, hooks or pipe tongs recommended by the pipe manufacturer.

### **3.06 LAYING OF PIPE**

#### **A. General**

1. Install ductile iron pipe and fittings in accordance with the following standards:
  - a. Ductile Iron Pipes and Fittings: AWWA C600
  - b. PVC Pipes and Fittings: AWWA C605
2. Handle and assemble pipe in accordance with manufacturer's instructions and as indicated on Drawings.
3. Connect continuity straps or wedges in accordance with manufacturer's instructions. Test for electrical conductivity of each joint by measuring resistance with digital micro ohm meter.
4. Steel Rods, Bolt, Lugs, and Brackets: Coat buried steel with one coat of coal tar coating before backfilling.
5. Maintain 10 ft horizontal and 18 inches vertical separation of water main from sewer piping.
6. Install pipe to indicated elevation.
7. Flanged Joints: Not to be used in underground installations except within structures.
8. Route pipe in straight line. Relay pipe that is out of alignment or grade.
9. Install pipe with no high points except where indicated on Drawings. If unforeseen field conditions arise which necessitate high points, seek direction from Engineer regarding hydrant locations or air release valves.
10. 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.
11. Prevent foreign material from entering pipe during placement.
12. Install pipe to allow for expansion and contraction without stressing pipe or joints.
13. Close pipe openings with watertight plugs during work stoppages.
14. Install access fittings to permit disinfection of water system performed under Section 33 13 00.
15. Establish elevations of buried piping with not less than 5 ft of cover. Measure depth of cover from final surface grade to top of pipe barrel.
16. Unless otherwise ordered, pipe shall be laid with the bell ends facing the direction of laying. When the grade exceeds two feet (2') of rise per one hundred feet (100') of trench, the bells shall face upgrade.

**B. Laying Mechanical Joint Ductile Iron Pipe**

1. Pipe assembly and handling shall conform to the manufacturer's recommendations.
2. Clean all dirt or foreign material off of spigot and out of socket. Use a wire brush if necessary. Slip gland on pipe for a distance of about twelve inches (12") and with the gland tip toward the joint. Place gasket about six inches (6") from the end of the pipe with the small end toward the joint.
3. Insert spigot all the way into socket. The two pipes should be substantially in alignment while the joint is being assembled. Center spigot in socket. Wet gasket and joint surfaces thoroughly with soapy water.
4. Slide gasket along the pipe into socket. Hand caulk into place until it is evenly seated in the socket. Always begin seating the gasket at the bottom of the joint and do not apply the gland and bolts until the gasket is definitely in place, especially in the lower half of the joint. The placing of the gasket in the socket serves to center the spigot end of the pipe in the socket which is essential to the making of a first class joint.
5. Slide gland into position with gland lip bearing on face of gasket. Insert bolts with head bearing on the pipe flange and nuts on the gland. Beginning at the lower half of the joint, run up all nuts with the fingers. Before starting to tighten bolts with wrench, be sure that the gland lip is centered on the face of the gasket.
6. In tightening the bolts it is essential that the gland be brought up toward the pipe flange evenly maintaining approximately the same distance between the flange and the gland at all points around the socket. Partially tighten the bottom bolts first, and then the top bolt. Next, tighten the two bolts on each side (90°) from top and bottom. Partially tighten the remaining bolts, maintaining approximately the same space between pipe flange and gland.
7. Continue tightening in steps, as above, until each bolt has been tightened to approximately 90 foot lbs. torque. Laying Push-on Joint Ductile Iron Pipe
8. Pipe assembly and handling shall conform to the manufacturer's recommendations.
9. Bell must be clean and free of all foreign matter. Brush coat gasket, retaining groove and inner shoulder, with non-toxic joint lubricant.
10. Insert gasket with solid face toward installer. Use one hand to hold a loop in gasket, the other to tuck remaining portion into its groove. Press gasket firmly into lubricated groove.
11. Pull gasket forward against bell lip to be sure the gasket is completely seated. Apply generous coating of lubricant to the exposed gasket surface.
12. Clean the spigot end of pipe, and grind or file sharp edges which might damage the basket. Lubricant may be applied to the beveled nose of the spigot end.
13. Place spigot end in the companion bell and provide reasonably straight alignment. Push pipe straight home with the aid of a bar or a jack and choker slings as needed for larger sizes.
14. Check the assembly. The joint is completely assembled and pressure tight when the strip is no longer visible. Deflection shall be taken after joint is assembled.

### C. Cutting of Ductile Iron Pipe

1. Pipe shall be cut at right angles to the center line of the pipe. Cutting shall be done in a neat workman like manner without damage to the pipe or lining and so as to leave a smooth end. All pipes shall be cut with an abrasive wheel, rotary wheel cutter, guillotine pipe saw, a milling wheel saw or an oxyacetylene torch. The cut end of a pipe to be used with rubber gasket joints shall be tapered by grinding or filing about one-eighth inch (1/8") back at an angle of approximately 30° with the center line of the pipe, and any sharp or rough edges shall be removed.

### D. Laying of Polyvinyl Chloride Pipe

1. Where specifically allowed on the Drawings or in the Contract Documents, PVC water pipe may be used for water main with cast or ductile iron fittings conforming to the applicable requirements of this specification
2. The laying of PVC pipe shall be in accordance with AWWA C605 and the following:
  - a. The inside and outside surface of each length of pipe shall be free from nicks, scratches and other surface defects and blemishes. The pipe shall be homogeneous throughout and free of any bubbles, voids or inclusions.
  - b. The jointing areas of the barrel of each length of pipe shall be free from dents or gouges.
  - c. Each pipe shall be properly machined on one end so as to facilitate joining the pipe sections without damage.
  - d. The rubber gasket shall be supplied by the manufacturer and conform to the requirements of ASTM F477.
  - e. Sufficient pipe lubricant shall be supplied by the manufacturer for use with each joint. A light film of lubricant shall be applied to each pipe spigot before insertion into bell.
  - f. The bell end of the pipe shall be free of dirt or other foreign matter. The gasket shall be inserted with the painted edge facing toward the end of the bell. After lubricating the spigot end, each length of pipe shall be pushed home individually. The use of a backhoe bucket bearing directly against the pipe shall not be used to force the spigot home.
  - g. The pipe shall be positioned so that the reference mark on the spigot end is in line with the bell end. PVC pipe shall be cut at right angles to the centerline of the pipe with an approved saw or mechanical cutter. A coarse hand file or an approved machining tool shall be used for beveling the end similar to the factory beveled edge as supplied by the manufacturer. A reference mark equal to that as shown on the pipe of similar size supplied by the manufactures shall be made at the proper distance from the cut end.
  - h. Maximum deflection shall not exceed that recommended by manufacturer. Bell design will not allow deflection at the joint.
  - i. The pipe shall be stored on the job site protected from direct sunlight and excessive heat. Stored pipe shall be covered with tarps. A #10 AWG copper tracing wire shall be installed with all PVC pipe. The wire shall be securely

attached to the top of the pipe a minimum of three times for each pipe length. The wire shall be grounded to all valves, fittings, and hydrants.

### **3.07 INSTALLATION - TAPPING SLEEVES**

- A. Install tapping sleeves in accordance with Drawings and in accordance with manufacturer's instructions.

### **3.08 INSTALLATION - VALVES**

- A. Install valves in conjunction with pipe laying; set valves plumb.
- B. Provide restrained joints on each end of valves.
- C. Provide buried valves with valve boxes installed flush with finished grade.
- D. Where valves are located outside of paved areas, construct 3' x 3' area of 4 inch thick concrete, paid for separately.
- E. Adjustment of Valve Boxes and Gate Well Castings:
  - 1. Adjustment of Gate Well Structures shall be performed in accordance with Section 33 05 14 – Public Manholes and Structures
  - 2. Adjustment of Valve Boxes shall be accomplished by removing pavement from around upper section of valve box assembly following leveling course pavement and rotating the stem to bring the lid and frame to the proper grade.
    - a. Where valves are located within Asphalt Paved areas, backfilling around valve box shall be performed with Concrete Grade S2 in accordance with MDOT Standard Specifications for Construction.
    - b. Concrete backfill shall be placed leveled to match the surface of the leveling course pavement. The surface of the concrete backfill shall be

### **3.09 INSTALLATION – GATE WELLS**

- A. Furnish and install precast concrete gate well and covers in accordance with Section 33 05 14.

### **3.10 INSTALLATION – FIRE HYDRANTS**

- A. Install fire hydrants; provide support blocking and drainage gravel; do not block drain hole unless otherwise directed by Engineer.
  - 1. Leave drain hole plugged-in areas of poor draining soils, high groundwater, and areas of soil or groundwater contamination.
- B. Set hydrants plumb with pumper nozzle facing roadway; set hydrants with centerline of pumper nozzle 18 inches above finished grade and safety flange not more than 6 inches nor less than 2 inches above grade.
- C. Provide restrained joints at hydrant, valve, fittings and pipe joints of hydrant lead.
- D. After hydrostatic testing, flush hydrants and check for proper drainage. Pump out hydrants with plugged drain holes.

### **3.11 POLYETHYLENE ENCASEMENT**

- A. Encase piping in polyethylene where shown on the plans to prevent contact with surrounding backfill material.
- B. Install in accordance with AWWA C105.
- C. Terminate encasement 6 inches below grade at hydrants and valve boxes.

### **3.12 THRUST RESTRAINT**

- A. Install joint restraining glands on all mechanical joint ends for hydrants, valves, and fittings
- B. Install joint restraining harnesses for push on joint pipe according to Schedules.
- C. Install joint restrains in accordance with manufacturer's instructions.
- D. Protect metal restrained joint components against corrosion by applying a coal tar or bituminous coating.
- E. Concrete thrust blocks are not permitted unless approved by Engineer.

### **3.13 TRACING EQUIPMENT**

- A. General
  - 1. Trace wire installation shall be performed in such a manner that allows proper access for connection of line tracing equipment, proper locating of wire without loss or deterioration of low frequency (512Hz) signal for distances in excess of 1,000 linear feet, and without distortion of signal caused by multiple wires being installed in close proximity to one another.
  - 2. Trace wire systems must be installed as a single continuous wire, except where using approved connectors. No looping or coiling of wire is allowed.
- B. Installation
  - 1. Trace wire shall be installed at the bottom half of the pipe and secured (taped/tied) at 5' intervals.
  - 2. Trace wire must be properly grounded as specified by the manufacturer.
  - 3. Mainline trace wire must be installed, with all service lateral trace wires properly connected to the mainline trace wire, to ensure full tracing/locating capabilities from a single connection point.
  - 4. Lay mainline trace wire continuously, by-passing around the outside of valves and fittings on the North or East side.
  - 5. Trace wire on all water service laterals must terminate at valve boxes and fire hydrant auxiliary valves within an approved trace wire access box color coded blue.
  - 6. All conductive and non-conductive service lines shall include tracer wire located directly above the service lateral at the edge of road right of way.

### **3.14 SERVICE CONNECTIONS**

- A. Preparation:
  - 1. Comply with local plumbing code.

2. Obtain plumbing permit for each residence and pay all fees.
  3. Organize and coordinate a date and time with each residence to receive a new connection. A list of names, addresses, and telephone numbers will be made available to Contractor.
- B. Service Leads:
1. Perform Service taps in accordance with the following standards:
    - a. Ductile Iron Water Main: AWWA C600 and DIPRA Installation Guide for Ductile Iron Water Main.
    - b. PVC Water Main: AWWA C605 and Uni-Bell Publication UNI-PUB-08-07.
  2. Install taps at 45 degrees above center.
  3. Direct tap ductile iron pipe for 1/2-inch through 1-1/2-inch services only.
  4. Use double strap saddle for all taps for PVC pipe and for services on DIP over 1-1/2-inch.
  5. Alignment and Grade:
    - a. At right angles with street line.
    - b. Minimum depth: 5 feet of cover.
- C. Residential Water Connections
1. Reconnecting Existing Service at Right-of Way:
    - a. Review area where new water service will connect to the existing water service piping at the limits of construction.
    - b. Verify connection size and provide the necessary compression type adapter fittings for proper connection.
  2. Basement Penetration:
    - a. Core drill 3-inch maximum hole for 1-inch or 1-1/2-inch copper service. Hole to be minimum of 5 feet below exterior finished grade.
    - b. Review area where water main will enter house and connect to existing plumbing. Organize and coordinate the temporary removal of all false walls.
    - c. If basement wall is nonexistent or cannot be drilled, the copper may be fed into the house through the basement floor with mole tunneling equipment.
    - d. Seal void between hole and copper with Fosrock, Preco Plug, or equal.
    - e. Existing service lines from wells may not be used for new connections, unless approved by Engineer.
  3. Connection of New Service Line:
    - a. Connect new shut off valve, copper horn, and meter within 3 feet of basement wall.
    - b. Continue 1-inch copper to existing house plumbing. Connect to maximum pipe size of system. Provide all copper and fittings necessary to make connection.

- c. Install remote meter reader in a visible location on the exterior of the home, in a location approved by homeowner.
  - d. Flush water system until water clears, check all new plumbing for leaks.
  - e. Restore temporary removals or damages to the lawn, driveway, or building.
  - f. Have homeowner sign a letter of acceptance of the Work, in a form approved by Engineer.
- 4. Remote Meters:
  - a. If building does not have a basement, an area where meter can be installed inside of the first floor, or has an existing meter pit, utilize a meter pit.
  - b. Install meter pit on private property in a location approved by the homeowner, or in the location designated on the plans.
  - c. Run new copper into the home and install a new shut off valve. Install new copper to the existing house plumbing.
  - d. Install remote meter reader on exterior of the home, in a location approved by homeowner.
  - e. Flush water system until water clears, check all new plumbing for leaks.
  - f. Restore temporary removals or damages to the lawn, driveway, or building.
  - g. Have homeowner sign a letter of acceptance of the Work, in a form approved by the Engineer.
- D. Disconnection of Existing Well Service Line:
  - 1. Saw cut existing supply line just inside basement wall and plug pipe with threaded or soldered cap.
  - 2. Disconnect bladder tank from house plumbing. Saw cut pipe to tank and cap with threaded or soldered cap.

### **3.15 BACKFILLING**

- A. Measure and record the distance between all fittings, valves, and hydrants prior to backfill.
- B. Backfill Trench in accordance with Michigan Department of Transportation Standard Plan Series R-83 – Utility Trenches, Detail G.
- C. Backfill around sides and to top of pipe in accordance with Section 31 23 33.
- D. Maintain optimum moisture content of bedding material to attain required compaction density.

### **3.16 SEQUENCE OF TESTING**

- A. Conduct flushing, testing, and disinfection in the following sequence:
  - 1. Pipe Continuity Testing – See Paragraph 3.17 below
  - 2. High Velocity Flush – See Paragraph 3.18 below
  - 3. Hydrostatic Pressure and Leakage Testing – See Paragraph 3.19 below
  - 4. Disinfection – See Section 33 13 00



5. Disinfectant Flush – See Section 33 13 00
6. Bacteriological Testing – See Section 33 13 00
7. Connection to existing water main – See Paragraph 3.22 below

### **3.17 PIPE CONTINUITY TESTING**

- A. The Contractor shall conduct a pipe continuity test on all completed ductile iron water system to test for electrical continuity between pipe lengths and across the joints of pipe and fittings.
- B. As a minimum, all ductile iron slip joint pipe shall have two serrated brass wedges firmly seated in each joint. All mechanical joint pipe shall have lead tipped rubber gaskets.
- C. Cable or strap bonding of all pipe joints may be required.

### **3.18 HIGH VELOCITY FLUSH**

- A. Review proposed configuration and flushing procedure with engineer to verify compliance with the following standards:
  1. Minimum Velocity: 2.5 feet per second
  2. Minimum Duration: until 2 times the volume of the flushed water main has been discharged.
- B. Provide and install all temporary appurtenances necessary to inject flushing water. This may include a temporary hydrant and fire hose if needed to achieve adequate flow rate.
- C. Review proposed water source, configuration and flushing procedure with Engineer.
- D. Notify water department.
- E. Conduct high velocity flush to remove any debris and contaminants which may have entered pipe during construction.
- F. Protect discharge from erosion and flooding

### **3.19 HYDROSTATIC TESTING**

- A. Pressure test system to 150 psi. Repair leaks and re-test.
  1. After completion of pipeline installation, including backfill, but prior to final connection to existing system, conduct, in presence of Engineer, concurrent hydrostatic pressure and leakage tests in accordance with AWWA C600.
  2. The maximum allowable length of water main to be tested at one time shall be 1,000 feet or the minimum distance between valves.
  3. Test Pressure: Not less than 150 psi or 50 psi in excess of maximum static pressure, whichever is greater. The contractor shall not raise the pressure in the water main more than 10 psi above the specified test pressure at any time during the test.
  4. Conduct hydrostatic test for at least two-hour duration.

5. Fill section to be tested with water slowly, expel air from piping at high points. Install corporation cocks at high points. Close air vents and corporation cocks after air is expelled. Raise pressure to specified test pressure.
6. Observe joints, fittings and valves under test. Remove and renew cracked pipe, joints, fittings, and valves showing visible leakage. Retest.
7. Correct visible deficiencies and continue testing at same test pressure for additional 2 hours to determine leakage rate. Maintain pressure within plus or minus 5.0 psig of test pressure. Leakage is defined as quantity of water supplied to piping necessary to maintain test pressure during period of test.
8. Compute maximum allowable leakage by the following formula:

$$L = \frac{S \cdot D \cdot P^{0.5}}{148,000}$$

Where:

D = nominal pipe diameter in inches;

L = allowable leakage in gallons per hour;

P = average test pressure (psi); and

S = length of pipe to be tested in feet.

Note: for a 2 hour test, multiply "L" by 2 to get the allowable leakage volume in gallons.

9. In the event that the line or section being tested contains pipe of more than one size, the allowable leakage from all joints of each size shall be calculated separately and then added to obtain the total allowable leakage from the entire line or lines.
10. When test of pipe indicates leakage greater than allowed, locate source of leakage, make corrections and retest until leakage is within allowable limits. Correct visible leaks regardless of quantity of leakage.

### **3.20 DISINFECTION OF POTABLE WATER PIPING SYSTEM**

- A. Flush and disinfect system in accordance with Section 33 13 00.

### **3.21 REPAIRING LEAKS AND BREAKS**

- A. Products
  1. Clow F-1208 Duo Sleeve, U.S. Pipe
  2. Substitutions: 01 60 00 - Product Requirements
  3. No stainless steel repair clamps or bell joint leak repair clamps will be permitted.
- B. Leaks and/or breaks occurring in new water mains installed under this Contract shall be repaired by the Contractor at his own expense during the construction period and during the guarantee period.
- C. All leaks, breaks, or defective sections of pipe shall be repaired by cutting out the defective section of joint and replacing that section with a length of pipe of equal material.
- D. All repair areas shall be rechlorinated and tested for leakage with operating pressure.

**3.22 CONNECTION TO EXISTING WATER MAIN**

- A. Make connection to existing water main after disinfection and bacteriological testing has been completed in accordance with Section 33 13 00.
- B. Connect new water main to existing water main in accordance with AWWA C651.
- C. Connection to existing water main shall be done only in the presence of City water department representatives.
- D. If connection is performed by the Water Utility, the work shall be done on a time and materials basis unless otherwise specified. All cut-in sleeves required for connection to existing mains shall be included in the unit price bid for each size of water main.
- E. Exercise sanitary construction practices to avoid contamination during this work.
- F. If it is suspected that any contamination has occurred during this work, flush the new main from the existing main.
- G. The Contractor shall remove all abandoned gate valves, tapping sleeves, valve boxes and all other water main material indicated in the Contract Documents as the Engineer determines.
- H. The cutting of pipe, burning and chipping out of joints shall be started only after permission is given by the Engineer.
- I. All water main material removed by the Contractor shall be carefully handled. Any watermain material broken by carelessness of the Contractor in removing will be replaced by him. If the material is to be reused by the Contractor, he shall clean it thoroughly inside and outside.
- J. If any water main materials are not to be reused, they shall be stored neatly in an area designated by the Owner. Lead removed shall become the property of the Contractor. All other material shall remain the property of the Owner.

**3.23 FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements.
- B. Owner's representative will perform laboratory testing of bedding material to determine gradation in accordance with ASTM C117 and ASTM C136.
- C. Owner's representative will perform in-place compaction tests of bedding and backfill material in accordance with Section 31 23 23.
- D. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

**PART 4 - MEASUREMENT AND PAYMENT****4.01 BASIS OF PAYMENT**

- A. Payment for the following item(s) of work shall cover all materials, equipment and labor necessary to install the following pay items in accordance with the plans and these specifications.

**4.02 METHOD OF MEASUREMENT**

Description	Unit Price
Fire Hydrant .....	Each
Gate Valve and Box, ___ inch .....	Each
Water Main, DI CI __, __ inch, Tr Det G .....	Foot
Water Serv .....	Each
Water Serv, Long .....	Each
Post Hydrant .....	Each

**Fire Hydrant** shall be paid at the unit price per each, which price shall be payment in full for furnishing and installing the auxiliary valve, hydrant lead, and hydrant complete and ready for use at the locations shown on the plans including furnishing and placing the coarse gravel/concrete base at the hydrant base (when required).

**Gate Valve and Box, \_\_\_ inch** shall be paid per each item installed. Payment shall include all material, equipment, and labor necessary to furnish and install and test each gate valve and box in accordance with these specifications.

**Water Main, DI, CI \_\_, \_\_ inch, Tr Det G** shall be measured from the spigot or cut end to the base of hub or bell end of the installed main. Water main shall be paid for at the unit price bid per lineal foot of each type of water main pipe and pipe diameter laid measured along the center line of the pipe and shall include the cost of all pipe, fittings and tapping or cut-in sleeves.

**Water Serv** and **Water Serv, Long** shall be paid at the contract unit price per each and shall include tapping the water main, installation of the corporation stop, copper pipe and fittings, curb stop, curb stop box, excavation, backfill, and disposal of waste. Also includes all labor and materials required to remove or abandon existing water service leads, curb stops, curb stop boxes, and corporation stops. Payment shall cover all materials labor and equipment necessary

to install and reconnect the new service.

**Water Serv** shall be paid for all water services where the water main and the curb stop are located on the same side of the centerline.

**Water Serv, Long** services shall be paid for all water services where the water main and the curb stop are located on opposite sides of the centerline.

**Post Hydrant** shall be paid for at the contract price per each and shall include the furnishing and connecting of the hydrant to the water service.

## END OF SECTION



**SECTION 33 13 00**  
**DISINFECTION OF WATER UTILITY DISTRIBUTION**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

A. Section Includes:

1. Disinfection of potable water distribution system
2. Testing and reporting results.

**1.02 RELATED SPECIFICATIONS**

- A. Section 33 11 13 - Public Water Utility Distribution Piping.
- B. Section 33 12 13 – Water Service Connections.

**1.03 REFERENCE STANDARDS**

- A. The publications listed in this section form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation. In the event a referenced publication has been replaced or superseded, the current version shall govern.
- B. American Water Works Association
1. AWWA C600 (605) - Hydrostatic Testing for Ductile Iron (PVC) Water Main
  2. AWWA C651 – Disinfecting Water Mains
  3. Polyethylene (PEX) Pressure Piping Systems Using Hydrostatic Pressure
- C. Great Lakes and Upper Mississippi Regional Board of State and Provincial Public Health and Environmental Managers
1. Recommended Standards for Water Works

**1.04 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit procedures, proposed chemicals, and treatment levels for review.
- C. Flushing, Disinfection, and Sampling Plan: Submit for review.
- D. Test Reports: Indicate results comparative to specified requirements.
- E. Certificate: Certify cleanliness of water distribution system meets or exceeds specified requirements.

**1.05 CLOSEOUT SUBMITTALS**

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

**B. Disinfection Report:**

1. Type and form of disinfectant used.
2. Date and time of disinfectant injection start and time of completion.
3. Test locations.
4. Name of person collecting samples.
5. Initial and 24 hour disinfectant residuals in treated water in ppm for each outlet tested.
6. Date and time of flushing start and completion.
7. Disinfectant residual after flushing in ppm for each outlet tested.

**C. Bacteriological Report:**

1. Date issued, project name, and testing laboratory name, address, and telephone number.
2. Time and date of water sample collection.
3. Name of person collecting samples.

**D. Test locations.**

1. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
2. Coliform bacteria test results for each outlet tested.
3. Certify water conforms, or fails to conform, to bacterial standards of Michigan Department of Environmental Quality.

**1.06 QUALITY ASSURANCE**

- A. Perform Work in accordance with AWWA C651.

**1.07 QUALIFICATIONS**

- A. Water Treatment Firm: Company specializing in disinfecting potable water systems specified in this section.
- B. Submit bacteriologist's signature and authority associated with testing.

**PART 2 - PRODUCTS****2.01 DISINFECTION CHEMICALS**

- A. Chemicals: AWWA B300, Liquid Sodium Hypochlorite. (Use of liquid chlorine is not permitted.)



**PART 3 - EXECUTION****3.01 PREPARATION**

- A. Prepare a flushing, disinfection, and sampling plan which identifies:
  - 1. Source location of flushing water.
  - 2. Method of connection to supply sufficient quantity of flushing water.
  - 3. Location of flushing discharge(s).
  - 4. Sequence of valve opening and closing to ensure complete flushing and disinfection of all segments.
  - 5. Location of sampling taps:
    - a. Collect samples from each branch.
    - b. Maximum spacing 1000 feet.
  - 6. Description of equipment to be utilized.

**3.02 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 in accordance with Section 33 11 13.

**3.03 DISINFECTION**

- A. Conduct disinfection in accordance with AWWA C651.
- B. Provide and attach all equipment needed to perform the Work of this section.
- C. Install temporary sampling taps at needed locations.
- D. Minimum Chlorine Residuals:
  - 1. Initial Concentration: 25 ppm free available chlorine.
  - 2. Final Concentration: 10 ppm free available chlorine after 24 hours.
- E. Inject Disinfection Chemicals into piping system by continuous feed method.
  - 1. Calculate injection rate based on water flow rate and required concentration.
  - 2. Begin flowing potable water through the new main from the beginning of the new main.
  - 3. Inject chemicals into water main at a location not more than 10 feet downstream from the beginning of the new main.
  - 4. Measure chlorine residual at discharge. Adjust water flow rate or chemical feed rate as necessary to achieve initial concentration.
- F. Stop flows.
- G. Operate all valves, including hydrant valves, within the treated section, to ensure disinfection of the appurtenances.
- H. Measure initial chlorine residual at each sampling location.

- I. Wait 24 hours.
- J. Measure final chlorine residual at each sampling location.
- K. If final chlorine residual is below minimum:
  - 1. Repeat high velocity flush.
  - 2. Repeat disinfection.

### **3.04 DISINFECTANT FLUSH**

- A. Conduct flushing in accordance with AWWA C651.
- B. Review proposed water source, configuration, and discharge location with engineer.
- C. Legally dispose of chlorinated water. When chlorinated discharge may cause damage to environment, apply neutralizing chemical to neutralize chlorine residual in water.
- D. Flush heavily chlorinated water from entire system with potable water, after completion of successful disinfection procedures, before bacteriological testing.
  - 1. Measure chlorine residual of supply water.
  - 2. Flush the full volume of the new watermain.
  - 3. Measure chlorine residual of the flushing discharge.
  - 4. Continue flushing until chlorine residual at discharge equals the supply water.
- E. Protect discharge from erosion and flooding.

### **3.05 BACTERIOLOGICAL TESTING (BY CONTRACTOR)**

- A. Conduct bacteriological testing in accordance with AWWA C651.
- B. Laboratory shall be selected from the Owner's list of approved testing laboratories.
- C. Collect samples, in sterile bottles supplied from testing laboratory, at each sampling location.
  - 1. Complete the form provided with the sample bottle.
  - 2. Deliver samples to testing laboratory the same day. Samples delivered more than 24 hours after collection may be discarded.
- D. Collect and submit repeat samples 24 hours after initial samples.
- E. Report laboratory results to engineer.
- F. If laboratory results indicate presence of coliform bacteria:
  - 1. Repeat disinfection and disinfectant flush procedures.
  - 2. Repeat bacteriological testing.
- G. The Contractor will pay sampling, transport, and laboratory testing fees for bacteriological testing as well as any additional laboratory testing due to failed test results.
- H. Remove temporary sampling taps and install plugs.

**3.06 BACTERIOLOGICAL TESTING (BY OWNER)**

- A. Coordinate with the utility owner to locate corporation stops for the purpose of obtaining samples for bacteriological sampling.
- B. Coordinate work schedule with the required two rounds of bacteriological samples taken at 24 hour intervals.
- C. If laboratory results indicate presence of coliform bacteria:
  - 1. Repeat disinfection and disinfectant flush procedures.
  - 2. Repeat bacteriological testing.
- D. The Owner will pay for original sampling, testing and reporting of test results. The Contractor will pay for any additional laboratory testing due to failed test results.
- E. Remove temporary sampling taps and install plugs.

**3.07 FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements.

**END OF SECTION**



**SECTION 33 31 13**  
**PUBLIC SANITARY UTILITY SEWERAGE PIPING**

**PART 1 - GENERAL****1.01 DESCRIPTION****A. Section Includes:**

1. Sanitary sewer pipe and fittings
2. Underground pipe markers
3. Connection to existing manholes.
4. Wye branches
5. Laterals and fittings
6. Cleanouts
7. Concrete encasement and cradles.
8. Bedding and cover materials

**B. Related Sections:**

1. Section 31 23 17 – Trenching.
2. Section 33 01 32 – Sewer and Manhole Testing.
3. Section 33 01 33 – TV Inspection of Sewer Pipelines.
4. Section 33 05 14 – Public Manholes and Structures.

**1.02 REFERENCES****A. American Association of State Highway and Transportation Officials:**

1. AASHTO M306 – Standard Specification for Drainage, Sewer, Utility, and Related Castings.

**B. ASTM International:**

1. ASTM A48/A48M – Standard Specification for Gray Iron Castings.
2. ASTM A746 – Standard Specification for Ductile Iron Gravity Sewer Pipe.
3. ASTM ASTM D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft–lbf/ft<sup>3</sup>).
4. ASTM D1785 – Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
5. ASTM D2321 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity–Flow Applications.
6. ASTM D2564 – Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
7. ASTM D2855 – Standard Practice for Making Solvent–Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.

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).
  10. ASTM D3034 – Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
  11. ASTM D3212 – Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
  12. ASTM F1336 – Standard Specification for Poly (Vinyl Chloride) (PVC) Gasketed Sewer Fittings.
- C. American Water Works Association:
1. AWWA C104 – ANSI Standard for Cement Mortar Lining for Ductile–Iron Pipe and Fittings for Water.
  2. AWWA C105 – ANSI Standard for Polyethylene Encasement for Ductile–Iron Pipe Systems.
  3. AWWA C110 – ANSI Standard for Ductile–Iron and Gray–Iron Fittings, 3 In. Through 48 In., for Water.
  4. AWWA C111 – ANSI Standard for Rubber–Gasket Joints for Ductile–Iron Pressure Pipe and Fittings.
  5. AWWA C115 – ANSI Standard for Flanged Ductile–Iron Pipe with Ductile–Iron or Gray–Iron Threaded Flanges.
  6. AWWA C150 – ANSI Standard for Thickness Design of Ductile Iron Pipe.
  7. AWWA C151 – ANSI Standard for Ductile–Iron Pipe, Centrifugally Cast, for Water or Other Liquids.
  8. AWWA C153 – ANSI Standard for Ductile–Iron Compact Fittings for Water
  9. AWWA C600 – Installation of Ductile–Iron Water Mains and Their Appurtenances.

### **1.03 SUBMITTALS**

- A. Section 01 33 00 – Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit pertinent data indicating proposed materials, accessories, details, and construction information.
- C. Reports: Submit reports indicating field tests made and results indicating conformance or non–conformance with specifications.
- D. Manufacturer's Installation Instructions:
  1. Indicate special procedures required to install Products specified.
  2. Submit detailed description of procedures for connecting.
  3. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

**E. Closeout Submittals**

1. Section 01 70 00 – Execution and Closeout Requirements: Requirements for submittals.
2. Project Record Documents: Accurately record actual locations of pipe runs, connections, manholes, and invert elevations.
3. For all mains record length of pipe run, invert elevations and slope.
4. For all laterals record:
  - a. Y+ (distance from the downstream manhole to the wye fitting).
  - b. E+ (distance measured along the lateral centerline to the lateral end).
  - c. L (perpendicular distance from the lateral end to main).
  - d. Two witness dimensions from the cleanout to a permanent structure.
    - i) Use manholes, catch basins, valves, hydrants, or property corners.
    - ii) Do not witness to trees or building corners.
5. Identify and describe any alterations made due to subsoil conditions, discovery of uncharted utilities, or unanticipated conditions.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this section.
- B. Installer Qualifications: Company specializing in performing work of this section.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 – Product Requirements.
- B. Block individual and stockpiled pipe lengths to prevent moving.
- C. Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.
- D. Do not place pipe flat on ground. Cradle to prevent point stress.
- E. Store UV sensitive materials out of direct sunlight.

**1.06 FIELD CONDITIONS**

- A. Verify field measurements and elevations are as indicated on drawings.
- B. Measure invert elevations of existing downstream sewer at proposed connection point.
- C. Measure elevation of existing pipes at proposed crossing locations.
- D. Calculate proposed pipe slopes and verify clearance at crossings.
- E. Notify Engineer of any discrepancies.
- F. 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.

**PART 2 - PRODUCTS****2.01 SANITARY SEWER PIPE AND FITTINGS**

- A. Plastic Pipe: ASTM D3034, Poly Vinyl Chloride (PVC) material; bell and spigot style rubber ring sealed gasket joints.
  - 1. Wall Thickness: Where PVC sewers are called for, utilize the following wall thicknesses.
    - a. SDR 26 for all main line sewer pipe unless otherwise designated on the plans.
    - b. SDR 35 may be used for main line sewer where specified on the plans. Under no circumstances shall the depth of cover exceed 12 feet.
    - c. SDR 35 for all sewer service laterals unless otherwise designated on the plans. SDR 26 shall be used where depth of cover exceeds 12 feet.
    - d. C-900 PVC for sewers constructed within 10-feet (measured horizontally) and 18-inches (measured vertically) of water main.
  - 2. Joints:
    - a. ASTM D3212, elastomeric seals.
    - b. For C-900 pipe, use joints as specified in this Section for Ductile Iron Pipe.
  - 3. Fittings:
    - a. ASTM F1336, PVC, of same wall thickness as pipe. ASTM F477 elastomeric seals for connecting new services to existing pipes.
    - b. For C-900 pipe, use fittings as specified in this Section for Ductile Iron Pipe.
- B. Ductile Iron Pipe: AWWA C150/C151, ASTM A746
  - 1. Bituminous Exterior coating: AWWA C110.
  - 2. Interior Lining
    - a. Cement Mortar Lining: AWWA C104, standard thickness.
    - b. Polyamine Cured Epoxy Lining (Where Designated):
      - i) Dry Film Thickness: 40 mils (min.)
      - ii) Products:
        - a) Protecto 401 Ceramic Epoxy, thickness per manufacturer
        - b) Tnemec Series 431 Perma-Shield PL
        - c) Substitutions: Section 01 600 00 – Product Requirements
  - 3. Pipe Thickness Class: AWWA C150, thickness class 52.
  - 4. Meet the requirements of ANSI/NSF Standard 61 and the certification must be stamped on the exterior wall of the pipe.
  - 5. Joints:
    - a. Mechanical and Push-On Joints: AWWA C111
    - b. Flanged Joints: AWWA C115. (do not use in buried applications)
    - c. Rubber Gaskets: AWWA C111.
  - 6. Electrical Continuity:
    - a. Wedges: Serrated silicon bronze., Two per joint.



7. Fittings:
  - a. All fittings shall be restrained to pipe.
  - b. 6–Inch Through 24–Inch:
    - i) ANSI/AWWA C153/A21.53, compact fittings.
    - ii) Mechanical joints.
    - iii) 350 psi pressure rating.
    - iv) Lining:
      - a) Standard thickness, cement mortar lining in accordance with AWWA C104.
      - b) Fusion bonded epoxy in accordance with AWWA C550, nominal 6–8 Mils.
  - c. 30–Inch Through 48–Inch:
    - i) ANSI/AWWA C110/A21.10.
    - ii) Manufactured restrained joint.
    - iii) Ductile iron glands.
    - iv) 250 psi pressure rating (minimum).
    - v) Lining:
      - a) Standard thickness, cement mortar lining in accordance with AWWA C104.
      - b) Fusion bonded epoxy in accordance with AWWA C550, nominal 6–8 Mils.

#### C. Reinforced Concrete Pipe

1. Reinforced Concrete Pipe (R.C.P.): ASTM C76, bell and spigot ends.
  - a. Class: Class III – V based on loading conditions per Schedules.
  - b. Wall Type: A, B, or C wall based on concrete strength per ASTM C76.
2. Fittings: Utilize cored service fittings in accordance with ASTM C923 using Series 300 Stainless Steel hardware.
  - a. Products/Manufacturers
    - i) Qwikseal by Fernco, Inc.
    - ii) Inserta Tee by Interta Tee
    - iii) Kor–N–Tee by Trelleborg Pipe Seals Milford
    - iv) Substitutions: Section 01 60 00 – Product Requirements
3. Joints: ASTM C443 rubber compression gasket.

## 2.02 FLEXIBLE COUPLINGS

#### A. Manufacturers:

1. Fernco Inc.
2. Mission Rubber Company.
3. NDS Inc.
4. Substitutions: Section 01 60 00 – Product Requirements

- B. Flexible Coupling: ASTM C1173, Resilient chemical-resistant elastomeric polyvinyl chloride coupling, two stainless steel clamps and stainless steel screws and housings.

### **2.03 SERVICE TAPS TO EXISTING PIPE**

- A. Configuration: Wye
- B. Service Size: 4" or 6" diameter matching existing service
- C. Pressure Rating: 7 psi (min.)
- D. Sewer Saddle to PVC or Ductile Iron Product:
  - 1. Flexible Tap Saddle – Fernco Inc.
  - 2. Geneco Sealtite Sewer Pipe Saddle – General Engineering Company
  - 3. T-Flex Sewer SaddleFlexible Saddle – NDS
  - 4. CB Sewer Saddle – Romac Industries, Inc.
  - 5. Substitutions: Section 01 60 00 – Product Requirements
- E. Sewer Saddle to Vitrified Clay Pipe:
  - 1. Products:
    - a. Flexible Tap Saddle – Fernco Inc.
    - b. Flexible Saddle – NDS
    - c. Substitutions: Section 01 60 00 – Product Requirements
- F. Sewer Service to Concrete Pipe: See 2.01.C.2

### **2.04 ACCESSORIES:**

- A. Furnish with rubber compression gasket in accordance with ASTM D5926 or bentonite tape for a water tight seal.
- B. All clamps and hardware to be Series 300 Stainless Steel
- C. Furnish stiffening bars with two additional stainless steel clamps when connecting to existing pipes with a nominal diameter larger than 15 inches in diameter.

### **2.05 CLEANOUTS**

- A. PVC body with PVC threaded plug.
- B. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.
- C. Cleanout Riser Covers
  - 1. Sanitary sewer cleanouts located in hardscaped or traffic bearing areas shall consist of cast iron frames and covers.
  - 2. Product Description:
    - a. ASTM A48/A48M, Class 35B gray cast iron or ASTM A536 ductile iron construction. Machined flat bearing surfaces.
    - b. Solid Cover, open pick slot; 9.25 inch clear opening, cast with "S" to indicate sanitary sewer.

- i) Machined flat bearing surfaces.
  - ii) Removable.
  - iii) Load rating of 40,000 lbs in accordance with AASHTO M306.
- c. Painting: Asphaltic Coating
- 3. Products:
  - a. EJ Co.: Model 1566.
  - b. Neenah Foundry Co. Model # R-1975-A2
  - c. Substitutions: Section 01 60 00 – Product Requirements

## **2.06 UNDERGROUND PIPE MARKERS**

- A. Trace Wire: Magnetic detectable conductor, 30 mil colored plastic covering, #12 AWG.
  - 1. Color: Green.
- B. Products:
  - 1. Trace Wire:
    - a. Copperhead Industries, LLC: Reinforced Tracer Wire™.
    - b. Substitutions: Not permitted.

## **2.07 MANHOLES**

- A. Manholes: Conform to Section 33 05 14.

## **2.08 CONCRETE ENCASEMENT AND CRADLES**

- A. Concrete: Concrete Grade S3 in accordance with Table 701–1 of the Michigan Department of Transportation Standard Specifications for Construction, latest edition.
- B. Finish: Rough Troweled

## **2.09 BEDDING AND COVER MATERIALS**

- A. Bedding and Cover: Special Granular Material Class IIIb as defined in Section 32 05 16 – Aggregates for Exterior Improvements.
- B. Backfill: Granular Material Class III as defined in Section 32 05 16 – Aggregates for Exterior Improvements.
- C. Suitable on site material may be utilized as bedding and cover with approval of Engineer.
- D. Soil Backfill from Above Pipe to Finish Grade: As specified in Section 31 23 33 – Trenching and Backfilling.

## **2.10 EQUIPMENT**

- A. Laser
  - 1. Self-leveling with digital grade input
  - 2. Accuracy: plus or minus 1/16 inch over 100 feet
  - 3. Target: manufactured for pipe installation, supplied with laser.

**PART 3 - EXECUTION****3.01 EXAMINATION**

- A. Section 01 30 00 – Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify trench bottom is ready to receive work and excavations, dimensions, and elevations are as indicated on drawings.
- C. Verify location of proposed manholes for proper sewer alignment.
- D. Verify end location of proposed laterals to match existing sewer laterals or to provide alignment for future connections.
- E. Verify location of proposed cleanouts. Whenever possible, cleanouts for new laterals on existing services shall be located directly in line with the existing lateral, without the use of bends upstream from the cleanout.
- F. Verify alignment of lateral and location of proposed wye fitting.
- G. Notify Engineer of conflicts with other utilities, surface improvements, and trees.

**3.02 PREPARATION**

- A. Correct over excavation with bedding material.
- B. Remove large stones or other hard matter capable of damaging pipe or impeding consistent backfilling or compaction.
- C. Protect and support existing sewer lines, utilities and appurtenances.
- D. Maintain profiles of utilities. Coordinate with other utilities to eliminate interference. Notify Engineer where crossing conflicts occur.

**3.03 BYPASS PUMPING**

- A. Maintain service in existing sewers at all times.
- B. Where the flow of existing sewers must be diverted to perform Work, perform bypass pumping.
  - 1. Design bypass pumping system to convey required flow rate.
  - 2. Verify receiving sewer has sufficient capacity to receive discharge from bypass pumping system; obtain Engineer's approval of proposed discharge location.
  - 3. Install, operate, maintain, and remove system.

**3.04 BEDDING**

- A. Excavate pipe trench in accordance with Section 31 23 33 for Work of this Section. 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 in accordance with Section 31 23 33.

- D. Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 12 inches compacted depth; compact to 95 percent maximum density per ASTM D1557.
- E. Backfill around sides and to top of pipe with cover fill; tamp in place and compact to 95 percent maximum density per ASTM D1557.
- F. Maintain optimum moisture content of fill material to attain required compaction density.

### **3.05 INSTALLATION – PIPE**

- A. Install pipe, fittings, and accessories in accordance with ASTM D2321. Seal joints watertight.
  - 1. Lay pipe to slope gradients noted on drawings with maximum variation from indicated slope of 1/8 inch in 10 feet; begin at downstream end and progress upstream. Do not allow tolerances to accumulate. Utilize laser to maintain line and grade.
- B. Assemble and handle pipe in accordance with manufacturer's instructions.
- C. Keep pipe and fittings clean until work is completed and accepted by Engineer. Cap open ends during periods of work stoppage.
- D. Lay bell and spigot pipe with bells upstream.
- E. Connect pipe to existing sewer system. Use only manufactured solid sleeve fittings. Do not use flexible couplings.
- F. Install trace wire continuous over top of pipe buried 24 inches below finish grade, above pipe line; coordinate with Section 31 23 33. Continue trace wire up sides of manholes and terminate with 12 inch tail below manhole cover.

### **3.06 INSTALLATION – CONNECTION TO EXISTING MANHOLE**

- A. Core drill existing manhole to clean opening. Using pneumatic hammers, chipping guns, or sledge hammers is not permitted.
- B. Install watertight neoprene gasket and seal with non-shrink concrete grout.
- C. Prevent construction debris from entering existing sewer line when making connection.
- D. Repair existing flow channel with grout. Contour to form continuous flow channel to new pipe connection.

### **3.07 INSTALLATION – MANHOLES**

- A. Install manholes in accordance with Section 33 05 14.

### **3.08 INSTALLATION – WYE BRANCHES**

- A. Install wye branches at locations indicated on Drawings concurrent with pipe laying operations. Use standard fittings of same material and joint type as sewer main.
- B. Maintain minimum 5 feet separation distance between wye connection and manhole.
- C. Adjust location of wye branches as necessary to match existing laterals. Do not install wye branch upstream of existing lateral being served.

**3.09 INSTALLATION – SANITARY LATERALS**

- A. Construct laterals from wye branch to cleanout.
- B. Use only manufactured fittings to adjust for alignment of existing lateral.
- C. Do not use 90 degree bends.
- D. Where depth of main pipeline warrants, construct mainline riser.
- E. Construct cleanout as close to right of way as feasible without excavating on private property. Install cleanout cover 4 inches below finished grade in lawn areas. Install cleanout cover with riser cover for cleanouts located in driveways.
- F. Install ball marker at cleanout. Attach to cleanout riser immediately below cleanout cap with plastic cable tie. Remove identification tag and attach to as-built drawings noting service address of lateral. Program ball marker with service address, type of service, size of service, and date installed.
- G. Construct laterals from cleanout to terminal point.
  - 1. Do not install bends upstream from the cleanout without approval of Engineer.
  - 2. Use only manufactured fittings to adjust for alignment of existing lateral.
  - 3. Do not adjust for alignment at connection to existing piping.
- H. Maintain 5 feet minimum depth of cover over pipe.
- I. Maintain minimum 5 feet separation distance between adjacent laterals and other parallel service lines.
- J. Install laterals at a minimum slope of 1.0%.
- K. Install watertight plug, braced to withstand pipeline test pressure thrust, at termination of laterals to empty lots.
- L. Connect new lateral pipe to existing lateral pipe with flexible coupling matching diameter of both pipe sizes.

**3.10 BACKFILLING**

- A. Measure and record the distance between all manholes, wyes, fittings, and cleanouts prior to backfill.
- B. Backfill around sides and to top of pipe in accordance with Section 31 23 17.
- C. Maintain optimum moisture content of bedding material to attain required compaction density.

**3.11 FIELD TESTING**

- A. General: Test newly constructed sanitary sewers in the following sequence.
  - 1. Sewer Mains
    - a. Exfiltration Testing
      - i) Low Pressure Air Test: Test newly constructed sanitary sewers in accordance with Section 33 01 30.13 – Sewer and Manhole Testing.
      - ii) Hydrostatic Test: PVC Pressure Pipe installed parallel to water mains within 10-feet (horizontal) and 18-inches (vertical) shall be subjected to hydrostatic testing in accordance with Section 33 11 13 – Public Water

Utility Distribution Piping. Install temporary mechanically restrained cap and ensure joints are properly restrained prior to testing.

- iii) Where newly constructed sewers must be placed into service immediately, exfiltration testing may be waived at the Engineer's sole discretion. Where exfiltration testing is waived, sewers shall be cleaned and televised in accordance with Section 33 01 30.16.

- b. Deflection Test: Test in accordance with Section 33 01 32.

## 2. Manholes

- a. Exfiltration Testing: Conduct vacuum testing of manholes in accordance with section

### 3.12 FIELD QUALITY CONTROL

- A. Section 01 40 00 – Quality Requirements.
- B. Visually inspect pipe, fittings, and connections for leakage or infiltration prior to backfilling.
- C. The Owner's Representative will perform laboratory testing of bedding, haunching, and backfill materials in accordance with Section 31 23 33 – Trenching and Backfilling.
- D. The Owner's Representative will perform field and laboratory testing of pipe materials as outlined in Paragraph 3.11 above.
- E. When tests indicate work does not meet specified requirements, remove work, replace and retest.

### 3.13 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 – Execution and Closeout Requirements.
- B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is complete.
- C. Take care not to damage or displace installed pipe and joints during construction of pipe supports, backfilling, testing, and other operations.
- D. Repair or replace pipe that is damaged or displaced from construction operations.

## PART 4 - MEASUREMENT AND PAYMENT

### 4.01 BASIS OF PAYMENT

- A. Payment for the following item(s) of work shall cover all materials, equipment and labor necessary to install the following pay items in accordance with the plans and these specifications.

### 4.02 METHOD OF MEASUREMENT

Description	Unit Price
Sanitary Sewer, (material) (class) __ inch, Tr Det __ .....	Foot

**Sanitary Sewer** of the materials, sizes and Trench Details specified, will be measured in place per foot along the centerline of the pipe. The price shall include payment in full for furnishing all excavation and backfill, all material, labor, and equipment required to perform the work specified herein and shown on the plans, including pumping to maintain sanitary service, locating and connecting to existing service leads, dewatering (trench and/or pipe), all testing, furnishing and installing all premium joints, bracing or sheeting, blocking and all other miscellaneous items necessary for the installation of the pipe. Also, additional costs due to working weekends, holidays and off-peak hours are included in the price.

Spot Repairs, including pipe couplings, shall be paid for at the contract unit price for **Sanitary Sewer, (material) (class), \_\_ inch, Tr Det \_\_**. Concrete collars will be paid separately.

Video inspection, mandrel testing and integrity testing are all considered as included in the contract unit price for **Sanitary Sewer, (material) (class), \_\_ inch, Tr Det \_\_**.

Payment for all material, labor and equipment necessary to remedy an unsatisfactory test, including removing and replacing any backfill, shall be considered as included in the contract unit price for Sanitary Sewer and Structures. Preparation and submittal of as-built plans are included in the cost of the Sanitary Sewer and Structures. Payment may be withheld until the as-built plans have been deemed acceptable by the Engineer.

#### END OF SECTION



**SECTION 33 41 13**  
**STORM UTILITY DRAINAGE PIPING****PART 1 - GENERAL****1.01 DESCRIPTION****A. Section Includes:**

1. Storm drainage piping.
2. Accessories.
3. Underground pipe markers.
4. Connection to existing manholes.
5. Laterals and fittings.
6. Cleanouts.
7. Concrete encasement and cradles.
8. Bedding and cover materials.

**B. Related Sections:**

1. Section 31 23 17 – Trenching.
2. Section 33 01 32 – Sewer and Manhole Testing.
3. Section 33 05 14 – Manholes and Structures.
4. Section 33 46 00 – Subdrainage.

**1.02 REFERENCES****A. American Association of State Highway and Transportation Officials:**

1. AASHTO M288 – Geotextiles.
2. AASHTO M294 – Corrugated Polyethylene Pipe, 12– to 36–in Diameter.
3. AASHTO M306 – Standard Specification for Drainage, Sewer, Utility, and Related Castings.

**B. ASTM International:**

1. ASTM A48/A48M – Standard Specification for Gray Iron Castings.
2. ASTM A123/A123M – Standard Specification for Zinc (Hot–Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM A716 – Standard Specification for Ductile Iron Culvert Pipe."
4. ASTM A746 – Standard specification for Ductile Iron Gravity Sewer Pipe.
5. ASTM C76 – Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.

6. ASTM C443 – Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets. ASTM D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>).
7. ASTM C923 – Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals.
8. ASTM D1785 – Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
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 D2855 – Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
12. ASTM D2922 – Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
13. ASTM D3017 – Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
14. ASTM D3034 – Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
15. ASTM D4355 – Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xeon Arc Type Apparatus.
16. ASTM D4491 – Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
17. ASTM D4751 – Standard Test Method for Determining Apparent Opening Size of a Geotextile.
18. ASTM F477 – Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

C. Michigan Department of Transportation

1. Standard Specifications for Construction, latest edition
2. Road and Bridge Standard Plans, latest edition.

### 1.03 SUBMITTALS

- A. Section 01 33 00 – Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit pertinent data indicating proposed materials, accessories, details, and construction information.
- C. Reports: Submit reports indicating field tests made and results indicating conformance or non-conformance with specifications.
- D. Manufacturer's Installation Instructions:
  1. Indicate special procedures required to install Products specified.

2. Submit detailed description of procedures for connecting.
- E. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

#### **1.04 CLOSEOUT SUBMITTALS**

- A. Section 01 70 00 – Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Accurately record actual locations of pipe runs, connections, manholes, inlets, catch basins, and invert elevations.
1. For all mains record length of pipe run, invert elevations and slope.
  2. For all laterals record:
    - a. Y+ (distance from the downstream manhole to the service fitting).
    - b. E+ (distance measured along the lateral centerline to the lateral end).
    - c. L (perpendicular distance from the lateral end to main).
    - d. Two witness dimensions from the cleanout to a permanent structure.
      - 1) Use manholes, catch basins, valves, hydrants, or property corners.
      - 2) Do not witness to trees or building corners.
  3. Identify and describe any alterations made due to subsoil conditions, discovery of uncharted utilities, or unanticipated conditions.

#### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this section.
- B. Installer Qualifications: Company specializing in performing work of this section.

#### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 – Product Requirements.
- B. Block individual and stockpiled pipe lengths to prevent moving.
- C. Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.
- D. Do not place pipe flat on ground. Cradle to prevent point stress.
- E. Store UV sensitive materials out of direct sunlight.

#### **1.07 FIELD CONDITIONS**

- A. Verify field measurements and elevations are as indicated on drawings.
1. Measure invert elevations of existing downstream sewer at proposed connection point.
  2. Measure elevation of existing pipes at proposed crossing locations.

3. Calculate proposed pipe slopes and verify clearance at crossings.
  4. Notify Engineer of any discrepancies.
- 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.

## **PART 2 - PRODUCTS**

### **2.01 STORM DRAINAGE PIPE AND FITTINGS**

- A. Reinforced Concrete Pipe (R.C.P.): ASTM C76, bell and spigot ends.
1. Class: Class III – V based on loading conditions per Schedules.
  2. Wall Type: A, B, or C wall based on concrete strength per ASTM C76.
  3. Joints: ASTM C443 rubber compression gasket.
- B. Plastic Pipe: ASTM D3034, Poly Vinyl Chloride (PVC) material; bell and spigot style rubber ring sealed gasket joints.
1. Wall Thickness: SDR 26.
  2. Fittings: PVC, of same wall thickness as pipe.
  3. Joints: ASTM F477, elastomeric gaskets.
- C. Plastic Pipe : AASHTO M294, type S, corrugated Polyethylene Drainage Pipe, smooth interior, perforated where specified (S.L.C.P.P.).
1. Fittings: Polyethylene.
  2. Joints: AASHTO M294, soil tight, integral bell.
  3. Gaskets shall meet requirements of ASTM D1056, grade 2A2.
- D. Steel Pipe: ASTM A-36, ASTM A515 grade 60 or ASTM A572 grade 42;
1. Wall Thickness: Class II
  2. Manufacturing:
    - a. Seamless up to 24 inch dia.
    - b. Rolled and Welded above 30 inch dia.
  3. Joints: Welded or Machined Press-Fit connection with Rubber O-Rings
- E. Ductile Iron Pipe: AWWA C150/151, ASTM A716/A746 Ductile Iron (DI); bell and spigot style rubber ring sealed gasket joints.
1. Bituminous exterior coating: AWWA C151
  2. Cement Mortar Lining: AWWA C104, standard thickness.
  3. Pipe Thickness Class: AWWA C150, thickness class 52.

4. Meet the requirements of ANSI/NSF Standard 61 and the certification must be stamped on the exterior wall of the pipe.
5. Joints:
  - a. Mechanical and Push-On Joints: AWWA C111.
  - b. Flanged Joints: AWWA C115.
  - c. Rubber Gaskets: AWWA C111.
6. Electrical Conductivity: Provide serrated silicon bronze wedges (two per joint).
7. Fittings:
  - a. All fittings shall be restrained to pipe.
  - b. Ductile Iron Fittings: 6-Inch Through 24-Inch:
    - 1) ANSI/AWWA C153/A21.53, compact fittings.
    - 2) Mechanical joints.
    - 3) 350 psi pressure rating.
    - 4) Lining:
      - a) Standard thickness, cement mortar lining in accordance with AWWA C104.
      - b) Fusion bonded epoxy in accordance with AWWA C550, nominal 6–8 Mils.
  - c. Ductile Iron Fittings: 30-Inch Through 48-Inch:
    - 1) ANSI/AWWA C110/A21.10.
    - 2) Manufactured restrained joint.
    - 3) Ductile iron glands.
    - 4) 250 psi pressure rating (minimum).
    - 5) Lining:
      - a) Standard thickness, cement mortar lining in accordance with AWWA C104.
      - b) Fusion bonded epoxy in accordance with AWWA C550, nominal 6–8 Mils.
8. Joint Restraint
  - a. Ductile Iron Fittings to Ductile Iron Pipe:
    - 1) 6-Inch Through 24-Inch Pipe:
      - a) Mechanical joints with Megalugs by EBAA Iron Sales, or Equal with stainless steel gripper gasket.
      - b) Restrained joints, as indicated on Drawings, to match restrained joint pipe.
    - 2) 30-Inch Through 48-Inch Pipe: Restrained joints.
9. Electrical Continuity:
  - a. Wedges:
    - 1) Serrated silicon bronze.
    - 2) Two per joint.

## 2.02 ACCESSORIES

- A. Geotextile Filter Fabric: AASHTO M288 for Permanent Erosion Control, non-biodegradable, non-woven, made from polyolefins or polyesters; with elongation less than 50 percent.
  - 1. Survivability: Class 1.
  - 2. Apparent Opening Size: No. 80 sieve, maximum; ASTM D4751.
  - 3. Permittivity:  $1.40 \text{ sec}^{-1}$ , minimum; ASTM D4491
  - 4. UV Stability: 70 percent after 500 hours exposure; ASTM D4355.
- B. Grout: Conform to Section 33 05 14.
- C. Rock: Conform to Section 31 25 13.
- D. Tapered End Sections: Precast concrete, reinforced to same specification as pipe material, with bell end compatible with pipe.
- E. Steel Grates for End Sections: Welded steel, hot-dip galvanized, conforming to Michigan Department of Transportation Standard Plan R-92-C; compatible with precast concrete tapered end sections.
- F. Resilient Pipe Connectors: ASTM C923, Neoprene gasket with stainless steel clamp, suitable for connection of plastic pipe lateral to reinforced concrete pipe.
  - 1. Products:
    - a. Fernco, Inc.: Qwik-Seal.
    - b. NPC, Inc.: Kor-N-Tee.
    - c. Substitutions: Section 01 16 00 – Product Requirements.

## **2.03 FLEXIBLE COUPLINGS**

- A. Manufacturers:
  - 1. Fernco, Inc.
  - 2. Mission Rubber Company.
  - 3. NDS, Inc.
  - 4. Substitutions: Section 01 60 00 – Product Requirements
- B. Flexible Coupling: ASTM C1173, Resilient chemical-resistant elastomeric polyvinyl chloride coupling, two stainless steel clamps and stainless steel screws and housings.

## **2.04 CLEANOUTS**

- A. PVC body with PVC threaded plug.
- B. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

## **2.05 CLEANOUT RISER COVERS**

- A. Products:
  - 1. East Jordan Iron Works: Model 3675.
  - 2. Substitutions: Section 01 60 00 – Product Requirements
- B. ASTM A48, Class 35B grey cast iron or ASTM A536 ductile iron construction.
- C. Lid:
  - 1. Machined flat bearing surfaces.
  - 2. Removable.
  - 3. Lockable.
  - 4. Load rating of 40,000 lbs in accordance with AASHTO M306.
- D. Painting: Not allowed.

## **2.06 UNDERGROUND PIPE MARKERS**

- A. Products:
  - 1. Trace Wire:
    - a. Copperhead Industries, LLC: Reinforced Tracer Wire™.
    - b. Substitutions: Not permitted.
  - 2. Ball Markers:
    - a. 3M: EMS iD Ball Marker – General Purpose 1428–XR/iD.
    - b. Substitutions: Not permitted
- B. Trace Wire: Magnetic detectable conductor, 30 mil black colored plastic covering, #12 AWG.
- C. Ball Markers: Round, high–density watertight polyethylene shell, impervious to minerals, chemicals, and temperature extremes normally found in the underground environment. RFID marker shall be encased within shell in a biodegradable mixture of propylene glycol and water.
  - 1. Color: Purple.

## **2.07 MANHOLES AND CATCH BASINS**

- A. Manholes and Catch Basins: Conform to Section 33 05 14.

## **2.08 CONCRETE ENCASEMENT AND CRADLES**

- A. Concrete: Concrete Grade S3 in accordance with Section 701 of the MDOT Standard Specifications for Construction, Table 701–1, 3000 psi 28 day compressive strength, rough troweled finish.

## **2.09 BEDDING AND COVER MATERIALS**

- A. Bedding and Cover: Granular material Class II in accordance with Section 902, Table 902–3 of the MDOT Standard Specifications for Construction.
- B. Suitable on site material may be utilized as bedding and cover with approval of Engineer.
- C. Soil Backfill from Above Pipe to Finish Grade: As specified in Section 31 23 17 – Trenching.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Section 01 30 00 – Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on drawings. Notify Engineer of discrepancies.
- C. Verify location of proposed manholes and catch basins for proper sewer alignment.
- D. Verify end location of proposed laterals to match existing storm laterals or to provide alignment for future connections.
- E. Verify location of proposed cleanouts. Whenever possible, cleanouts for new laterals on existing services shall be located directly in line with the existing lateral, without the use of bends upstream from the cleanout.
- F. Verify alignment of lateral.
- G. Notify Engineer of conflicts with other utilities, surface improvements, and trees.

### **3.02 PREPARATION**

- A. Correct over excavation with bedding material.
- B. Remove large stones or other hard matter capable of damaging pipe or impeding consistent backfilling or compaction.
- C. Protect and support existing sewer lines, utilities and appurtenances.
- D. Maintain profiles of utilities. Coordinate with other utilities to eliminate interference. Notify Engineer where crossing conflicts occur.

### **3.03 BEDDING**

- A. Excavate pipe trench in accordance with Section 31 23 17 for Work of this Section. Hand trim excavation for accurate placement of pipe to elevations indicated on Drawings.



- B. Dewater excavations to maintain dry conditions to preserve final grades at bottom of excavation.
- C. Provide sheeting and shoring in accordance with Section 31 23 17.
- D. Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 6 inches compacted depth; compact to 95 percent maximum density per ASTM D1557.
- E. Backfill around sides and to top of pipe with cover fill; tamp in place and compact to 95 percent maximum density per ASTM D1557.
- F. Install pipe on compacted subgrade meeting bedding requirements. Cradle bottom 20 percent of diameter to avoid point load.
- G. Maintain optimum moisture content of fill material to attain required compaction density.

### **3.04 INSTALLATION – PIPE**

- A. Install reinforced concrete pipe according to MDOT Standard Specifications for Construction, ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual. Join piping with rubber compression gaskets.
- B. Install plastic pipe, fittings, and accessories in accordance with ASTM D2321. Seal joints watertight.
- C. Lay pipe to slope gradients noted on drawings with maximum variation from indicated slope of 1/8 inch in 10 feet; begin at downstream end and progress upstream. Do not allow tolerances to accumulate. Utilize laser to maintain line and grade.
- D. Assemble and handle pipe in accordance with manufacturer's instructions.
- E. Keep pipe and fittings clean until work is completed and accepted by Engineer. Cap open ends during periods of work stoppage.
- F. Lay bell and spigot pipe with bells upstream.
- G. Wrap Pipe Joints for all sewers with a diameter greater than 24 inches, using geotextile fabric. Geotextile Fabric shall be a minimum of 22 inches wide, centered on joint.

### **3.05 INSTALLATION – CONNECTION TO EXISTING MANHOLE**

- A. Core drill existing manhole to clean opening. Using pneumatic hammers, chipping guns, or sledge hammers is not permitted.
- B. Install watertight neoprene gasket and seal with non-shrink concrete grout.
- C. Prevent construction debris from entering existing sewer line when making connection.

- D. Repair existing flow channel with grout. Contour to form continuous flow channel to new pipe connection.

### **3.06 INSTALLATION – DRAINAGE STRUCTURES**

- A. Install manholes and catch basins in accordance with Section 33 05 14.

### **3.07 INSTALLATION – TAPERED END SECTIONS**

- A. Install tapered end sections at all storm sewer outlets and inlets.
- B. Construct 12 inch wide by 18 inch deep concrete footing to support tapered end section.
- C. Install rock rip rap over geotextile filter fabric as indicated on Drawings.
- D. Secure steel grate over end section.

### **3.08 INSTALLATION – SERVICE TAPS**

- A. Core drill reinforced concrete pipe after installation to permit connection of storm laterals. Using pneumatic hammers, chipping guns, or sledge hammers is not permitted.
- B. Make tap above reinforced concrete pipe centerline at 10 and 2 o'clock position on main's circumference. Locate taps at least 5 feet apart and no closer than 18 inches to pipe joint.
- C. Install resilient pipe connector per manufacturer's instructions. Insert storm lateral piping into resilient pipe connector and tighten stainless steel clamp.

### **3.09 INSTALLATION – STORM LATERALS**

- A. Construct laterals from service tap to cleanout of plastic pipe and fittings.
  - 1. Use only manufactured fittings to adjust for alignment of existing lateral.
  - 2. Do not use 90 degree bends.
  - 3. Do not use 45 degree bends without approval of Engineer.
- B. Construct cleanout as close to right of way as feasible without excavating on private property. Install cleanout cover 4 inches below finished grade in lawn areas. Install cleanout cover with riser cover for cleanouts located in driveways.
- C. Install ball marker at cleanout. Attach to cleanout riser immediately below cleanout cap with plastic cable tie. Remove identification tag and attach to as-built drawings noting service address of lateral. Program ball marker with service address, type of service, size of service, and date installed.
- D. Construct laterals from cleanout to terminal point.
  - 1. Do not install bends upstream from the cleanout without approval of Engineer.

2. Use only manufactured fittings to adjust for alignment of existing lateral.
  3. Do not adjust for alignment at connection to existing piping.
- E. Maintain 3 feet minimum depth of cover over pipe.
- F. Maintain minimum 5 feet separation distance between adjacent laterals and other parallel service lines.
- G. Install laterals at a minimum slope of 1.0%.
- H. Install watertight plug at termination of laterals to empty lots.
- I. Connect new lateral pipe to existing lateral pipe with flexible coupling matching diameter of both pipe sizes.

### **3.10 BACKFILLING**

- A. Measure and record the distance between all manholes, catch basins, service taps, fittings, and cleanouts prior to backfill.
- B. Backfill around sides and to top of pipe in accordance with Section 31 23 17.
- C. Maintain optimum moisture content of bedding material to attain required compaction density.

### **3.11 FIELD TESTING OF PIPE**

- A. Televising of Sewers: Televising newly constructed storm sewers in accordance with Section 33 01 30.16 – Cleaning and Televising Sewer Pipelines.

### **3.12 FIELD QUALITY CONTROL**

- A. Section 01 40 00 – Quality Requirements.
- B. Visually inspect pipe, fittings, and connections for leakage or infiltration prior to backfilling.
- C. The Owner's Representative will perform laboratory testing of bedding, haunching, and backfill materials in accordance with Section 31 23 33 – Trenching and Backfilling.
- D. The Owner's Representative will perform field and laboratory testing of pipe materials as outlined in Paragraph 3.11 above.
- E. When tests indicate work does not meet specified requirements, remove work, replace and retest.

### **3.13 PROTECTION OF FINISHED WORK**

- A. Section 01 70 00 – Execution and Closeout Requirements.

- B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is complete.
1. Take care not to damage or displace installed pipe and joints during construction of pipe supports, backfilling, testing, and other operations.
  2. Repair or replace pipe that is damaged or displaced from construction operations.

### 3.14 SCHEDULES

**Pipe Material Selection**

Depth of Cover*	Concrete Pipe: ASTM classification
0–3 feet, under pavement	C–76–IV
0–16 feet	C–76–III
16–23 feet	C–76–IV
23–33 feet	C–76–V
*Depth of cover measured from the top of pipe to finished grade (or pavement surface)	

- A. All main line storm sewer and catch basin leads shall be concrete pipe.
- B. Storm sewer service leads shall be plastic pipe, ASTM D3034 PVC material.
- C. Plastic pipe AASHTO M294 polyethylene shall be used only where shown on drawings and approved by Engineer. In no case shall polyethylene pipe be installed under pavement.

## PART 4 - MEASUREMENT AND PAYMENT

### 4.01 BASIS OF PAYMENT

- A. The completed work as described will be measured and paid for at the contract unit price using the following contract item (pay item):

**4.02 METHOD OF MEASUREMENT****Description****Unit Price**

Sewer, (class), \_\_\_\_ inch, Tr Det \_\_\_\_ .....Foot

Pay measurement for **Sewer, (class), \_\_\_\_ inch, Tr Det \_\_\_\_** and **Sewer, DI, \_\_\_\_ inch, Tr Det \_\_\_\_** shall be paid for at the unit price bid per lineal foot of each type of pipe and pipe diameter laid measured along the center line of the pipe and shall include the cost of all pipe, fittings, taps, and appurtenances.

**END OF SECTION**



CITY OF ALLEGAN  
RIVERFRONT PLAZA  
SPLASH PAD

SPECIAL PROVISION  
FOR  
**COORDINATION CLAUSE**

Abonmarche

1 OF 1

05/29/18

The Contractor's attention is called to the requirements of cooperation with others as covered in Article 104.08 of the MDOT 2012 Standard Specifications for Construction.

The Contractor shall take due account of all such work and shall arrange his methods of operation and storage of materials and equipment so as to cause a minimum of interference with the work to be performed by other Contractors.

The Contractor shall coordinate all work with the installation of splash pad components by Vortex International. The Contractor shall also coordinate with the relocation of the electric transformer by Consumers Energy.

No claims for extra compensation or adjustments will be allowed for coordination efforts.





CITY OF ALLEGAN  
RIVERFRONT PLAZA  
SPLASH PAD

SPECIAL PROVISION  
FOR  
**FIRE PLACE**

ABONMARCHE:EJK

1 OF 1

6/1/2018

**a. Description.** This work consists of providing all labor, equipment and materials necessary to install Fire Place in the location shown on the plans.

**b. Materials.** Provide all components to connect the fire place to the gas and electric services. The service material is to meet all gas utility requirements and electrical utility requirements.

Fire place must be Custom Crossfire Burner System from Woodland Direct per quote 78499. No other fire places will be approved.

Block to face the fire place structure must be Unilock Brussel Block with the color being mahogany with a dark charcoal accent block (see plans.)

Provide a shutoff valve on the fire pit structure for emergencies.

**c. Construction.**

Contractor to install fire place structure as shown on Sheet 7 of the plans. Installation of the fire place and service connections to be performed by a licensed installer.

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

Pay Item	Pay Unit
Fire Place.....	LSUM

**Fire Place** includes the connection of the gas and electrical service to the fire place in the location shown on the plans. This also includes all excavation, material, compaction, fittings, valves, leak testing and repairs needed to perform this work as well as all other related work and materials. The gas and electric services needed for the fire places will be paid separately.



CITY OF ALLEGAN  
RIVERFRONT PLAZA  
SPLASH PAD

SPECIAL PROVISION  
FOR  
**SHADE STRUCTURE**

ABONMARCHE:EJK

1 OF 1

6/1/2018

**a. Description.** This work consists of installing Shade Structure, as detailed on the plans, in accordance with the Standard Specifications for Construction, this special provision, and as directed by the Engineer.

Work must be performed by experienced personnel with satisfactory record of performance on completed projects of comparable size and quality. Provide documentation if required by the Engineer.

**b. Materials.** Shade Structure must be CoolToppers 136759 CoolToppers, Full Sail. No equals will be accepted. Provide any necessary supplementary items such as, but not limited to, bolts and fasteners as required to install shade structure per the manufactures instructions.

**c. Construction Methods.** Coordinate installation procedures with sleeves, foundations, underground utilities, concrete placement, and other work affected by the shade structure installation.

1. Examine all work in place before installation of shade structure.

2. Install shade structure in accordance with the contract and the manufacturer's instructions.

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

Pay Item	Pay Unit
Shade Structure.....	Each



CITY OF ALLEGAN  
RIVERFRONT PLAZA  
SPLASH PAD

SPECIAL PROVISION  
FOR  
**IRRIGATION SYSTEM**

ABONMARCHE:EJK

1 OF 2

6/1/2018

**a. Description.** This work consists of providing all labor, equipment and materials necessary to design, furnish, and install a manual irrigation system as specified herein and as shown on the plans to irrigate the areas with new landscape as shown on the plan. Utilize a qualified residential irrigation specialist to design and install a system to provide adequate irrigation to the proposed planting beds shown on the plans. Provide operation and maintenance manuals for the system and a one-time winterization of the system.

**b. Materials.** Provide all components for the irrigation system from the same supplier or as recommended by the system manufacturer. Provide a complete irrigation system manufactured by Toro, Buckner, Rain Bird, Aqua-Dial or approved equal.

Design the irrigation system with a single control valve to be used to turn on the system by city staff.

Provide blowout fittings on each line in accordance with the manufacturer's recommendations.

**c. Construction.** Provide water zone coverage as shown on the plans or as approved by the Engineer. Water supply for the irrigation system must utilize a 1½ inch polyethylene piping system for the extended water outlets. Tap connections must be made downstream from each backflow preventer provided for the extended water outlet pipe.

Provide at least 18 inches of cover over piping. Cap or plug pipe ends when pipe installation is not completed at the end of each day. Perform all work in accordance with acceptable practices prevailing in the piping trades.

1. **Backfill.** Backfill and compact all trenching required for complete installation of the system. Compaction must be such that the original density of the material is obtained. Backfill material must be free from rock, large stones or other unsuitable substances that may damage the piping. Backfilling of trenches containing plastic pipe must be conducted when the pipe is cool to avoid excessive contraction.

2. **Testing and Flushing.** Test all lines that will have continuously applied pressure at 160 psi or at the rated pressure of the pipe, whichever is lower. Repair any leaks discovered during testing. Retest the line following the repairs and repeat the pressure testing and subsequent repairs until repairs are satisfactory to the Engineer.

Thoroughly flush the entire system after testing. Following the testing and flushing of the system, demonstrate the full operation of the irrigation system, in the presence of the Engineer.

Submit shop drawings to the Engineer for approval at least 10 working days prior to starting the work for all equipment associated with the automated irrigation system. Provide a minimum of two copies of operation and maintenance manuals to the Owner upon completion and acceptance of the work.

Provide a one-time winterization of the irrigation system during the fall. Coordinate the winterization with the Owner. Additionally, provide a one-time startup of the irrigation system following construction completion. Coordinate startup with the Owner.

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

<b>Pay Item</b>	<b>Pay Unit</b>
Irrigation System .....	Lump Sum

**Irrigation System** includes the design and installation of the complete automated irrigation system as specified herein and as shown on the plans. This also includes all excavation, backfilling, piping, fittings, valves, taps, sprinkler heads, electrical wiring and conduit, control panels, leak testing and repairs, and all other related work and materials.

CITY OF ALLEGAN  
RIVERFRONT PLAZA  
SPLASH PAD

SPECIAL PROVISION  
FOR  
**SITE FURNITURE, INSTALL**

ABONMARCHE:EJK

1 OF 1

6/1/2018

**a. Description.** This work consists of installing Site Furniture, provided by the owner, as detailed on the plans, in accordance with the Standard Specifications for Construction, this special provision, and as directed by the Engineer. The site furniture includes:

1. Benches
2. Litter Receptacles
3. Tables with 3 and 4 seats

Work must be performed by experienced personnel with satisfactory record of performance on completed projects of comparable size and quality. Provide documentation if required by the Engineer.

**b. Materials.** Provide any necessary supplementary items such as, but not limited to, bolts and fasteners as required to install site furnishings per the manufactures instructions.

**c. Construction Methods.** Coordinate installation procedures with sleeves, underground utilities, concrete placement, and other work affected by the site furniture installation.

1. Examine all work in place before installation of site furniture items.
2. Install site furniture in accordance with the contract and the manufacturer's instructions.

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

Pay Item	Pay Unit
Site Furniture, Install .....	LSUM





CITY OF ALLEGAN  
RIVERFRONT PLAZA  
SPLASH PAD

SPECIAL PROVISION  
FOR  
**DRINKING FOUNTAIN**

ABONMARCHE:EJK

1 OF 1

6/1/2018

**a. Description.** This work consists of providing all labor, equipment and materials necessary to install a water service and drinking fountain in the location shown on the plans.

**b. Materials.** Provide all components for a 1 inch water service. The service material is to be type K copper piping.

Drinking fountain to be Most Dependable Fountains, Inc. Model #10145SM.

Provide a shutoff valve for the water service for the drinking fountain.

**c. Construction.**

Provide at least 60 inches of cover over service. Cap or plug pipe ends when pipe installation is not completed at the end of each day. Perform all work in accordance with acceptable practices prevailing in the piping trades.

1. Backfill. Backfill and compact all trenching required for complete installation of the system. Compaction must be such that the original density of the material is obtained. Backfill material must be free from rock, large stones or other unsuitable substances that may damage the piping. Backfilling of trenches containing plastic pipe must be conducted when the pipe is cool to avoid excessive contraction.

2. Testing and Flushing. Test all lines that will have continuously applied pressure. Repair any leaks discovered during testing. Retest the line following the repairs and repeat the pressure testing and subsequent repairs until repairs are satisfactory to the Engineer.

Thoroughly flush the entire system after testing. Following the testing and flushing of the system, demonstrate the full operation of the drinking fountain, in the presence of the Engineer.

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

Pay Item	Pay Unit
Drinking Fountain .....	Ea

**Drinking Fountain** includes the connection of the water service and drinking fountain as shown on the plans. This also includes all excavation, fittings, valves, leak testing and repairs, and all other related work and materials.



CITY OF ALLEGAN  
RIVERFRONT PLAZA  
SPLASH PAD

SPECIAL PROVISION  
FOR  
**LANDSCAPE IMPROVEMENTS**

ABONMARCHE:EJK

1 OF 4

06/01/2018

**a. Description.** This work consists of furnishing and installing all plant materials, preparing the soil, fertilizer, mulch, edging, staking materials and all related items necessary to complete the work and provide maintenance in accordance with the plans and specifications. This work shall be done in accordance with Section 815 of the Standard Specifications for Construction, and as listed herein.

1. Quality Assurance

A. Source Quality Control:

- (1) General: Ship landscape materials with certificates of inspection required by governing authorities. Comply with regulations applicable to landscape materials.
- (2) Do not make substitutions: If specified landscape material is not obtainable, submit to Engineer proof of non-availability and proposal for use of equivalent material. When authorized, adjustment of contract amount will be made.
- (3) Analysis and Standards: Package standard products with manufacturers certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever possible.
- (4) Trees / Shrubs / Perennials and Ornamental Grasses: To be grown in a recognized nursery in accordance with good horticultural practice. Provide healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions or disfigurement.
- (5) Sizes: Provide all plan material as shown or specified. Plant material of larger size may be used if acceptable to Engineer, and if sizes of roots or balls are increased proportionately.
- (6) Inspection: Engineer reserves the right to inspect trees and shrubs either at place of growth or at site before planting, for compliance with requirements for name, variety, size and quality.

B. Contractor Qualifications

- (1) Landscaping shall be installed by a single firm specializing in this work with a minimum of five (5) years of documented experience with projects for municipal or the public sector, similar in scope, and is subject to review/approval by the Owner and the Engineer.
- (2) Company specializing and performing work of this Section shall provide a list of a minimum of three (3) project references completed within the last ten (10) years and must include the following:
  - (a) Name and Location
  - (b) Contact Name and Phone Number
  - (c) Year Project was completed
  - (d) Overall cost of components
  - (e) Example photographs
  - (f) Optional – Any other additional information to support their ability to complete work of this section

C. Planting Schedule: Submit planting schedule showing scheduled dates for planting each section of the Work. Sections to be clearly described by contractor using business and entrance drives in description. If lane closure or traffic control is required during planting or maintenance operations the contractor shall submit a traffic control plan meeting MMUTCD to the Engineer for approval two weeks prior to implementation. Traffic control work shall be included with planting items for payment purposes.

D. Maintenance Schedule: Submit schedule for maintenance as specified in Section 815.

- (1) Contractor shall perform one (1) year of maintenance on plants and mulch the Spring following construction completion which shall include general plant maintenance, providing fresh mulching where required, removal and replacement of plants with equal plants that did not survive the winter.

## 2. Delivery, Storage and Handling

A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery, while stored at site.

### B. Plant Materials:

- (1) Trees and Shrubs: Provide freshly dug trees and shrubs. Do not prune prior to delivery. Do not bend or bind tie trees or shrubs in such manner as to damage bark, break branches or destroy natural shape. Provide protective covering during delivery.

- (2) Deliver trees and shrubs only that are to be planted immediately for section in which contractor is working. If planting is delayed more than 6 hours after delivery, set trees and shrubs in shade, protect from weather and mechanical damage, and keep roots moist.
- (3) Label at least one tree and one shrub of each variety per section with a securely attached waterproof tag bearing legible designation of botanical and common name.
- (4) Provide perennials and ornamental grasses in proper size containers and plant immediately upon delivery.

**b. Materials.** Supply all plants and planting materials in accordance with Section 917 of the Standard Specifications for Construction and as modified by this special provision.

1. **Packaged Materials:** Deliver packaged materials in containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery, while stored at site.

2. **Miscellaneous Landscape Materials**

- A. **Shredded Hardwood Mulch.** Provide shredded hardwood mulch consisting of tree bark stripped and shredded from sawn logs with a de-barking machine. Shredded hardwood mulch must be capable of passing through a conventional mulch blower. Do not use wood chips.

- B. **Weed Barrier.** Weed barrier shall be heavy duty polypropylene intended for long-term use in exposed conditions. The minimum fabric weight shall be as specified on the plans.

**c. Construction.** Construction methods and application rates for planting items shall be in accordance with Sections 815 and 816 of the Standard Specifications for Construction, as detailed in the plans, and as modified by this special provision.

1. **Inspection**

- A. Installer must examine subgrade, verify elevations, observe conditions under which work is to be performed, and notify CONTRACTOR (or if none, OWNER) of unsatisfactory conditions. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to installer.

2. **Planting**

- A. **Plant Trees and Shrubs**

- (1) If deciduous trees or shrubs are moved in full leaf, spray with anti-desiccant at nursery before moving and again two weeks after planting.
    - (2) Remove and replace excessively pruned or malformed stock resulting from improper pruning.

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

Pay Item	Pay Unit
(Botanical Name) .....	Each
Hardwood Mulch, __ inch .....	Square Yard

Plants will be measured by the units shown on the plans and methods specified in ANSI Z 60.1. Payment for **(Botanical Name)** will be made once the plant has been pruned, planted, watered-in, wrapped, braced or guyed, and mulched. Replacement of plants in the Spring that do not survive the winter will be considered include in the original cost of the planting and no additional payment will be made for necessary replacements.

**Hardwood Mulch, \_\_ inch** shall be paid by the square yard (in place) for furnishing, spreading the hardwood mulch material to the specified depth. Providing fresh mulch in the Spring following construction shall be considered included in the original payment of this item and no additional payment will be made for this work.

MICHIGAN  
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION  
FOR  
**SLOPE RESTORATION, NON-FREEWAY**

C&amp;T:DMG

1 of 3

C&amp;T:APPR:TWK:DBP:04-25-12

**a. Description.** This work consists of preparing all lawns and slopes on non-freeway projects designated for slope restoration on the plans or as directed by the Engineer and applying topsoil, fertilizer, seed, mulch with mulch anchor, mulch blanket, high velocity mulch blanket and permanent turf reinforcement mat to those areas. Turf establishment must be in accordance with section 816 of the Standard Specifications for Construction and Standard Plan R-100 Series, except as modified herein or otherwise directed by the Engineer.

**b. Materials.** The materials and application rates specified in sections 816 and 917 of the Standard Specifications for Construction apply unless modified by this special provision or otherwise directed by the Engineer. The following materials must be used on this project:

1. Seeding mixture as called for on the plans
2. Fertilizer, Chemical Nutrient, Class A
3. Topsoil Surface, Furnished or Salvaged, 4 inch. Remove any stones greater than 1/2 inch in diameter or other debris from all topsoil.
4. Mulch and Mulch Anchoring, Mulch Blanket and High Velocity Mulch Blanket
5. Permanent Turf Reinforcement Mat (TRM) must be 100 percent synthetic and consist of 100 percent ultraviolet (UV) stabilized polyolefin fibers sewn between two layers of black UV stabilized polypropylene netting with polyolefin thread. The TRM must meet the following "minimum average roll value" requirements:

<b>Property</b>	<b>Test Method</b>	<b>Requirement</b>
Mass/Unit Area	ASTM D 6566	10 oz/syd
Ultraviolet Stability @ 1000 hrs	ASTM D 4355	80 percent
Tensile Strength (MD)	ASTM D 6818	165 lbs/ft

Acceptance. Supply a Test Data Certification for the permanent TRM from one of the following manufacturers:

Recyclex - American Excelsior Co., Arlington, TX (800) 777-7645  
P300 - North American Green, Poseyville, IN (800) 772-2040  
Landlok 450 - Propex, Inc., Chattanooga, TN (800) 621-1273  
PP5-10 - Western Excelsior, Mancos, CO (800) 833-8573

**c. Construction.** Construction methods must be in accordance with subsection 816.03 of the Standard Specifications for Construction. Begin this work as soon as possible after final grading of the areas designated for slope restoration but no later than the maximum time frames stated in

subsection 208.03 of the Standard Specifications for Construction. It may be necessary, as directed by the Engineer, to place materials by hand.

Shape, compact and assure all areas to be seeded are weed free prior to placing topsoil. Place topsoil to the minimum depth indicated above, to meet proposed finished grade. If the area being restored requires more than the minimum depth of topsoil to meet finished grade, this additional depth must be filled using topsoil or, at the Contractor's option, embankment. Furnishing and placing this additional material is included in this item of work.

Topsoil must be weed and weed seed free and friable prior to placing seed. Remove any stones greater than 1/2 inch in diameter or other debris. Apply seed mixture and fertilizer to prepared soil surface. Incorporate seed into top 1/2 inch of topsoil

Apply mulch at a rate of 2 tons per acre. Place Mulch Anchoring over the mulch at a rate specified in subsection 816.03.F of the Standard Specifications for Construction. Mulch Blanket and High Velocity Mulch Blanket must be placed in accordance with subsection 816.03.H of the Standard Specifications for Construction and as shown on Standard Plan R-100 Series.

Areas constructed with the TRM must be installed on prepared (seeded) grades as shown on the plans in strict accordance with the manufacturer's published installation guidelines. The top edge of the TRM must be anchored in a minimum 6 inch deep trench. Operation of equipment on the slope will not be allowed after placement of the TRM. No credit for splices, overlaps, tucks or wasted material will be made.

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

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

The Engineer will inspect the seeded turf to ensure the end product is well established, weed free, in a vigorous growing condition, and contains the species called for in the seeding mixture.

If the seeded turf is not well established at the end of the first growing season, the Contractor is responsible to re-seed until the turf is well established and approved by the Engineer.

If weeds are determined by the Engineer to cover more than 10 percent of the total area of slope restoration, the Contractor must provide weed control in accordance with subsection 816.03.J of the Standard Specifications for Construction. Weed control will be at the Contractor's expense with no additional charges to the project.

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

Pay Item	Pay Unit
Slope Restoration, Type _____	Square Yard

1. Place **Slope Restoration, Type A** in all areas not described in the other types of slope restoration and will be measured by area in square yards in place. **Slope Restoration, Type A**



includes all labor, equipment and materials required to install Topsoil Surface, Furnished or Salvaged; Fertilizer, Chemical Nutrient, Class A; Seeding Mixture; and Mulch and Mulch Anchoring which will not be paid for separately but is included in the contract unit price for **Slope Restoration, Type A**.

2. Place **Slope Restoration, Type B** parallel (6 feet minimum) to the edge of the roadway, in areas that have a 1 on 3 slope and in any ditch with a grade less than 1.5 percent, or as directed by the Engineer. **Slope Restoration, Type B** will be measured by area in square yards in place. **Slope Restoration, Type B** includes all labor, equipment and materials required to install Topsoil Surface, Furnished or Salvaged; Fertilizer, Chemical Nutrient, Class A; Seeding Mixture; and Mulch Blanket which will not be paid for separately but is included in the contract unit price for **Slope Restoration, Type B**.

3. Place **Slope Restoration, Type C** in areas that have a 1 on 2 slope, any ditch with a grade of 1.5 percent to 3 percent or as directed by the Engineer. **Slope Restoration, Type C** will be measured by area in square yards in place. **Slope Restoration, Type C** includes all labor, equipment and materials required to install Topsoil, Furnished or Salvaged; Fertilizer, Chemical Nutrient, Class A; Seeding Mixture; and High Velocity Mulch Blanket which will not be paid for separately but is included in the contract unit price for **Slope Restoration, Type C**.

4. Place **Slope Restoration, Type D** in areas that have a slope steeper than 1 on 2, any ditch with a grade steeper than 3 percent or as directed by the Engineer. **Slope Restoration, Type D** will be measured by area in square yards in place. **Slope Restoration, Type D** includes all labor, equipment and materials required to install Topsoil, Furnished or Salvaged; Fertilizer, Chemical Nutrient, Class A; Seeding Mixture; and TRM which will not be paid for separately but is included in the contract unit price for **Slope Restoration, Type D**.