

# **SAVAGE DRAIN**

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## **BIDDING DOCUMENTS**



Prepared For:

**SAGINAW COUNTY PUBLIC WORKS COMMISSIONER**

Prepared By:



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**Brian J. Wendling**  
**Public Works Commissioner**  
Governmental Center  
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Saginaw, MI 48602  
Phone 989-790-5258  
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**SAGINAW COUNTY PUBLIC WORKS COMMISSIONER**

**SAVAGE DRAIN**

**NOTICE OF LETTING**

**NOTICE OF LETTING**

**DATE:** May 24, 2023  
**TIME:** 10:00 a.m.  
**LOCATION:** Spicer Group, Inc.  
230 S. Washington Avenue  
Saginaw, MI 48607  
**QUESTIONS:** (989) 790-5258

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

The Savage Drain project will be let in 2 sections as follows, each section having the length, average depth and width as set forth:

*Said Drain is an existing open channel drain with dikes and flapgates at the outlet for flood protection. Project includes reconstruction of dikes along approximately 1 mile of drain and replacement of the flapgate structure. This Notice of Letting, the plans, specifications, and bid proposal shall be considered a part of the contract. The following items will be required, and a contract let for same:*

**DIVISION I - OPTION A - OUTLET STRUCTURE**

**SAVAGE DRAIN OUTLET**

300	Lin. Ft.	Dike and Channel Reconstruction (Misteguay Creek)
3	Each	8' x 8' Flap Gate (Fontaine)
2	Each	4' x 3.5' Flap Gate (Fontaine)
1	Lump Sum	Concrete Outlet Structure, Complete (Includes Apron, Footing, Wall, Walkway)
1	Lump Sum	Temporary Dewatering and Cofferdams
1	Lump Sum	Demolition (Existing Outlet Structure)
1	Lump Sum	Sitework and Grading
150	Cu. Yds.	Subgrade Undercut
1,400	Sq. Yds.	Miscellaneous Riprap

**OPEN CHANNEL CONSTRUCTION**

300	Lin. Ft.	Dike and Channel Reconstruction - Left Side (Sta. 0+00 to 3+00)
300	Lin. Ft.	Dike and Channel Reconstruction - Right Side (Sta. 0+00 to 3+00)
1	Lump Sum	Sediment Sump
1	Lump Sum	Site Clearing - Both Sides

**SOIL EROSION AND SEDIMENT CONTROL**

50	Lin. Ft.	Plain Riprap Toe of Slope
50	Lin. Ft.	Plain Riprap Spillway
1	Lump Sum	Seeding, Fertilizing, and Blown Straw Mulch - On Dike
1	Lump Sum	Cleanup and Restoration

**DIVISION I - OPTION B - OUTLET STRUCTURE**

**SAVAGE DRAIN OUTLET**

300	Lin. Ft.	Dike and Channel Reconstruction (Misteguay Creek)
3	Each	8' x 8' Flap Gate (Fontaine)
2	Each	48" Flap Gate (Fontaine)
210	Lin. Ft.	8' Rise x 8' Span Concrete Box Culvert
128	Lin. Ft.	48" RCP (C-76, CL IV)
1	Lump Sum	Concrete Headwall and Wingwalls, Complete (Includes Apron and Footing)
1	Lump Sum	Temporary Dewatering and Cofferdams
1	Lump Sum	Demolition (Existing Outlet Structure)
1	Lump Sum	Sitework and Grading
200	Cu. Yds.	Subgrade Undercut
1,000	Sq. Yds.	Miscellaneous Riprap

**OPEN CHANNEL CONSTRUCTION**

300	Lin. Ft.	Dike and Channel Reconstruction - Left Side (Sta. 0+00 to 3+00)
300	Lin. Ft.	Dike and Channel Reconstruction - Right Side (Sta. 0+00 to 3+00)
1	Lump Sum	Sediment Sump
1	Lump Sum	Site Clearing - Both Sides

**SOIL EROSION AND SEDIMENT CONTROL**

50	Lin. Ft.	Plain Riprap Toe of Slope
50	Lin. Ft.	Plain Riprap Spillway
1	Lump Sum	Seeding, Fertilizing, and Blown Straw Mulch - On Dike
1	Lump Sum	Cleanup and Restoration

**DIVISION II - DIKE RECONSTRUCTION**

**OPEN CHANNEL CONSTRUCTION**

5,060	Lin. Ft.	Dike and Channel Reconstruction - Left Side (Sta. 3+00 to 53+60)
5,060	Lin. Ft.	Dike and Channel Reconstruction - Right Side (Sta. 3+00 to 53+60)
1	Lump Sum	Site Clearing - Both Sides

**BLAINE PUMP STATION (STA. 21+50 - RIGHT SIDE)**

12	Lin. Ft.	6' Dia. Manhole Crock (Paid Per Vertical Lin. Ft.)
5	Lin. Ft.	48" RCP (C-76, CL III)
1	Each	48" RCP Flared End Section
1	Lump Sum	Pump Removal and Reinstallation (Includes Fabrication for Reinstallation)
64	Lin. Ft.	36" RCP (C-76, CL IV)
1	Each	36" RCP Flared End Section
1	Each	Precast Concrete Headwall (w/out Baffle)

1	Each	36" Flapgate (Fontaine)
1	Lump Sum	Electrical, Complete
1	Lump Sum	Demolition
1	Lump Sum	Grading and Sitework

**SOIL EROSION AND SEDIMENT CONTROL**

200	Sq. Yds.	Miscellaneous Riprap
200	Lin. Ft.	Plain Riprap Toe of Slope
200	Lin. Ft.	Plain Riprap Spillway
1	Lump Sum	Seeding, Fertilizing, and Blown Straw Mulch - On Dike
1	Lump Sum	Cleanup and Restoration

**Field Tiles**

3	Each	Precast Concrete Headwall (Sized for 8" Tile and Flapgate)
180	Lin. Ft.	8" Tile Outlet Replacement (PVC, SDR-26)
3	Each	Flap Gate (Fontaine - Flatback) (Size Required for 8" Tile)
100	Lin. Ft.	12" Header Tile Relocation (Single Wall, Heavy Duty)
100	Lin. Ft.	10" Header Tile Relocation (Single Wall, Heavy Duty)
100	Lin. Ft.	8" Header Tile Relocation (Single Wall, Heavy Duty)
3	Each	Plain Riprap Splash Pad

This Notice of Letting, the plans, specifications and bid proposal shall be considered a part of the Contract. The Contract will be let in accordance with the Contract Documents now on file at Spicer Group, 230 S. Washington Ave., Saginaw, MI (Luke O’Brien, 989-280-2109) and available to interested parties. Bids will be made and received in accordance with these documents. Bidding Documents, including plans and specifications, may be examined at the following locations:

**Saginaw County Public Works Commissioner: Digital documents on website at no charge**

<http://www.saginawcounty.com/departments/public-works-drain-office/current-projects/>

Copies of Bidding Documents may only be obtained upon payment of a **\$100.00 non-refundable** deposit. (Contact Angie McCullen, 989-921-5538).

A security deposit drawn payable to the **Savage Drain Drainage District** in the form of a cashier’s check, money order, certified check or bidders bond shall be submitted with any bids. No cash will be permitted. The security deposits of all unsuccessful bidders shall be returned after the Contract is awarded.

A **mandatory pre-bid conference** will be held at **9:00 a.m.** on the **3<sup>rd</sup> day of May, 2023**, at the office of Spicer Group, Inc., 230 S. Washington Avenue, Saginaw, Michigan 48607. It is a requirement that any prospective General Contractor bidding attend this meeting. Representatives of the Drainage District and Spicer Group, Inc. will be present to discuss the project. Attendance is required for sealed bids to be accepted. Spicer Group, Inc. will transmit to all prospective bidders of record an Addendum as Spicer Group, Inc. considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be legally effective.

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

Dated: \_\_\_\_\_

\_\_\_\_\_  
Brian J. Wendling  
Saginaw County Public Works Commissioner

## **INSTRUCTIONS TO BIDDERS**

### **ARTICLE 1 – DEFINED TERMS**

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

### **ARTICLE 2 – COPIES OF BIDDING DOCUMENTS**

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

### **ARTICLE 3 – QUALIFICATIONS OF BIDDERS**

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

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

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



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

#### 4.03 *Site Visit and Testing by Bidders*

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

#### 4.04 *Owner's Safety Program*

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

4.05 *Other Work at the Site*

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

**ARTICLE 5 – BIDDER’S REPRESENTATIONS**

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

- A. examine and carefully study the Bidding Documents, and any data and reference items identified in the Bidding Documents;
- B. visit the Site, conduct a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfy itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;
- C. become familiar with and satisfy itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work;
- D. carefully study all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings;
- E. consider the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder’s safety precautions and programs;
- F. agree, based on the information and observations referred to in the preceding paragraph, that at the time of submitting its Bid no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;
- G. become aware of the general nature of the work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;
- H. promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder;
- I. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work; and
- J. agree that the submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

## **ARTICLE 6 – PRE-BID CONFERENCE**

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

## **ARTICLE 7 – INTERPRETATIONS AND ADDENDA**

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

7.02 Addenda may be issued to clarify, correct, supplement, or change the Bidding Documents.

7.03 All Addenda will be distributed on the Owner's website:  
<http://www.saginawcounty.com/PublicWorks/Current-Projects.aspx>

It is the Contractor's responsibility to check the website regularly during the bidding process.

## **ARTICLE 8 – BID SECURITY**

8.01 A Bid must be accompanied by Bid security made payable to Savage Drain Drainage District in an amount of 5 percent of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form of a certified check, bank money order, or a Bid bond (on the form included in the Bidding Documents) issued by a surety meeting the requirements of Paragraphs 6.01 and 6.02 of the General Conditions.

8.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract Documents, furnished the required contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited. Such forfeiture shall be Owner's exclusive remedy if Bidder defaults.

8.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective Date of the Contract or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.

8.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within seven days after the Bid opening.

## **ARTICLE 9 – CONTRACT TIMES**

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

## **ARTICLE 10 – LIQUIDATED DAMAGES**

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

## **ARTICLE 11 – SUBSTITUTE AND “OR-EQUAL” ITEMS**

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

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

## **ARTICLE 12 – SUBCONTRACTORS, SUPPLIERS, AND OTHERS**

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

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

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

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

12.04 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, or other individuals or entities. Declining to make requested substitutions will constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 7.06 of the General Conditions.

## **ARTICLE 13 – PREPARATION OF BID**

13.01 The Bid Form is included with the Bidding Documents.

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

**ARTICLE 14 – BASIS OF BID**

14.01 *Lump Sum*

- A. Bidders shall submit a Bid on a lump sum basis as set forth in the Bid Form.

14.01 Base Bid with Alternates

- A. Bidders shall submit a Bid on a lump sum basis for the base Bid and include a separate price for each alternate described in the Bidding Documents and as provided for in the Bid Form. The price for each alternate will be the amount added to or deleted from the base Bid if Owner selects the alternate.
- B. In the comparison of Bids, alternates will be applied in the same order of priority as listed in the Bid Form.

14.02 *Unit Price*

- A. Bidders shall submit a Bid on a unit price basis for each item of Work listed in the unit price section of the Bid Form.
- B. The “Bid Price” (sometimes referred to as the extended price) for each unit price Bid item will be the product of the “Estimated Quantity” (which Owner or its representative has set forth in the Bid Form) for the item and the corresponding “Bid Unit Price” offered by the Bidder. The total of all unit price Bid items will be the sum of these “Bid Prices”; such total will be used by Owner for Bid comparison purposes. The final quantities and Contract Price will be determined in accordance with Paragraph 13.03 of the General Conditions.

- C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

14.03 *Allowances*

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

**ARTICLE 15 – SUBMITTAL OF BID**

- 15.01 With each copy of the Bidding Documents, a Bidder is furnished one Affidavit of Compliance – Iran Economic Sanctions Act (C210) This form must be signed, notarized and included with the submitted bid package.
- 15.02 A Bid shall be received no later than the date and time prescribed and at the place indicated in the advertisement or invitation to bid and shall be enclosed in a plainly marked package with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted), the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with the notation “**BID ENCLOSED.**” A mailed Bid shall be addressed to **Spicer Group, Inc., 230 S. Washington Avenue, Saginaw, MI 48607, Attn: Luke O’Brien.**
- 15.03 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

**ARTICLE 16 – MODIFICATION AND WITHDRAWAL OF BID**

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

**ARTICLE 17 – OPENING OF BIDS**

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

**ARTICLE 18 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE**

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

**ARTICLE 19 – EVALUATION OF BIDS AND AWARD OF CONTRACT**

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

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

19.03 Evaluation of Bids

A. In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.

B. For the determination of the apparent low Bidder when unit price bids are submitted, Bids will be compared on the basis of the total of the products of the estimated quantity of each item and unit price Bid for that item, together with any lump sum items.

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

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

**ARTICLE 20 – BONDS AND INSURANCE**

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

**ARTICLE 21 – SIGNING OF AGREEMENT**

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





**BID FORM  
FOR CONSTRUCTION CONTRACTS**

**ARTICLE 1 – BID RECIPIENT**

- 1.01 This Bid is submitted to:  
*Saginaw County Public Works Commissioner*
- 1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

**ARTICLE 2 – BIDDER’S ACKNOWLEDGEMENTS**

- 2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 120 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

**ARTICLE 3 – BIDDER’S REPRESENTATIONS**

- 3.01 In submitting this Bid, Bidder represents that:
  - A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

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

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

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

Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

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

#### **ARTICLE 4 – BIDDER'S CERTIFICATION**

4.01 Bidder certifies that:

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:
  - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process;
  - 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. “collusive practice” means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and
4. “coercive practice” means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

#### **ARTICLE 5 – BASIS OF BID**

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

##### **UNIT PRICE BID – SEE ATTACHED BID FORM**

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

#### **ARTICLE 6 – TIME OF COMPLETION**

- 6.01 Bidder agrees that the Work will be substantially complete on or before October 1, 2024, and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before October 31, 2024.
- 6.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

#### **ARTICLE 7 – ATTACHMENTS TO THIS BID**

- 7.01 The following documents are submitted with and made a condition of this Bid:
- A. Required Bid security;
  - B. Affidavit of Compliance – Iran Economic Sanctions Act;
  - C. List of Subcontractors to be used on project

#### **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 – BIDDER COMMUNICATIONS**

- 9.01 Communications concerning this Bid shall be addressed to:

**Luke O’Brien, P.E., Project Manager, 230 S. Washington, Saginaw, MI 48607-1286, Phone; (989) 280-2109; [lukeo@spicergroup.com](mailto:lukeo@spicergroup.com).**

**ARTICLE 10 – BID SUBMITTAL**

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

By:

*[Signature]* \_\_\_\_\_

*[Printed name]* \_\_\_\_\_

*(If Bidder is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.)*

Attest:

*[Signature]* \_\_\_\_\_

*[Printed name]* \_\_\_\_\_

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

Submittal Date: \_\_\_\_\_

Address for giving notices:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Telephone Number: \_\_\_\_\_

Fax Number: \_\_\_\_\_

Contact Name and e-mail address: \_\_\_\_\_  
\_\_\_\_\_

Bidder's License No.: \_\_\_\_\_

*(where applicable)*

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

**SAVAGE DRAIN  
BID FORM**

Item No.	Estimated Quantity	Unit	Description	Unit Price	Amount
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**DIVISION I - OPTION A - OUTLET STRUCTURE**

**SAVAGE DRAIN OUTLET**

1.	300	Lin. Ft.	Dike and Channel Reconstruction (Misteguay Creek)	\$ _____	_____
2.	3	Each	8' x 8' Flap Gate (Fontaine)	\$ _____	_____
3.	2	Each	4' x 3.5' Flap Gate (Fontaine)	\$ _____	_____
4.	1	Lump Sum	Concrete Outlet Structure, Complete (Includes Apron, Footing, Wall, Walkway)	Lump Sum	\$ _____
5.	1	Lump Sum	Temporary Dewatering and Cofferdams	Lump Sum	\$ _____
6.	1	Lump Sum	Demolition (Existing Outlet Structure)	Lump Sum	\$ _____
7.	1	Lump Sum	Sitework and Grading	Lump Sum	\$ _____
8.	150	Cu. Yds.	Subgrade Undercut	\$ _____	\$ _____
9.	1,400	Sq. Yds.	Miscellaneous Riprap	\$ _____	\$ _____

**OPEN CHANNEL CONSTRUCTION**

10.	300	Lin. Ft.	Dike and Channel Reconstruction - Left Side (Sta. 0+00 to 3+00)	\$ _____	\$ _____
11.	300	Lin. Ft.	Dike and Channel Reconstruction - Right Side (Sta. 0+00 to 3+00)	\$ _____	\$ _____
12.	1	Lump Sum	Sediment Sump	Lump Sum	\$ _____
13.	1	Lump Sum	Site Clearing - Both Sides	Lump Sum	\$ _____

**SOIL EROSION AND SEDIMENT CONTROL**

14.	50	Lin. Ft.	Plain Riprap Toe of Slope	\$ _____	\$ _____
15.	50	Lin. Ft.	Plain Riprap Spillway	\$ _____	\$ _____
16.	1	Lump Sum	Seeding, Fertilizing, and Blown Straw Mulch - On Dike	Lump Sum	\$ _____
17.	1	Lump Sum	Cleanup and Restoration	Lump Sum	\$ _____

**DIVISION IA - TOTAL AMOUNT OF BID-----** \$ \_\_\_\_\_

**DIVISION I - OPTION B - OUTLET STRUCTURE**

**SAVAGE DRAIN OUTLET**

18.	300	Lin. Ft.	Dike and Channel Reconstruction (Misteguay Creek)	\$ _____	_____
19.	3	Each	8' x 8' Flap Gate (Fontaine)	\$ _____	_____
20.	2	Each	48" Flap Gate (Fontaine)	\$ _____	_____
21.	210	Lin. Ft.	8' Rise x 8' Span Concrete Box Culvert	\$ _____	_____

22.	128	Lin. Ft.	48" RCP (C-76, CL IV)	\$	_____	_____
23.	1	Lump Sum	Concrete Headwall and Wingwalls, Complete (Includes Apron and Footing)		<u>Lump Sum</u>	\$ _____
24.	1	Lump Sum	Temporary Dewatering and Cofferdams		<u>Lump Sum</u>	\$ _____
25.	1	Lump Sum	Demolition (Existing Outlet Structure)		<u>Lump Sum</u>	\$ _____
26.	1	Lump Sum	Sitework and Grading		<u>Lump Sum</u>	\$ _____
27.	200	Cu. Yds.	Subgrade Undercut	\$	_____	\$ _____
28.	1,000	Sq. Yds.	Miscellaneous Riprap	\$	_____	\$ _____

**OPEN CHANNEL CONSTRUCTION**

29.	300	Lin. Ft.	Dike and Channel Reconstruction - Left Side (Sta. 0+00 to 3+00)	\$	_____	\$ _____
30.	300	Lin. Ft.	Dike and Channel Reconstruction - Right Side (Sta. 0+00 to 3+00)	\$	_____	\$ _____
31.	1	Lump Sum	Sediment Sump		<u>Lump Sum</u>	\$ _____
32.	1	Lump Sum	Site Clearing - Both Sides		<u>Lump Sum</u>	\$ _____

**SOIL EROSION AND SEDIMENT CONTROL**

33.	50	Lin. Ft.	Plain Riprap Toe of Slope	\$	_____	\$ _____
34.	50	Lin. Ft.	Plain Riprap Spillway	\$	_____	\$ _____
35.	1	Lump Sum	Seeding, Fertilizing, and Blown Straw Mulch - On Dike		<u>Lump Sum</u>	\$ _____
36.	1	Lump Sum	Cleanup and Restoration		<u>Lump Sum</u>	\$ _____

**DIVISION IB - TOTAL AMOUNT OF BID-----** \$ \_\_\_\_\_

**DIVISION II - DIKE RECONSTRUCTION**

**OPEN CHANNEL CONSTRUCTION**

37.	5,060	Lin. Ft.	Dike and Channel Reconstruction - Left Side (Sta. 3+00 to 53+60)	\$	_____	\$ _____
38.	5,060	Lin. Ft.	Dike and Channel Reconstruction - Right Side (Sta. 3+00 to 53+60)	\$	_____	\$ _____
39.	1	Lump Sum	Site Clearing - Both Sides		<u>Lump Sum</u>	\$ _____

**BLAINE PUMP STATION (STA. 21+50 - RIGHT SIDE)**

40.	12	Lin. Ft.	6' Dia. Manhole Crock (Paid Per Vertical Lin. Ft.)	\$	_____	\$ _____
41.	5	Lin. Ft.	48" RCP (C-76, CL III)	\$	_____	\$ _____
42.	1	Each	48" RCP Flared End Section	\$	_____	\$ _____

43.	1	Lump Sum	Pump Removal and Reinstallation (Includes Fabrication for Reinstallation)	<u>Lump Sum</u>	\$ _____
44.	64	Lin. Ft.	36" RCP (C-76, CL IV)	\$ _____	\$ _____
45.	1	Each	36" RCP Flared End Section	\$ _____	\$ _____
46.	1	Each	Precast Concrete Headwall (w/out Baffle)	\$ _____	\$ _____
47.	1	Each	36" Flapgate (Fontaine)	\$ _____	\$ _____
48.	1	Lump Sum	Electrical, Complete	<u>Lump Sum</u>	\$ _____
49.	1	Lump Sum	Demolition	<u>Lump Sum</u>	\$ _____
50.	1	Lump Sum	Grading and Sitework	<u>Lump Sum</u>	\$ _____

**SOIL EROSION AND SEDIMENT CONTROL**

51.	200	Sq. Yds.	Miscellaneous Riprap	\$ _____	\$ _____
52.	200	Lin. Ft.	Plain Riprap Toe of Slope	\$ _____	\$ _____
53.	200	Lin. Ft.	Plain Riprap Spillway	\$ _____	\$ _____
54.	1	Lump Sum	Seeding, Fertilizing, and Blown Straw Mulch - On Dike	<u>Lump Sum</u>	\$ _____
55.	1	Lump Sum	Cleanup and Restoration	<u>Lump Sum</u>	\$ _____

**Field Tiles**

56.	3	Each	Precast Concrete Headwall (Sized for 8" Tile and Flapgate)	\$ _____	\$ _____
57.	180	Lin. Ft.	8" Tile Outlet Replacement (PVC, SDR-26)	\$ _____	\$ _____
58.	3	Each	Flap Gate (Fontaine - Flatback) (Size Required for 8" Tile)	\$ _____	\$ _____
59.	100	Lin. Ft.	12" Header Tile Relocation (Single Wall, Heavy Duty)	\$ _____	\$ _____
60.	100	Lin. Ft.	10" Header Tile Relocation (Single Wall, Heavy Duty)	\$ _____	\$ _____
61.	100	Lin. Ft.	8" Header Tile Relocation (Single Wall, Heavy Duty)	\$ _____	\$ _____
62.	3	Each	Plain Riprap Splash Pad	\$ _____	\$ _____

**DIVISION II - TOTAL AMOUNT OF BID----- \$ \_\_\_\_\_**

**NOTICE OF AWARD**

---

Date of Issuance:

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

Engineer: Spicer Group, Inc.      Engineer's Project No.: 126999SG2019

Project: Savage Drain      Contract Name: Savage Drain

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]*

Four (4) unexecuted counterparts of the Agreement accompany this Notice of Award, and one copy of the Contract Documents accompanies this Notice of Award, or has been transmitted or made available to Bidder electronically. *[revise if multiple copies accompany the Notice of Award]*

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

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

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

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

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

---

Owner:

Authorized Signature

By:

Title:

Copy: Engineer



## AGREEMENT

THIS AGREEMENT is by and between

Saginaw County Public Works Commissioner (“Owner”) and  
\_\_\_\_\_  
 (“Contractor”).

Owner and Contractor hereby agree as follows:

### ARTICLE 1 – WORK

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

### ARTICLE 2 – THE PROJECT

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

### ARTICLE 3 – ENGINEER

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

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

### ARTICLE 4 – CONTRACT TIMES

4.01 *Time of the Essence*

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

4.02 *Contract Times: Dates*

A. The Work will be substantially completed on or before October 1, 2024, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before October 31, 2024.

4.03 *Liquidated Damages*

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

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

#### 4.04 *Special Damages*

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

### **ARTICLE 5 – CONTRACT PRICE**

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

### **ARTICLE 6 – PAYMENT PROCEDURES**

#### 6.01 *Submittal and Processing of Payments*

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

#### 6.02 *Progress Payments; Retainage*

- A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the 28th day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract
  - a. 90 percent of Work completed (with the balance being retainage). If the Work has been 50 percent completed as determined by Engineer, and if the character and progress of the Work have been satisfactory to Owner and Engineer, then as long as the character and progress of the Work remain satisfactory to Owner and Engineer, there will be no additional retainage; and
  - B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 100 percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less 100 percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 *Final Payment*

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

**ARTICLE 7 – INTEREST**

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

**ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS**

- 8.01 In order to induce Owner to enter into this Contract, Contractor makes the following representations:
- A. Contractor has examined and carefully studied the Contract Documents, and any data and reference items identified in the Contract Documents.
  - B. Contractor has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
  - C. Contractor is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
  - D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.
  - E. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (3) Contractor's safety precautions and programs.

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

## **ARTICLE 9 – CONTRACT DOCUMENTS**

### **9.01 *Contents***

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

## ARTICLE 10 – MISCELLANEOUS

### 10.01 *Terms*

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

### 10.02 *Assignment of Contract*

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

### 10.03 *Successors and Assigns*

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

### 10.04 *Severability*

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

### 10.05 *Contractor's Certifications*

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

### 10.06 *Other Provisions*

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

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

B. Equal Opportunity

Contractor shall not discriminate against an employee or applicant for employment with respect to hire, tenure, terms, conditions, or privileges of employment, or a matter directly or indirectly related to employment, because of race, color, religion, national origin, age, sex, height, weight, marital status, or because of a handicap that is unrelated to the person’s ability to perform the duties of a particular job or position.

C. Prevailing Wage

Contractor will comply with prevailing wage requirements as set forth in the Bidding Documents, including all Subcontractors completing work on the project. Contractor will make payrolls available for all of their employees, and their Subcontractor’s employees as requested by the Owner or Engineer.

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

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

OWNER:

CONTRACTOR:

Saginaw County Public Works Commissioner

\_\_\_\_\_

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

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

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

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

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

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

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

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

Address for giving notices:

Address for giving notices:

111 S. Michigan Avenue

\_\_\_\_\_

Saginaw, MI 48602

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**NOTICE TO PROCEED**

---

Owner:	Saginaw County Public Works Commissioner	Owner's Contract No.:	
Contractor:		Contractor's Project No.:	
Engineer:	Spicer Group, Inc.	Engineer's Project No.:	126999SG2019
Project:	Savage Drain	Contract Name:	Savage Drain
		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 October 1, 2024, and the date of readiness for final payment is October 31, 2024.

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

---

Owner:

\_\_\_\_\_  
Authorized Signature

By:

Title:

Date Issued:

Copy: Engineer



**PERFORMANCE BOND**

CONTRACTOR *(name and address)*:

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

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

**CONSTRUCTION CONTRACT**

Effective Date of the Agreement:

Amount:

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

**BOND**

Bond Number:

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

Amount:

Modifications to this Bond Form:  None  See Paragraph 16

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

**CONTRACTOR AS PRINCIPAL**

**SURETY**

\_\_\_\_\_  
Contractor's Name and Corporate Seal *(seal)*

\_\_\_\_\_  
Surety's Name and Corporate Seal *(seal)*

**By:** \_\_\_\_\_  
Signature

**By:** \_\_\_\_\_  
Signature *(attach power of attorney)*

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

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

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

**Attest:** \_\_\_\_\_  
Signature

**Attest:** \_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

#### 14. Definitions

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

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

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

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

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

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

16. Modifications to this Bond are as follows:

**PAYMENT BOND**

CONTRACTOR *(name and address):*

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

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

**CONSTRUCTION CONTRACT**

Effective Date of the Agreement:

Amount:

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

**BOND**

Bond Number:

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

Amount:

Modifications to this Bond Form:  None  See Paragraph 18

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

**CONTRACTOR AS PRINCIPAL**

**SURETY**

\_\_\_\_\_  
Contractor's Name and Corporate Seal *(seal)*

\_\_\_\_\_  
Surety's Name and Corporate Seal *(seal)*

**By:** \_\_\_\_\_  
Signature

**By:** \_\_\_\_\_  
Signature *(attach power of attorney)*

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

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

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

**Attest:** \_\_\_\_\_  
Signature

**Attest:** \_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

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

Claim to the Surety (at the address described in Paragraph 13).

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
6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.
7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:
  - 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
  - 7.2 Pay or arrange for payment of any undisputed amounts.
  - 7.3 The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.
8. The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.
9. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond,

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

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

## 16. Definitions

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

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

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

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

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

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

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

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

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

18. Modifications to this Bond are as follows:

**CERTIFICATE OF SUBSTANTIAL COMPLETION**

---

Owner: Saginaw County Public Works Commissioner	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer: Spicer Group, Inc.	Engineer's Project No.: 126999SG2019
Project: Savage Drain	Contract Name: Savage Drain

---

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

- All Work  The following specified portions of the Work:

---

**Date of Substantial Completion**

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

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

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

Amendments to Owner's responsibilities:  None  
 As follows

Amendments to Contractor's responsibilities:  None  
 As follows:

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

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

---

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



**STANDARD GENERAL CONDITIONS OF THE  
CONSTRUCTION CONTRACT**

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## ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

### 1.01 *Defined Terms*

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

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

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

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

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

## 1.02 Terminology

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



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

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

## **ARTICLE 2 – PRELIMINARY MATTERS**

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

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

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

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

## 2.02 *Copies of Documents*

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

## 2.03 *Before Starting Construction*

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

## 2.04 *Preconstruction Conference; Designation of Authorized Representatives*

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

## 2.05 *Initial Acceptance of Schedules*

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

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

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

#### 2.06 *Electronic Transmittals*

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

### **ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE**

#### 3.01 *Intent*

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

#### 3.02 *Reference Standards*

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

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

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

### 3.03 *Reporting and Resolving Discrepancies*

#### A. *Reporting Discrepancies:*

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

#### B. *Resolving Discrepancies:*

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

### 3.04 *Requirements of the Contract Documents*

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

### 3.05 *Reuse of Documents*

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

## **ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK**

### 4.01 *Commencement of Contract Times; Notice to Proceed*

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

### 4.02 *Starting the Work*

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

#### 4.03 *Reference Points*

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

#### 4.04 *Progress Schedule*

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

#### 4.05 *Delays in Contractor's Progress*

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

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

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

5.01 *Availability of Lands*

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

5.02 *Use of Site and Other Areas*

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

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

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

### 5.03 *Subsurface and Physical Conditions*

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



5.04 *Differing Subsurface or Physical Conditions*

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

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

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

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

#### 5.05 *Underground Facilities*

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

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

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

#### 5.06 *Hazardous Environmental Conditions at Site*

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

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

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

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

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

## **ARTICLE 6 – BONDS AND INSURANCE**

### **6.01 *Performance, Payment, and Other Bonds***

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

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

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

#### 6.02 *Insurance—General Provisions*

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

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

### 6.03 *Contractor's Insurance*

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

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



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

#### 6.04 *Owner's Liability Insurance*

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

#### 6.05 *Property Insurance*

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

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

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

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

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

#### 6.06 *Waiver of Rights*

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

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

6.07 *Receipt and Application of Property Insurance Proceeds*

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

**ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES**

7.01 *Supervision and Superintendence*

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

7.02 *Labor; Working Hours*

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

7.03 *Services, Materials, and Equipment*

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

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

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

#### 7.04 "Or Equals"

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

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

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

#### 7.05 *Substitutes*

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

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

7.06 *Concerning Subcontractors, Suppliers, and Others*

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

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

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

#### 7.07 *Patent Fees and Royalties*

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



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

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

#### 7.08 *Permits*

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

#### 7.09 *Taxes*

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

#### 7.10 *Laws and Regulations*

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

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

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

#### 7.11 *Record Documents*

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

#### 7.12 *Safety and Protection*

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

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

7.13 *Safety Representative*

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

7.14 *Hazard Communication Programs*

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

7.15 *Emergencies*

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

7.16 *Shop Drawings, Samples, and Other Submittals*

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

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

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

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

#### 7.17 *Contractor's General Warranty and Guarantee*

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

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

#### 7.18 *Indemnification*

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

#### 7.19 *Delegation of Professional Design Services*

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

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

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

## **ARTICLE 8 – OTHER WORK AT THE SITE**

### **8.01 *Other Work***

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

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

#### 8.02 *Coordination*

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

#### 8.03 *Legal Relationships*

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



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

## **ARTICLE 9 – OWNER'S RESPONSIBILITIES**

### **9.01 *Communications to Contractor***

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

### **9.02 *Replacement of Engineer***

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

### **9.03 *Furnish Data***

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

### **9.04 *Pay When Due***

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

### **9.05 *Lands and Easements; Reports, Tests, and Drawings***

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

### **9.06 *Insurance***

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

### **9.07 *Change Orders***

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

### **9.08 *Inspections, Tests, and Approvals***

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

9.09 *Limitations on Owner's Responsibilities*

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

9.10 *Undisclosed Hazardous Environmental Condition*

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

9.11 *Evidence of Financial Arrangements*

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

9.12 *Safety Programs*

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

**ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION**

10.01 *Owner's Representative*

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

10.02 *Visits to Site*

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

10.03 *Project Representative*

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

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

10.04 *Rejecting Defective Work*

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

10.05 *Shop Drawings, Change Orders and Payments*

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

10.06 *Determinations for Unit Price Work*

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

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

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

10.08 *Limitations on Engineer's Authority and Responsibilities*

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

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

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

#### 10.09 *Compliance with Safety Program*

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

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

#### 11.01 *Amending and Supplementing Contract Documents*

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

##### 1. *Change Orders:*

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

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

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

#### 11.02 *Owner-Authorized Changes in the Work*

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

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

#### 11.03 *Unauthorized Changes in the Work*

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

#### 11.04 *Change of Contract Price*

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

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

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

#### 11.05 *Change of Contract Times*

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

#### 11.06 *Change Proposals*

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

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

#### 11.07 *Execution of Change Orders*

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

#### 11.08 *Notification to Surety*

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

### **ARTICLE 12 – CLAIMS**

#### 12.01 *Claims*

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

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

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

### **13.01 *Cost of the Work***

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



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

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

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

#### 13.02 Allowances

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

#### 13.03 Unit Price Work

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

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

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

**14.01 Access to Work**

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

**14.02 Tests, Inspections, and Approvals**

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

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

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

#### 14.03 *Defective Work*

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

#### 14.04 *Acceptance of Defective Work*

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

#### 14.05 *Uncovering Work*

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

#### 14.06 *Owner May Stop the Work*

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

#### 14.07 *Owner May Correct Defective Work*

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

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

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

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

### *15.01 Progress Payments*

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

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



D. *Payment Becomes Due:*

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

E. *Reductions in Payment by Owner:*

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

15.02 *Contractor's Warranty of Title*

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

15.03 *Substantial Completion*

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

15.04 *Partial Use or Occupancy*

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

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

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

#### 15.05 *Final Inspection*

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

#### 15.06 *Final Payment*

##### A. *Application for Payment:*

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

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

#### 15.07 *Waiver of Claims*

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

#### 15.08 *Correction Period*

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

### **ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION**

#### 16.01 *Owner May Suspend Work*

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

16.02 *Owner May Terminate for Cause*

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

16.03 *Owner May Terminate For Convenience*

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

16.04 *Contractor May Stop Work or Terminate*

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

**ARTICLE 17 – FINAL RESOLUTION OF DISPUTES**

17.01 *Methods and Procedures*

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

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

## **ARTICLE 18 – MISCELLANEOUS**

### **18.01 *Giving Notice***

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

### **18.02 *Computation of Times***

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

### **18.03 *Cumulative Remedies***

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

### **18.04 *Limitation of Damages***

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

### **18.05 *No Waiver***

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

### **18.06 *Survival of Obligations***

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

### **18.07 *Controlling Law***

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



18.08 *Headings*

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

## Supplementary Conditions

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

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

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

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

#### SC-5.03 *Subsurface and Physical Conditions*

**SC-5.03 Delete Paragraphs 5.03.A and 5.03.B in their entirety and insert the following:**

**A. See Appendix A for all available information for subsurface 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.**

**B. Not Used.**

### ARTICLE 6 – BONDS AND INSURANCE

#### SC-6.03 *Contractor's Liability Insurance*

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

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

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

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

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

General Aggregate Limit	\$1,000
Products/Completed Operations Aggregate Limit	\$1,000

Personal/Adverse Injury	\$1,000
Each Occurrence Limit	\$1,000

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

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

OR

Combined Single Limit	\$1,000
No Fault	Statutory

**4. Excess or Umbrella Liability:**

<b>Per Occurrence</b>	<b>\$2,000,000</b>
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**5. Additional Insureds:** In addition to Owner and Engineer, include as additional insureds the following: Saginaw County Public Works Commissioner, Savage Drain Drainage District, Spicer Group, Inc., Saginaw County, Albee Township, the People of the State of Michigan, the State of Michigan, and governmental bodies performing permit activities under a maintenance contract, and all officers, agents, and employees of the above, for claims arising out of, under, or by reason of operations covered by a permit issued to (CONTRACTOR) for the construction of the Savage Drain, Saginaw County, Michigan.

**6. Owner's and Contractor's Protective Liability**

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

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

**Separate:**

<b>Each Occurrence</b>	<b>\$1,000</b>
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<b>General Aggregate</b>	<b>\$1,000</b>
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In lieu of the Owner's and Contractor's Protective Liability, the Contractor may provide an endorsement to their policy for a per project aggregate coverage with the following limits:

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

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

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

## **ARTICLE 7 – CONTRACTOR’S RESPONSIBILITIES**

### *SC 7.02 Labor; Working Hours*

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

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

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

### *SC-7.08 Permits*

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

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

## **ARTICLE 10 – ENGINEER’S STATUS DURING CONSTRUCTION**

### *SC-10.03 Project Representative*

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

- B. **The Resident Project Representative (RPR) will be Engineer's representative at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions.**
  1. **General: RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall only be through or with the full knowledge and approval of Contractor. RPR shall generally communicate with Owner only with the knowledge of and under the direction of Engineer.**
  2. **Schedules: Review the progress schedule, schedule of Shop Drawing and Sample submittals, and Schedule of Values prepared by Contractor and consult with Engineer concerning acceptability.**
  3. **Conferences and Meetings: Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and**

other Project-related meetings, and prepare and circulate copies of minutes thereof.

4. **Liaison:**
  - a. **Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.**
  - b. **Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.**
  - c. **Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.**
5. **Interpretation of Contract Documents: Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.**
6. **Shop Drawings and Samples:**
  - a. **Record date of receipt of Samples and Contractor-approved Shop Drawings.**
  - b. **Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.**
  - c. **Advise Engineer and Contractor of the commencement of any portion of the Work requiring a Shop Drawing or Sample submittal for which RPR believes that the submittal has not been approved by Engineer.**
7. **Modifications: Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, if any, to Engineer. Transmit to Contractor in writing decisions as issued by Engineer.**
8. **Review of Work and Rejection of Defective Work:**
  - a. **Conduct on-Site observations of Contractor's work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.**
  - b. **Report to Engineer whenever RPR believes that any part of Contractor's work in progress is defective, will not produce a completed Project that conforms generally to the Contract Documents, or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.**
9. **Inspections, Tests, and System Start-ups:**
  - a. **Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate**

Owner's personnel, and that Contractor maintains adequate records thereof.

- b. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups.

**10. Records:**

- a. Prepare a daily report or keep a diary or log book, recording Contractor's hours on the Site, Subcontractors present at the Site, weather conditions, data relative to questions of Change Orders, Field Orders, Work Change Directives, or changed conditions, Site visitors, deliveries of equipment or materials, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to Engineer.
- b. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.
- c. Maintain records for use in preparing Project documentation.

**11. Reports:**

- a. Furnish to Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.
- b. Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.
- c. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, force majeure or delay events, damage to property by fire or other causes, or the discovery of any Constituent of Concern or Hazardous Environmental Condition.

- 12. Payment Requests:** Review applications for payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the Schedule of Values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.

- 13. Certificates, Operation and Maintenance Manuals:** During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Contract Documents to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.

**14. Completion:**

- a. Participate in Engineer's visits to the Site to determine Substantial Completion, assist in the determination of Substantial Completion and the preparation of a punch list of items to be completed or corrected.

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

**C. The RPR shall not:**

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

Date of Issuance:	Effective Date:
Owner: Saginaw County Public Works Commissioner	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer: Spicer Group, Inc.	Engineer's Project No.: 126999SG2019
Project: Savage Drain	Contract Name: Savage Drain

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

Description:

Attachments: *[List documents supporting change]*

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

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

Approved by Funding Agency (if applicable)

By: \_\_\_\_\_ Date: \_\_\_\_\_  
Title: \_\_\_\_\_



Date of Issuance:	Effective Date:
Owner: Saginaw County Public Works Commissioner	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer: Spicer Group, Inc.	Engineer's Project No.: 126999SG2019
Project: Savage Drain	Contract Name: Savage Drain

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

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

Description:

Attachments:

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

Copy to: Owner

**LANDOWNER AGREEMENT FORM**

**Project Name:** Savage Drain

**Date:** \_\_\_\_\_

**Landowner's Name:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Parcel No. \_\_\_\_\_

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

\_\_\_\_\_  
\_\_\_\_\_

This activity will take place on the following location:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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

\_\_\_\_\_

**CONTRACTOR**

**LANDOWNER**

By: \_\_\_\_\_  
(Authorized Signature)

By: \_\_\_\_\_  
(Authorized Signature)

Date: \_\_\_\_\_

Date: \_\_\_\_\_

\*Renters cannot authorize.

**AFFIDAVIT AND CONSENT OF SURETY**

STATE OF MICHIGAN

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

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

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

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

DATE: \_\_\_\_\_, 20\_\_\_\_

Signed in the presence of:

\_\_\_\_\_

\_\_\_\_\_  
Contractor

\_\_\_\_\_

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Name and Title\*

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

Notary Public:

\_\_\_\_\_  
\_\_\_\_\_

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

\_\_\_\_\_

CONSENT OF SURETY

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

Date \_\_\_\_\_, 20\_\_\_\_

\_\_\_\_\_  
Surety Company\*

\_\_\_\_\_  
Attorney-in-Fact (Signature)

\_\_\_\_\_  
Name and Title\*

\*Typed or printed in ink.

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

END OF AFFIDAVIT AND CONSENT OF SURETY

## COORDINATION CLAUSE

### **Contractor Coordination**

The Savage Drain project is being bid in two (2) divisions. Contractors for separate divisions will be required to work together and coordinate schedules when working near other contractors. The contractors on the Savage Drain will be required to coordinate project schedules with all contractors and entities completing work on the project.

**No claims for extra compensation or adjustment in contract unit prices will be allowed on account of delay or failure of other contractors to complete work scheduled.**

Contractor is required to coordinate with landowners prior to access drives shutdown and provide access to access drives outside of working hours, if needed. Contractor is required to coordinate project schedule to accommodate utility relocations as needed.

## SECTION 01 10 00

### SUMMARY

#### PART 1 GENERAL

##### 1.1 SUMMARY

###### A. Section Includes:

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

##### 1.2 CONTRACT DESCRIPTION

###### A. Work of the Project includes:

1. Excavation.
2. Spoil leveling and hauling.
3. Private drive crossing replacements.
4. Field tile outlet repair.
5. Road crossing replacements.
6. Placement of fill and riprap.
7. Site grading and seeding.
8. Traffic Control

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

##### 1.3 WORK BY OWNER OR OTHERS

###### A. None.

##### 1.4 OWNER-FURNISHED PRODUCTS

###### A. None.

##### 1.5 WORK SEQUENCE

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

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

###### C. Open channel excavation and or cleanout shall commence at the downstream end of construction and continue to the upstream limits of construction.

## 1.6 PERMITS

A. Necessary permits for construction of Work including the following:

1. Contractor will coordinate with the local Road Commission and acquire a permit for construction activities within the County Road right-of-way.

## 1.7 SPECIFICATION CONVENTIONS

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

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

## SECTION 01 20 00

### PRICE AND PAYMENT PROCEDURES

#### PART 1 - GENERAL

##### 1.1 SECTION INCLUDES

- A. Testing and inspection allowances.
- B. Application for Payment.
- C. Change procedures.
- D. Defect assessment.
- E. Unit prices.
- F. Alternates.

##### 1.2 APPLICATION FOR PAYMENT

- A. Submit electronic file of each Application for Payment to Engineer.
- B. Format shall follow that of the Bid Form. Installed quantity, description of Work, unit price, installed price, retainage, payment amount, and date must be included.
- C. Submit updated construction schedule with each Application for Payment.
- D. Payment shall be in accordance with Public Act 524 – as outlined in the agreement.
- E. Submit submittals with transmittal letter as specified in Section 01 33 00 - Submittal Procedures.
- F. Submit waivers requested by Owner.
- G. Substantiating Data: When Engineer requires substantiating information, submit data justifying dollar amounts in question.

##### 1.3 CHANGE PROCEDURES

- A. Submittals: Submit name of individual who is authorized to receive change documents and is responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.
- B. Carefully study and compare Contract Documents before proceeding with fabrication and installation of Work. Promptly advise Engineer of any error, inconsistency, omission, or apparent discrepancy.



- C. Requests for Interpretation (RFI) and Clarifications: Allot time in construction scheduling for liaison with Engineer; establish procedures for handling queries and clarifications.
  - 1. Use Contractor form for requesting interpretations.
  - 2. Engineer may respond with a direct answer on the Request for Interpretation form, C-942 - Field Order.
- D. Engineer will advise of minor changes in the Work not involving adjustment to Contract Sum/Price or Contract Time by issuing supplemental instructions on C-940.
- E. Engineer may issue Proposal Request including a detailed description of proposed change with supplementary or revised Drawings and Specifications, a change in Contract Time for executing the change with stipulation of overtime work required and with the period of time during which the requested price will be considered valid. Contractor will prepare and submit estimate within 14 days.
- F. Contractor may propose changes by submitting a request for change to Engineer, describing proposed change and its full effect on the Work. Include a statement describing reason for the change and the effect on Contract Sum/Price and Contract Time with full documentation and a statement describing effect on the Work by separate or other Contractors.
- G. Stipulated Sum/Price Change Order: Based on and Contractor's estimated price quotation or Contractor's request for Change Order as approved by Engineer.
- H. Unit Price Change Order: For Contract unit prices and quantities, the Change Order will be executed on a fixed unit price basis. For unit costs or quantities of units of that which are not predetermined, execute Work under Work Directive Change. Changes in Contract Sum/Price or Contract Time will be computed as specified for Force Account Change Order.
- I. Work Directive Change: Engineer may issue directive, on C-940 - Work Change Directive signed by Owner, instructing Contractor to proceed with change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute change.
- J. Time and Material Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in Conditions of the Contract. Engineer will determine change allowable in Contract Sum/Price and Contract Time as provided in Contract Documents.
- K. Maintain detailed records of Work done on time and material basis. Provide full information required for evaluation of proposed changes and to substantiate costs for changes in the Work.
- L. Document each quotation for change in Project Cost or Time with sufficient data to allow evaluation of quotation.
- M. Change Order Forms: C-941 - Change Order.
- N. Execution of Change Orders: Engineer will issue Change Orders for signatures of parties as provided in Conditions of the Contract.

O. Correlation of Contractor Submittals:

1. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as separate line item and adjust Contract Sum/Price.
2. Promptly revise Progress Schedules to reflect change in Contract Time, revise sub schedules to adjust times for other items of Work affected by the change, and resubmit.
3. Promptly enter changes in Record Documents.

1.4 DEFECT ASSESSMENT

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

1.5 UNIT PRICES

- A. Authority: Measurement methods are delineated in individual Specification Sections.
- B. Measurement methods delineated in individual Specification Sections complement criteria of this Section. In event of conflict, requirements of individual Specification Section govern.
- C. Take measurements and compute quantities. Engineer will verify measurements and quantities.
- D. Unit Quantities: Quantities and measurements indicated on Bid Form are for Contract purposes only. Quantities and measurements supplied or placed in the Work shall determine payment.

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

## 1.6 ALTERNATES

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

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

## SECTION 01 25 00

### SUBSTITUTION PROCEDURES

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Quality assurance.
- B. Product options.
- C. Product substitution procedures.

##### 1.2 QUALITY ASSURANCE

- A. Contract is based on products and standards established in Contract Documents without consideration of proposed substitutions.
- B. Products specified define standard of quality, type, function, dimension, appearance, and performance required.
- C. Substitution Proposals: Permitted for specified products except where specified otherwise. Do not substitute products unless substitution has been accepted and approved in writing by Owner.

##### 1.3 PRODUCT OPTIONS

- A. See Section 01 60 00 - Product Requirements.

##### 1.4 PRODUCT SUBSTITUTION PROCEDURES

- A. Engineer will consider requests for substitutions only within **15** days after date of Owner-Contractor Agreement.
- B. Substitutions may be considered when a product becomes unavailable through no fault of Contractor.
- C. Document each request with complete data, substantiating compliance of proposed substitution with Contract Documents, including:
  - 1. Manufacturer's name and address, product, trade name, model, or catalog number, performance and test data, and reference standards.
  - 2. Itemized point-by-point comparison of proposed substitution with specified product, listing variations in quality, performance, and other pertinent characteristics.
  - 3. Reference to Article and Paragraph numbers in Specification Section.
  - 4. Cost data comparing proposed substitution with specified product and amount of net change to Contract Sum.
  - 5. Changes required in other Work.
  - 6. Availability of maintenance service and source of replacement parts as applicable.

7. Certified test data to show compliance with performance characteristics specified.
8. Samples when applicable or requested.
9. Other information as necessary to assist Engineer's evaluation.

D. 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 that may be required for the Work to be complete with no additional cost to Owner.
4. Waives claims for additional costs or time extension that may subsequently become apparent.
5. Will coordinate installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.
6. Will reimburse Owner for review or redesign services associated with reapproval by authorities having jurisdiction.

E. 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.

F. Substitution Submittal Procedure:

1. Submit requests for substitutions.
2. Submit three copies of Request for Substitution for consideration. Limit each request to one proposed substitution.
3. Submit Shop Drawings, Product Data, and certified test results attesting to proposed product equivalence. Burden of proof is on proposer.
4. 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 30 00

### ADMINISTRATIVE REQUIREMENTS

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Coordination and Project conditions.
- B. Field Engineering
- C. Preconstruction meeting.
- D. Site mobilization meeting.
- E. Progress meetings.
- F. Preinstallation meetings.
- G. Closeout meeting.
- H. Alteration procedures.

##### 1.2 COORDINATION AND PROJECT CONDITIONS

- A. Coordinate scheduling, submittals, and Work of various Sections of Bidding Documents to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Verify that utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate Work of various Sections having interdependent responsibilities for installing, connecting to, and placing operating equipment in service.
- C. Coordination Meetings: In addition to other meetings specified in this Section, hold coordination meetings with personnel and Subcontractors to ensure coordination of Work.
- D. Coordinate completion and clean-up of Work of separate Sections in preparation for Substantial Completion and for portions of Work designated for Owner's partial occupancy.
- E. After Owner's occupancy of premises, coordinate access to Site for correction of defective Work and Work not complying with Contract Documents, to minimize disruption of Owner's activities.

##### 1.3 FIELD ENGINEERING

- A. Contractor to locate and protect survey control and reference points, land monuments, and property corner.
- B. Control datum for survey is that established by Owner provided survey shown on Drawings.

- C. Engineer will provide construction staking. Call the Engineer to request staking at least 3 working days in advance of the time needed for the work.
- D. Construction stakes removed or damaged by Contractor shall be replaced at Contractor's expense.
- E. When finished surfaces are cut so that a smoother transition and new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Engineer.
- F. Where a change of plane of 1/4 inch or more occurs, submit recommendation for providing a smooth transition for Engineer review and request instructions from Engineer.
- G. Patch or replace portions of existing surfaces which are damaged, lifted, discolored, or showing other imperfections.
- H. Finish surfaces as specified in individual product sections.
- I. Where there are changes in open drain cross sections, excavate a 20-foot smooth transition between sections.

#### 1.4 PRECONSTRUCTION MEETING

- A. Engineer will schedule and preside over meeting after Notice of Award.
- B. Attendance Required: Engineer, Owner, appropriate governmental agency representatives, applicable public and private utility companies and Contractor.
- C. Minimum Agenda:
  1. 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, schedule of values, and Progress Schedule.
  5. Designation of personnel representing parties in Contract, along with contact phone number and Engineer.
  6. Communication procedures.
  7. Procedures and processing of requests for interpretations, field decisions field orders, submittals, substitutions, Applications for Payments, proposal request, Change Orders, and Contract closeout procedures.
  8. Scheduling.
  9. Critical Work sequencing.
  10. Scheduling activities.
  11. Utility Representatives comments and requirements.
- D. Engineer will record minutes and distribute copies to participants after meeting.

#### 1.5 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work.



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

#### 1.6 PREINSTALLATION MEETINGS

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

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION – Not Used

END OF SECTION

## SECTION 01 32 16

### CONSTRUCTION PROGRESS SCHEDULE

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Submittals.
- B. Review and evaluation.
- C. Updating schedules.
- D. Distribution.

##### 1.2 SUBMITTALS

- A. 5 days prior to the pre-construction meeting the Contractor shall submit a construction work schedule laying out the progress of the project for the Engineer's review.
- B. Schedule Updates:
  - 1. Overall percent complete, projected and actual.
  - 2. Completion progress by listed activity and sub-activity, to within five days prior to submittal.
  - 3. Changes in Work scope and activities modified since submittal.
  - 4. Delays in submittals or resubmittals, deliveries, or Work.
  - 5. Adjusted or modified sequences of Work.
  - 6. Other identifiable changes.
  - 7. Revised projections of progress and completion.

##### 1.3 REVIEW AND EVALUATION

- A. Participate in joint review and evaluation of schedules with Engineer at each submittal.
- B. Evaluate Project status to determine Work behind schedule and Work ahead of schedule.
- C. After review, revise schedules incorporating results of review, and resubmit within 10 days.

##### 1.4 UPDATING SCHEDULES

- A. Maintain schedules to record actual start and finish dates of completed activities.
- B. Indicate progress of each activity to date of revision, with projected completion date of each activity. Update schedules to depict current status of Work.
- C. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.

- D. Upon approval of a Change Order, include the change in the next schedule submittal.
- E. Indicate changes required to maintain Date of Substantial and Total Completion.
- F. Submit sorts as required to support recommended changes.
- G. Prepare narrative report to define problem areas, anticipated delays, and impact on schedule. Report corrective action taken or proposed and its effect.

#### 1.5 DISTRIBUTION

- A. Following joint review, distribute copies of updated schedules to Contractor's Project site file, to Subcontractors, suppliers, Engineer, Owner, and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 33 00  
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

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

1.2 DEFINITIONS

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

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

### 1.3 SUBMITTAL PROCEDURES

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

### 1.4 CONSTRUCTION PROGRESS SCHEDULES

- A. Comply with Section 01 32 16 - Construction Progress Schedule

### 1.5 PROPOSED PRODUCT LIST

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

## 1.6 PRODUCT DATA

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

## 1.7 SHOP DRAWINGS

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

## 1.8 SAMPLES

- A. Samples: Action Submittal: Submit to Engineer for assessing conformance with information given and design concept expressed in Contract Documents.
- B. Samples for Selection as Specified in Product Sections:
  - 1. Submit to Engineer for aesthetic, color, and finish selection.
  - 2. Submit Samples of finishes, textures, and patterns for Engineer selection.
- C. Submit Samples to illustrate functional and aesthetic characteristics of products, with integral parts and attachment devices. Coordinate Sample submittals for interfacing work.

- D. Include identification on each Sample, with full Project information.
- E. Submit number of Samples specified in individual Specification Sections; Engineer will retain **one** Sample.
- F. Reviewed Samples that may be used in the Work are indicated in individual Specification Sections.
- G. Samples will not be used for testing purposes unless specifically stated in Specification Section.
- H. After review, produce copies and distribute according to "Submittal Procedures" Article and for record documents described in Section 01 70 00 - Execution and Closeout Requirements.

#### 1.9 OTHER SUBMITTALS

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

#### 1.10 TEST REPORTS

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

#### 1.11 CERTIFICATES

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

#### 1.12 MANUFACTURER'S INSTRUCTIONS

- A. Informational Submittal: Submit manufacturer's installation instructions for Engineer's knowledge as Contract administrator or for Owner.
- B. Submit printed instructions for delivery, storage, assembly, installation, startup, adjusting, and finishing, to Engineer in quantities specified for Product Data.

- C. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

#### 1.13 MANUFACTURER'S FIELD REPORTS

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

#### 1.14 ERECTION DRAWINGS

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

#### 1.15 CONTRACTOR REVIEW

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



## 1.16 ENGINEER REVIEW

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

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 40 00  
QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

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

1.2 QUALITY CONTROL

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

1.3 TOLERANCES

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

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

#### 1.4 REFERENCES

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

#### 1.5 LABELING

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

#### 1.6 MOCK-UP REQUIREMENTS

- A. Tests will be performed under provisions identified in this Section and identified in individual product Specification Sections.
- B. Assemble and erect specified or indicated items with specified or indicated attachment and anchorage devices, flashings, seals, and finishes.
- C. Accepted mockups shall be comparison standard for remaining Work.

- D. Where mockup has been accepted by Engineer and is specified in product Specification Sections to be removed, remove mockup and clear area when directed to do so by Engineer.

## 1.7 TESTING AND INSPECTION SERVICES

- A. Owner will employ Engineer to perform testing and inspection.
- B. Engineer will perform tests, inspections, and other services specified in individual Specification Sections and as required by Engineer, Owner, or authorities having jurisdiction.
  - 1. Laboratory: Authorized to operate in State of Michigan.
  - 2. Laboratory Staff: Maintain full-time specialist on staff to review services.
  - 3. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to National Bureau of Standards or accepted values of natural physical constants.
- C. Testing, inspections, and source quality control may occur on or off Project Site. Perform off-Site testing as required by Engineer or Owner.
- D. Reports shall be submitted to Engineer, Contractor, and authorities having jurisdiction indicating observations and results of tests and compliance or noncompliance with Contract Documents.
  - 1. Submit final report indicating correction of Work previously reported as noncompliant.
- E. Cooperate with Engineer; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
  - 1. Notify Engineer 48 hours before expected time for operations requiring services.
  - 2. Make arrangements with Engineer and pay for additional Samples and tests required for Contractor's use.
- F. Employment of testing agency or laboratory shall not relieve Contractor of obligation to perform Work according to requirements of Contract Documents.
- G. Retesting or re-inspection required because of nonconformance with specified or indicated requirements shall be performed by Engineer.
- H. Agency Responsibilities:
  - 1. Test Samples of mixes submitted by Contractor.
  - 2. Provide qualified personnel at Site. Cooperate with Engineer and Contractor in performance of services.
  - 3. Perform indicated sampling and testing of products according to specified standards.
  - 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
  - 5. Promptly notify Engineer and Contractor of observed irregularities or nonconformance of Work or products.
  - 6. Perform additional tests required by Engineer.
  - 7. Attend preconstruction meetings and progress meetings.

- I. Agency Reports: After each test, promptly submit two copies of report to Engineer, Contractor, and authorities having jurisdiction. When requested by Engineer, provide interpretation of test results. Include the following:
  - 1. Date issued.
  - 2. Project title and number.
  - 3. Name of inspector.
  - 4. Date and time of sampling or inspection.
  - 5. Identification of product and Specification Section.
  - 6. Location in Project.
  - 7. Type of inspection or test.
  - 8. Date of test.
  - 9. Results of tests.
  - 10. Conformance with Contract Documents.
  
- J. Limits on Testing Authority:
  - 1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
  - 2. Agency or laboratory may not approve or accept any portion of the Work.
  - 3. Agency or laboratory may not assume duties of Contractor.
  - 4. Agency or laboratory has no authority to stop the Work.

#### 1.8 MANUFACTURER'S FIELD SERVICES

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

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

## SECTION 01 50 00

### TEMPORARY FACILITIES AND CONTROLS

#### PART 1 - GENERAL

##### 1.1 SECTION INCLUDES

- A. Temporary facilities under Construction Management Agreement.
- B. Construction Facilities:
  - 1. Vehicular access.
  - 2. Parking.
  - 3. Progress cleaning and waste removal.
  - 4. Traffic regulation.
- C. Temporary Controls:
  - 1. Barriers.
  - 2. Water control.
  - 3. Dust control.
  - 4. Erosion and sediment control.
  - 5. Pollution control.
- D. Removal of utilities, facilities, and controls.

##### 1.2 UNIT PRICE – MEASUREMENT AND PAYMENT

- A. Temporary Dewatering and Cofferdams (Division I)
  - 1. Basis of Measurement: At the lump sum price bid as state in the proposal.
  - 2. Basis of Payment: Includes all labor, equipment, and material to perform any damming and/or water control needed to perform the work shown on the plans.

##### 1.3 VEHICULAR ACCESS

- A. Construct temporary all-weather access roads from public thoroughfares to serve construction area, of width and load-bearing capacity to accommodate unimpeded traffic for construction purposes.
- B. Construct temporary bridges and culverts to span low areas and allow unimpeded drainage.
- C. Extend and relocate vehicular access as Work progress requires and provide detours as necessary for unimpeded traffic flow.
- D. Locate as approved by Engineer or as approved by Owner.
- E. Provide unimpeded access for emergency vehicles. Maintain 10-foot-wide driveways with turning space between and around combustible materials.

- F. Provide and maintain access to fire hydrants and control valves and keep free of obstructions.
- G. Provide means of removing mud from vehicle wheels before entering streets.
- H. Use designated existing on-Site roads for construction traffic.

#### 1.4 PARKING

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

#### 1.5 PROGRESS CLEANING AND WASTE REMOVAL

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain Site in clean and orderly condition.

## 1.6 TRAFFIC REGULATION

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

## 1.7 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.
- B. Tree and Plant Protection: Preserve and protect existing trees and plants designated to remain.
  - 1. Protect areas within drip lines from traffic, parking, storage, dumping, chemically injurious materials and liquids, ponding, and continuous running water.
  - 2. Replace trees and plants damaged by construction operations.
- C. Protect non-owned vehicular traffic, stored materials, Site, and structures from damage.



## 1.8 WATER CONTROL

- A. Grade Site to drain. Maintain excavations free of water. Provide, operate, and maintain necessary pumping equipment.
- B. Protect Site from puddles or running water.

## 1.9 DUST CONTROL

- A. Execute Work by methods that minimize raising dust from construction operations.
- B. Provide positive means to prevent airborne dust from dispersing into atmosphere.

## 1.10 EROSION AND SEDIMENT CONTROL

- A. Plan and execute construction by methods to control surface drainage from cuts and fills from borrow and waste disposal areas. Prevent erosion and sedimentation.
- B. Minimize surface area of bare soil exposed at one time.
- C. Provide temporary measures including berms, dikes, drains, and other devices to prevent water flow.
- D. Construct fill and waste areas by selective placement to avoid erosive surface silts and clays.
- E. Periodically inspect earthwork to detect evidence of erosion and sedimentation. Promptly apply corrective measures.
- F. Comply with sediment and erosion control plan indicated on Drawings.

## 1.11 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.

## 1.12 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

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

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

SECTION 01 60 00  
PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

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

1.2 PRODUCTS

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

1.3 PRODUCT DELIVERY REQUIREMENTS

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

#### 1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

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

#### 1.5 PRODUCT OPTIONS

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

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

PART 2 - PRODUCTS – Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

## SECTION 01 70 00

### EXECUTION AND CLOSEOUT REQUIREMENTS

#### PART 1 - GENERAL

##### 1.1 SECTION INCLUDES

- A. Related Sections.
- B. Measurement and Payment.
- C. Closeout Procedures.
- D. Punchlist Procedures.
- E. Cleanup and Restoration.
- F. Adjusting.
- G. Project Record Documents.
- H. Warranties.
- I. Correction period.

##### 1.2 RELATED SECTIONS

- A. Section 01 50 00 – Construction Facilities and Temporary Controls: Progress cleaning
- B. Section 32 91 19 – Landscape Grading
- C. Section 32 92 19 - Seeding

##### 1.3 MEASUREMENT AND PAYMENT

- A. Contract Closeout:
  - 1. Basis of Measurement: Included in other Work items of this Project.
  - 2. Basis of Payment: Includes all associated labor, material and equipment required to implement or perform the following: closeout procedures, punchlist procedures, adjusting, project record documents, warranties and correction period.
- B. Cleanup and Restoration:
  - 1. Basis of Measurement: At the lump sum price bid as stated in the proposal.
  - 2. Basis of Payment: Includes all material, equipment and labor to cleanup and restore the Project to original condition or better as directed by the Engineer.

#### 1.4 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 inspection.
- B. Provide submittals to Engineer that are required by governing or other authorities.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

#### 1.5 PUNCHLIST PROCEDURES

- A. Contractor shall notify Engineer when the Work is substantially complete in accordance with Contract Documents.
- B. Owner and Engineer will each appoint one Punchlist Representative who will conduct an inspection of the Work and compile a list of items that are incomplete or do not comply with the requirements of the Contracts Documents. Contractor may accompany the inspection.
- C. Contractor shall acknowledge that subsequent to the initial issuance of the punchlist, more items may be added to the list, which will be deemed amended, but only by the punchlist representatives.
- D. Contractor shall proceed immediately to address the items on the list.
- E. Contractor shall notify Engineer when listed items are completed and corrected.
- F. Contractor shall make arrangements with the Owner and Punchlist Representative for final inspection and acceptance. Should items still be deficient, they will remain on the list until accepted by the Owner and Engineer.
- G. Money will be retained under the Contract to cover items not accepted by the Owner and Engineer.

#### 1.6 CLEANUP AND RESTORATION

- A. Final cleaning shall be completed prior to final payment.
- B. Clean site; sweep paved areas, rake clean landscaped surfaces.
- C. Remove waste and surplus materials, rubbish, and construction facilities from the site.
- D. Repair washouts and seed poorly vegetated areas as directed by the Engineer.
- E. Cleanout excess sediment islands deposited (more than 0.3ft.) in drain during construction as required by Engineer.
- F. Clean site to a sanitary and non-hazardous condition.

- G. Restore roads, driveways, parking areas, lawns, drainage, and other items disturbed during construction to original condition or as required by the documents.
- H. Remove debris from the project site according to section 02110 - Site Clearing.
- I. Remove sediment and debris from catch basins, manholes, sumps, storm sewers, sanitary sewers and sedimentation basins.

#### 1.7 ADJUSTING

- A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

#### 1.8 PROJECT RECORD DOCUMENTS

- A. Maintain on Site one set of the following record documents; record actual revisions to the Work:
  - 1. Contract Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Change Orders and other Modifications to the Contract.
  - 5. Reviewed shop drawings, product data, and samples.
  - 6. Soil Erosion and Sedimentation Control Plans.
  - 7. Storm water Operators Inspection Log.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress, not less than weekly.
- E. Specifications: Legibly mark and record, at each product Section, description of actual products installed, including the following:
  - 1. Manufacturer's name and product model and number.
  - 2. Product substitutions or alternates used.
  - 3. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction as follows:
  - 1. Field changes of dimension and detail.
  - 2. Details not on original Drawings.
- G. Submit marked-up paper copy documents to Engineer before Substantial Completion.
- H. Submit PDF electronic files of marked-up documents to Engineer before Substantial Completion.
- I. Final Payment will not be paid until uniform grass growth is established along the entire project.



## 1.9 WARRANTIES

- A. Execute and assemble documents from Subcontractors, suppliers, and manufacturers.
- B. Provide Table of Contents and assemble in three D-size ring binder with durable plastic cover.
- C. Submit prior to final Application for Payment.
- D. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

## 1.10 CORRECTION PERIOD

- A. For a period of one year from the date of substantial completion, promptly correct Work or replace materials that are found to be defective.
- B. Seed as needed to establish uniform growth of grass. Final payment will not be issued until uniform growth of grass is established as determined by the APA.
- C. Repair erosion areas as directed by Engineer within one year of substantial completion.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION – Not Used

END OF SECTION

## SECTION 02 41 16

### DEMOLITION AND REMOVALS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Demolishing designated items.
  - 2. Demolishing designated foundations.
  - 3. Disconnecting and capping designated utilities.
  - 4. Removing designated items for reuse and Owner's retention.
  - 5. Protecting items designated to remain.
  - 6. Removing demolished materials.
- B. Related Requirements:
  - 1. Section 31 10 00 - Site Clearing.
  - 2. Section 31 23 23 - Fill.

##### 1.2 UNIT PRICES

- A. Demolition:
  - 1. Basis of Measurement: At the lump sum price bid for demolition.
  - 2. Basis of Payment: Includes demolition, loading, removal from site. Includes all labor, equipment, and materials to demolish all items shown on plans and properly abandon any items shown on plans.
- B. Pump Removal and Reinstallation
  - 1. Basis of Measurement: At the lump sum price bid as stated in the proposal.
  - 2. Basis of Payment: Includes all labor, equipment, and material to remove and salvage the existing pump and discharge piping from the existing pump station and reinstalling it at the proposed location. Includes coordinating with Engineer to make observations of existing pump crock and pump dimensions prior to ordering new manhole crock. Also includes providing any accessories and/or fabricated pieces necessary to complete the installation at the proposed location for a fully functional pump station.

##### 1.3 SEQUENCING

- A. Section 01 10 00 - Summary: Requirements for sequencing.

##### 1.4 SCHEDULING

- A. Section 01 30 00 - Administrative Requirements: Requirements for scheduling.
- B. Schedule Work to coincide with new construction.
- C. Describe demolition removal procedures and schedule.

D. Perform Work between the hours of 7 a.m. and 7 p.m. only.

#### 1.5 SUBMITTALS

A. Permits: Submit copies of permits required by regulatory agencies for demolition and sidewalk and street closings.

#### 1.6 CLOSEOUT SUBMITTALS

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

B. Project Record Documents: Accurately record actual locations of capped or abandoned utilities, subsurface obstructions.

C. Operation and Maintenance Data: Submit description of system, inspection data, and parts lists.

#### 1.7 QUALITY ASSURANCE

A. Perform Work according to local standards and codes.

B. Conform to applicable codes for demolition of structures, safety of adjacent structures, runoff control and disposal.

C. Conform to applicable codes for procedures when hazardous or contaminated materials are discovered.

D. Permits: Obtain required permits from authorities having jurisdiction.

E. Maintain one copy of each document on-Site.

#### 1.8 QUALIFICATIONS

A. Construction Firm: Company specializing in performing Work of this Section with minimum 3 years' documented experience.

B. Licensed Professional: Design shoring, bracing, and underpinning under direct supervision of professional engineer experienced in design of this Work and licensed in State of Michigan.

#### 1.9 EXISTING CONDITIONS

A. Owner assumes no responsibility for actual condition of items to be demolished.

B. Notify Architect/Engineer upon discovery of hazardous materials.

C. Do not sell demolished materials on-Site.

D. Maintain existing sidewalks to greatest extent possible.

## PART 2 - EXECUTION

### 2.1 EXAMINATION

- A. Examine existing items indicated to be demolished or removed before work begins.
- B. Determine where removals may result in structural deficiency or unplanned building collapse during demolition. Coordinate demolition sequence and procedures to prevent structures from becoming unstable.
- C. Determine where demolition or removal may affect structural integrity or weather resistance of adjacent items indicated to remain.
  - 1. Identify measures required to protect building elements from damage.
  - 2. Identify remedial Work including patching, repairing, bracing, and other Work required to leave buildings indicated to remain in structurally sound, weathertight, and watertight condition.
- D. Existing Structure Documentation
  - 1. Document condition of adjacent structures and building elements indicated to remain.

### 2.2 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.
- B. Call Miss Dig not less than three working days before performing Work.
  - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- C. Notify affected utility companies before starting Work, and comply with utility's requirements.
- D. Do not close or obstruct roadways, sidewalks, or hydrants without permits.
- E. Erect and maintain temporary barriers and security devices, including warning signs and lights, and similar measures, for protection of the public, Owner and existing improvements indicated to remain.
- F. Protect existing appurtenances and structures indicated to remain.
- G. Prevent movement or settlement of adjacent structures. Provide bracing and shoring.

### 2.3 DEMOLITION

- A. General:
  - 1. Use of explosives is not permitted.
  - 2. Conduct demolition to minimize interference with adjacent structures.
  - 3. Cease operations immediately when adjacent structures appear to be in danger. Notify Architect/Engineer. Do not resume operations until directed.
  - 4. Conduct operations with minimum interference to public or private accesses to occupied adjacent structures. Maintain continuous egress and access from structures.

5. Obtain written permission from adjacent property owners when demolition equipment will traverse, infringe upon, or limit access to their property.
- B. Remove wet wells, pumps, discharge pipes, and electrical components as indicated on drawings.
- C. Remove items to be re-installed or retained in manner to prevent damage; store and protect according to requirements of Section 01 60 00 - Product Requirements.
- D. Rough grade and compact areas affected by demolition to maintain Site grades and contours.
- E. Continuously clean up and remove demolished materials from Site. Do not allow materials to accumulate in building or on-Site.
- F. Do not burn or bury materials on-Site; leave Site in clean condition.

END OF SECTION

## SECTION 03 10 00

### CONCRETE FORMING AND ACCESSORIES

#### PART 1 - GENERAL

##### 1.1 SUMMARY

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

##### 1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

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

##### 1.3 REFERENCES

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

#### 1.4 QUALITY ASSURANCE

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

#### 1.5 DELIVERY, STORAGE, AND HANDLING

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

#### 1.6 COORDINATION

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

### PART 2 - PRODUCTS

#### 2.1 WOOD FORM MATERIALS

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

## 2.2 PREFABRICATED FORMS

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

## 2.3 FORMWORK ACCESSORIES

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

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 INSTALLATION

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



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

B. Formwork - General:

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

C. Forms for Smooth Finish Concrete:

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

D. Framing, Studding and Bracing:

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

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

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

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

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

### 3.3 APPLICATION - FORM RELEASE AGENT

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

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

### 3.4 INSTALLATION - INSERTS, EMBEDDED PARTS, AND OPENINGS

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

- K. Embedded Items:
  - 1. Make provisions for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, water stops, and other features.
  - 2. Do not embed wood or uncoated aluminum in concrete.
  - 3. Obtain installation and setting information for embedded items furnished under other Specification sections.
  - 4. Securely anchor embedded items in correct location and alignment prior to placing concrete.
  - 5. Verify conduits and pipes, including those made of coated aluminum, meet requirements of ACI 318 for size and location limitations.
  
- L. Openings for Items Passing Through Concrete:
  - 1. Frame openings in concrete where indicated on Drawings. Establish exact locations, sizes, and other conditions required for openings and attachment of work specified under other sections.
  - 2. Coordinate work to avoid cutting and patching of concrete after placement.
  - 3. Perform cutting and repairing of concrete required as result of failure to provide required openings.
  
- M. Screeds:
  - 1. Set screeds and establish levels for tops of concrete slabs and levels for finish on slabs.
  - 2. Slope slabs to drain where required or as shown on Drawings.
  - 3. Before depositing concrete, remove debris from space to be occupied by concrete and thoroughly wet forms. Remove freestanding water.
  
- N. Screenshot Supports:
  - 1. For concrete over waterproof membranes and vapor retarder membranes, use cradle, pad or base type screed supports which will not puncture membrane.
  - 2. Staking through membrane is not be permitted.
  
- O. Cleanouts and Access Panels:
  - 1. Provide removable cleanout sections or access panels at bottoms of forms to permit inspection and effective cleaning of loose dirt, debris and waste material.
  - 2. Clean forms and surfaces against which concrete is to be placed. Remove chips, saw dust and other debris. Thoroughly blow out forms with compressed air just before concrete is placed.

### 3.5 FORM CLEANING

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

### 3.6 FORM REMOVAL

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

### 3.7 ERECTION TOLERANCES

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

### 3.8 FIELD QUALITY CONTROL

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

END OF SECTION

SECTION 03 20 00  
CONCRETE REINFORCING

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

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

1.3 REFERENCE STANDARDS

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

1.4 COORDINATION

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

## 1.5 SUBMITTALS

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

## 1.6 QUALITY ASSURANCE

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

## 1.7 QUALIFICATIONS

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

## 1.8 DELIVERY, STORAGE, AND HANDLING

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

## 1.9 EXISTING CONDITIONS

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

## PART 2 - PRODUCTS

### 2.1 REINFORCEMENT

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

3. Billet Bars: In accordance to the requirements of MDOT Standard Specifications for Construction
  4. Finish: In accordance to the requirements of MDOT Standard Specifications for Construction
- B. Deformed and Plain Reinforcement:
1. Material: Steel bars.
  2. Comply with ASTM A706.
  3. Yield Strength: In accordance to the requirements of MDOT Standard Specifications for Construction
  4. Finish: In accordance to the requirements of MDOT Standard Specifications for Construction

## 2.2 FABRICATION

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

## 2.3 SHOP FINISHING

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

## 2.4 ACCESSORY MATERIALS

- A. Tie Wire: In accordance to MDOT Standard Specifications for Construction.
- B. Chairs, Bolsters, Bar Supports, and Spacers:

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

## 2.5 SOURCE QUALITY CONTROL

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

## PART 3 - EXECUTION

### 3.1 INSTALLATION

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

### 3.2 TOLERANCES

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



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

3.3 FIELD QUALITY CONTROL

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

END OF SECTION

SECTION 03 30 00  
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

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

PRODUCTS

1.2 PERFORMANCE AND DESIGN CRITERIA

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

1.3 REFERENCE STANDARDS

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

B. ASTM International:

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

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

#### 1.4 UNIT PRICE – MEASUREMENT AND PAYMENT

- A. Cast-In-Place-Concrete:
  1. Basis of Measurement: Included in items utilizing cast-in-place concrete of this Project.
  2. Basis of Payment: Includes all labor, materials, and equipment to install concrete, grout, and appurtenances as shown on the contract documents and as stated in the specifications.
- B. Concrete Outlet Structure:
  1. Basis of Measurement: At the lump sum price bid as stated in the proposal.
  2. Basis of Payment: Includes all labor, equipment, and material to construct the concrete structure for the proposed flapgates complete as shown on drawings for Division I – Option A.
- C. Concrete Headwall and Wingwalls:
  1. Basis of Measurement: At the lump sum price bid as stated in the proposal.
  2. Basis of Payment: Includes all labor, equipment, and material to construct the concrete headwall and wingwalls for the proposed flapgates complete as shown on drawings for Division I – Option B.

#### 1.5 COORDINATION

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

#### 1.6 SUBMITTALS

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

- E. Manufacturer Instructions: Submit installation procedures and interfacing required with adjacent Work.
- F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

#### 1.7 CLOSEOUT SUBMITTALS

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

#### 1.8 QUALITY ASSURANCE

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

#### 1.9 MATERIALS

- A. Concrete:
  - 1. Cement:
    - a. Comply with ASTM C150, Type I - Normal.
    - b. Type: Portland.
  - 2. Normal Weight Aggregates:
    - a. Comply with ASTM C33.
    - b. Coarse Aggregate Maximum Size: According to ACI 318.
  - 3. Water:
    - a. Comply with ACI 318.
    - b. Potable, without deleterious amounts of chloride ions.
- B. Admixtures:
  - 1. Furnish materials according to Perform Work according to State of Michigan MDOT Standard Specifications for Construction, current addition.
    - a. Air Entrainment: Comply with ASTM C260.
  - 2. Chemical:
    - a. Comply with ASTM C494.
    - b. Type A - Water Reducing.
    - c. Type B - Retarding.
    - d. Type C - Accelerating.
    - e. Type D - Water Reducing and Retarding.
    - f. Type E - Water Reducing and Accelerating.
    - g. Type F - Water Reducing, High Range.
    - h. Type G - Water Reducing, High Range, and Retarding.
  - 3. Fly Ash: Comply with ASTM C618, Class F or C.
  - 4. Silica Fume: Comply with ASTM C1240.
  - 5. Slag:

- a. Description: Ground-granulated blast-furnace slag.
- b. Comply with ASTM C989.
- c. Grade 100 or 120.
- 6. Plasticizing:
  - a. Comply with ASTM C1017.
  - b. Type II, plasticizing and retarding.
- C. Joint Devices and Filler:
  - 1. Joint Filler, Type A:
    - a. Description: Asphalt-impregnated fiberboard or felt.
    - b. Comply with ASTM D1751.
    - c. Thickness: 1/4 inch.
    - d. Profile: Tongue-and-groove.
  - 2. Construction Joint Devices:
    - a. Material: Integral extruded plastic.
    - b. Profile: Tongue-and-groove with removable top strip exposing sealant trough and knockout holes spaced at 6 inches o.c.
    - c. Furnish ribbed steel spikes with tongue to fit top screed edge.
  - 3. Expansion and Contraction Joint Devices:
    - a. Comply with ASTM B221.]
    - b. Material: Extruded aluminum.
    - c. Filler Strip: Resilient elastomeric with Shore A hardness of 80.
    - d. Cover Plate: Extruded aluminum, of longest manufactured length at each location, and flush mounted.
    - e. Color: As selected by Owner.
  - 4. Sealant:
    - a. Comply with ASTM D6690.
    - b. Type: I.

#### 1.10 CONCRETE MIX

- A. Select proportions for normal weight concrete according to ACI 301, Method 1.
  - B. Concrete mixtures, general
    - 1. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both.
    - 2. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:
      - a. Fly Ash: 25%
      - b. Ground Granulated Blast-Furance Slag: 50%
      - c. Combined Fly Ash and Ground Granulated Blast-Furanvce Slag: 50% Portland cement minimum, with fly ash not exceeding 25%
    - 3. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 % by weight of cement.
    - 4. Admixtures: Use admixtures according to manufacturer's written instructions.
      - a. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
- Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

- b. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

Use air-entraining admixture in exterior exposed concrete unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having a total air content with a tolerance of plus or minus 1-1/2 percent within the following limits:

- (1) Concrete structures and slabs exposed to freezing and thawing, deicer chemicals, or hydraulic pressure: 4.5 percent.
  - (2) Other concrete not exposed to freezing, thawing, or hydraulic pressure, or to receive a surface hardener: 2 to 4 percent.

C. Concrete mixtures for structural elements:

- 1. Footings, Foundation walls, building frame members, junction chambers, valve vaults and building walls
  - a. Minimum Compressive Strength: 4000 psi at 28 days.
  - b. Maximum Water-Cementitious Materials Ratio: 0.45.
  - c. Slump Limit: 4 inches to 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
  - d. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch nominal maximum aggregate size.
- 2. Slabs-On-Grade, sidewalks and Suspended Slabs: Proportion normal-weight concrete mixture as follows:
  - a. Minimum Compressive Strength: 4000 psi at 28 days.
  - b. Minimum Cementitious Materials Content: 540 lb/cu. yd..
  - c. Slump Limit: 4 inches, plus or minus 1 inch.
  - d. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

D. Admixtures:

- 1. Include admixture types and quantities indicated in concrete mix designs only if approved by Engineer.
- 2. Cold Weather:
  - a. Use accelerating admixtures in cold weather.
  - b. Use of admixtures will not relax cold-weather placement requirements.
- 3. Hot Weather: Use set-retarding admixtures.
- 4. Use calcium chloride only if approved by Engineer.

E. Average Compressive Strength Reduction: Not permitted.

F. Ready-Mixed Concrete: Mix and deliver concrete according to ASTM C685.

G. Site-Mixed Concrete: Mix concrete according to ACI 318.

## 1.11 ACCESSORIES

A. Bonding Agent:

- 1. ASTM C/1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene:
- 2. Description: Polymer resin emulsion.

- B. Vapor Retarder:
  - 1. ASTM E 1745 Class C, not less than 10 mils thick clear polyethylene film; type recommended for below grade application. Furnish joint tape recommended by manufacturer.
  - 2. Description: Clear polyethylene film.
  - 3. Comply with ASTM E1745, Class C.
  - 4. Thickness: 10 mils.
  - 5. Type: As recommended for below-grade application.
  - 6. Joint Tape: As recommended by manufacturer.
  
- C. Non-shrink Grout:
  - 1. Description: Premixed compound consisting of non-metallic aggregate, cement, and water-reducing and plasticizing agents.
  - 2. Comply with ASTM C1107.
  - 3. Minimum Compressive Strength: 2,400 psi in 48 hours and 7,000 psi in 28 days.
  
- D. Concrete Reinforcing Fibers:
  - 1. Description: High-strength industrial-grade fibers specifically engineered for secondary reinforcement of concrete.
  - 2. Comply with ASTM C1116.
  - 3. Tensile Strength: 130 ksi.
  - 4. Toughness: 15 ksi.
  - 5. Fiber Length: 3/4 inch.
  - 6. Fiber Count: 34 million/lb.

## PART 2 - EXECUTION

### 2.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify requirements for concrete cover over reinforcement.
- C. Verify that anchors, seats, plates, reinforcement, and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with placing concrete.

### 2.2 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.
- B. Previously Placed Concrete:
  - 1. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent.
  - 2. Remove laitance, coatings, and unsound materials.
- C. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels, and pack solid with Hilti-HY 200 Injectable Mortar.



- D. Remove debris and ice from formwork, reinforcement, and concrete substrates.
- E. Remove water from areas receiving concrete before concrete is placed.

## 2.3 INSTALLATION

### A. Placing Concrete:

1. Place concrete according to ACI 318.
2. Notify testing laboratory and Engineer minimum 24 hours prior to commencement of operations.
3. Ensure that reinforcement, inserts, embedded parts, formed expansion and contraction joints are not disturbed during concrete placement.
4. Install vapor retarder under interior slabs on grade according to ASTM E1643.
5. Lap joints minimum 6 inches and seal watertight by taping edges and ends.
6. Repairs:
  - a. Repair vapor retarder damaged during placement of concrete reinforcement.
  - b. Using vapor retarder material, lap over damaged areas minimum 6 inches and seal watertight.
7. Joint Filler:
  - a. Separate slabs on grade from vertical surfaces with joint filler.
  - b. Place joint filler in floor slab pattern placement sequence; set top to required elevations; secure to resist movement by wet concrete.
  - c. Extend joint filler from bottom of slab to within 1/2 inch of finished slab surface.
8. Joint Devices:
  - a. Coordination: Install construction joint devices in coordination with floor slab pattern placement sequence; set top to required elevations; secure to resist movement by wet concrete.
  - b. Install joint device anchors, maintaining correct position to allow joint cover to be flush with floor and wall finish.
  - c. Install joint covers in longest practical length when adjacent construction activity is complete.
9. Deposit concrete at final position, preventing segregation of mix.
10. Place concrete in continuous operation for each panel or section as determined by predetermined joints.
11. Consolidate concrete.
12. Maintain records of concrete placement, including date, location, quantity, air temperature, and test samples taken.
13. Place concrete continuously between predetermined expansion, control, and construction joints.
14. Do not interrupt successive placement and do not permit cold joints to occur.
15. Place floor slabs in indicated checkerboard or saw-cut pattern.
16. Saw-Cut Joints:
  - a. Saw-cut joints within 12 hours after placing.
  - b. Use 3/16-inch-thick blade.
  - c. Cut into 1/4 depth of slab thickness.
17. Screeding:
  - a. Screed floors and slabs on grade level.
  - b. Surface Flatness: maximum 1/4 inch in 10 feet.

- B. Separate Floor Toppings:
  1. Prior to placing floor topping, remove deleterious material, roughen substrate concrete surface, and broom and vacuum clean.
  2. Place required dividers and other items to be cast in concrete.
  3. Apply bonding agent to substrate.
- C. Curing and Protection:
  1. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
  2. Protect concrete footings from freezing for minimum of five days.
  3. Maintain concrete with minimal moisture loss at relatively constant temperature for period as necessary for hydration of cement and hardening of concrete.
  4. Cure concrete floor surfaces as specified in Section 03 39 00 - Concrete Curing.

## 2.4 FIELD QUALITY CONTROL

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

b. Measure air content in air-entrained concrete for each sample.

H. Cylinder Compressive Strength Testing:

1. Test Method: Comply with ASTM C39.
2. Test Acceptance: According to ACI 318.
3. Test one cylinder at seven days.
4. Test one cylinder at 28 days.
5. Retain one cylinder for 30 days for testing when requested by Engineer.
6. Dispose of remaining cylinders if testing is not required.

I. Core Compressive Strength Testing:

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

END OF SECTION

SECTION 03 39 00  
CONCRETE CURING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
  - 1. Initial and final curing of horizontal and vertical concrete surfaces.
- B. Related Sections:
  - 1. Section 03 30 00 - Cast-In-Place Concrete.

1.2 REFERENCES

- A. American Concrete Institute:
  - 1. ACI 301 - Specifications for Structural Concrete.
  - 2. ACI 302.1 - Guide for Concrete Floor and Slab Construction.
  - 3. ACI 308.1 - Standard Specification for Curing Concrete.
  - 4. ACI 318 - Building Code Requirements for Structural Concrete.
  - 5. MDOT Standard Specifications for Construction, current edition.
- B. ASTM International:
  - 1. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.
  - 2. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
  - 3. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
  - 4. ASTM D2103 - Standard Specification for Polyethylene Film and Sheeting.

1.3 UNIT PRICE – MEASUREMENT AND PAYMENT

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

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on curing compounds, mats, paper, film, compatibilities, and limitations.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 308.

- B. Perform Work in accordance with MDOT Standard Specifications for Construction, current edition.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Deliver curing materials in manufacturer's packaging including application instructions.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Membrane Curing Compound Type A: ASTM C309, Type 1, Class A.
- B. Water: Potable, not detrimental to concrete.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify substrate surfaces are ready to be cured.

#### 3.2 INSTALLATION - HORIZONTAL SURFACES

- A. Cure concrete in accordance with ACI 308.1 using moisture curing or moisture-retaining-cover curing method.
- B. Spraying: Spray water over slab areas and maintain wet for 7 days.

#### 3.3 INSTALLATION - VERTICAL SURFACES

- A. Cure concrete in accordance with ACI 308.1 using moisture curing or moisture-retaining-cover curing method.
- B. Spraying: Spray water over surfaces and maintain wet for 7 days.

#### 3.4 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished Work.
- B. Do not permit traffic over unprotected floor surface.

END OF SECTION

SECTION 26 05 05  
SELECTIVE DEMOLITION FOR ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Removal of existing electrical equipment, wiring, and conduit in areas to be remodeled; removal of designated construction; dismantling, cutting and alterations for completion of the Work.
2. Disposal of materials.
3. Storage of removed materials.
4. Identification of utilities.
5. Salvaged of items.
6. Protection of items to remain as scheduled at end of section or as indicated on Drawings.
7. Relocate existing equipment to accommodate construction.

B. Related Sections:

1. Section 02 41 16 - Structure Demolition.

1.2 UNIT PRICE – MEASUREMENT AND PAYMENT

A. Demolition:

1. Basis of Measurement: Included in the lump sum price bid for electrical as stated in the proposal.
2. Basis of Payment: Includes all associated labor, equipment coordination, transport, loading/unloading, storage, etc. required to remove required materials and protect materials to be salvaged or remain.

1.3 SUBMITTALS

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

B. Shop Drawings: Indicate demolition and removal sequence and location of salvageable items; location and construction of temporary work. Describe demolition removal procedures and schedule.

1.4 CLOSEOUT SUBMITTALS

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

B. Project Record Documents: Record actual locations of capped utilities, conduits and equipment abandoned in place, and any remaining items originally scheduled for demolition.

## 1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with Perform Work in accordance with all applicable Federal, State, and local Codes and Ordinances.

## 1.6 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

## 1.7 SEQUENCING

- A. Section 01 10 00 - Summary: Requirements for sequencing.
- B. Sequence work as required to coordinate with other trades, avoid conflict with daily operations (where possible), and as directed on drawings.

## 1.8 SCHEDULING

- A. Section 01 30 00 - Administrative Requirements: Requirements for scheduling.
- B. Schedule work to coincide with new construction.
- C. Perform noisy, malodorous, or dusty work at coordinated times to avoid conflict with other trades.
- D. Cease operations immediately when the structure appears to be in danger and notify Architect/Engineer. Do not resume operations until directed.

## 1.9 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Conduct demolition to minimize interference with adjacent building areas.
- C. Coordinate demolition work with Owner, Architect/Engineer, and all other trades.
- D. Coordinate and sequence demolition so as not to cause shutdown of operation of surrounding areas.
- E. Shut-down Periods:
  - 1. Arrange timing of shut-down periods of in-service panels with Owner and Architect/Engineer. Do not shut down any utility without prior written approval.
  - 2. Keep shut-down period to minimum or use intermittent period as directed by Owner and Architect/Engineer.
  - 3. Maintain life-safety systems in full operation in occupied facilities or provide notice minimum 3 days in advance.

- F. Identify salvage items in cooperation with Owner.

## PART 2 - PRODUCTS

- 2.1 Not Used

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify wiring and equipment indicated to be demolished serve only abandoned facilities.
- C. Verify termination points for demolished services.

### 3.2 PREPARATION

- A. Erect, and maintain temporary safeguards, including warning signs and lights, barricades, and similar measures, for protection of the public, Owner, Contractor's employees, and existing improvements to remain.
- B. Temporary egress signage and emergency lighting

### 3.3 DEMOLITION

- A. Demolition Drawings are based on casual field observation and existing record documents. Report discrepancies to Owner, Architect/Engineer, and other Contractor(s) before disturbing existing installation.
- B. Remove exposed abandoned conduit and wire, including abandoned conduit and wire above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- C. Remove conduit, wire, boxes, and fastening devices to avoid any interference with new installation.
- D. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.
- E. Reconnect equipment being disturbed by renovation work and required for continued service to temporary service or nearest available panel, unless otherwise directed.
- F. Disconnect or shut off service to areas where electrical work is to be removed. Remove electrical fixtures, equipment, and related switches, outlets, conduit, and wiring which are not part of final project.



- G. Install temporary wiring and connections to maintain existing systems in service during construction.
- H. Perform work on energized equipment or circuits with experienced and trained personnel.
- I. Remove, relocate, and extend existing installations to accommodate new construction.
- J. Repair adjacent construction and finishes damaged during demolition and extension work.
- K. Remove exposed abandoned grounding and bonding components, fasteners and supports, and electrical identification components, including abandoned components above accessible ceiling finishes. Cut embedded support elements flush with walls and floors.
- L. Clean and repair existing equipment to remain or to be reinstalled.
- M. Protect and retain power to existing active equipment remaining.
- N. Cap abandoned empty conduit at both ends.

#### 3.4 EXISTING PANELBOARDS

- A. Ring out circuits in existing panel affected by the Work. Where additional circuits are needed, reuse circuits available for reuse. Install new breakers.
- B. Tag unused circuits as spare.
- C. Where existing circuits are indicated to be reused, use sensing measuring devices to verify circuits feeding Project area or are not in use.
- D. Remove existing wire no longer in use from panel to equipment.
- E. Provide new updated directories where more than three circuits have been modified or rewired.

#### 3.5 SALVAGE ITEMS

- A. Remove and protect items indicated in Schedule and on Drawings to be salvaged and turn over to Owner, unless otherwise directed.
- B. Items of salvageable value may be removed as work progresses. Transport salvaged items from site as they are removed.

#### 3.6 REUSABLE ELECTRICAL EQUIPMENT

- A. Carefully remove equipment, materials, or fixtures which are to be reused.
- B. Disconnect, remove, or relocate existing electrical material and equipment interfering with new installation.

- C. Relocate existing lighting fixtures as indicated on Drawings. Clean fixtures and re-lamp. Test fixture to see if it is in good working condition before installation at new location.

### 3.7 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.
- B. Remove demolished materials as work progresses. Legally dispose.
- C. Keep workplace neat.

### 3.8 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.

END OF SECTION

## SECTION 26 05 19

### LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section includes building wire and cable; nonmetallic-sheathed cable; direct burial cable; service entrance cable; armored cable; metal clad cable; and wiring connectors and connections.
- B. Related Sections:
  - 1. Section 26 05 53 - Identification for Electrical Systems.
  - 2. Section 31 23 17 - Trenching.

##### 1.2 UNIT PRICE – MEASUREMENT AND PAYMENT

- A. Electrical, Complete:
  - 1. Basis of Measurement: Included in the lump sum price bid for electrical as stated in the proposal.
  - 2. Basis of Payment: Includes all associated labor, material, equipment coordination, transport, loading/unloading, storage, etc. required for a complete and operable system.

##### 1.3 REFERENCES

- A. International Electrical Testing Association:
  - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- B. National Fire Protection Association:
  - 1. NFPA 70 - National Electrical Code.
  - 2. NFPA 262 - Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.
- C. Underwriters Laboratories, Inc.:
  - 1. UL 1277 - Standard for Safety for Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.

##### 1.4 SYSTEM DESCRIPTION

- A. Product Requirements: Provide products as follows:
  - 1. Solid conductor for feeders and branch circuits 10 AWG and smaller.
  - 2. Stranded conductors for control circuits.
  - 3. Conductor not smaller than 12 AWG for power and lighting circuits.
  - 4. Conductor not smaller than 14 AWG for control circuits.
  - 5. Increase wire size in branch circuits to limit voltage drop to a maximum of 3 percent.

- B. Wiring Methods: Provide the following wiring methods:
  - 1. Concealed Dry Interior Locations: Use only building wire, Type THHN/THWN insulation, in raceway, nonmetallic- sheathed cable, armored cable or metal clad cable.
  - 2. Exposed Dry Interior Locations: Use only building wire, Type THHN/THWN insulation, in raceway, nonmetallic-sheathed cable, armored cable or metal clad cable.
  - 3. Above Accessible Ceilings: Use only building wire, Type THHN/THWN insulation, in raceway, nonmetallic-sheathed cable, armored cable or metal clad cable.
  - 4. Wet or Damp Interior Locations: Use only building wire, Type THHN/THWN insulation, in raceway, direct burial cable, armored cable or metal clad cable.
  - 5. Exterior Locations: Use only building wire, Type THHN/THWN insulation, in raceway, direct burial cable, service-entrance cable, armored cable or metal clad cable.
  - 6. Underground Locations: Use only building wire, Type THHN/THWN insulation, in raceway, direct burial cable, service-entrance cable, armored cable or metal clad cable.
  - 7. Cable Tray Locations: Use only Tray cable Type TC.

## 1.5 DESIGN REQUIREMENTS

- A. Conductor sizes are based on copper unless indicated as aluminum or "AL".
- B. When aluminum conductor is substituted for copper conductor, size to match circuit requirements, terminations, conductor ampacity and voltage drop.

## 1.6 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit for building wire and each cable assembly type.
- C. Design Data: Indicate voltage drop and ampacity calculations for aluminum conductors substituted for copper conductors.
- D. Test Reports: Indicate procedures and values obtained.

## 1.7 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations of components and circuits.

## 1.8 QUALITY ASSURANCE

- A. Provide wiring materials located in plenums with peak optical density not greater than 0.5, average optical density not greater than 0.15, and flame spread not greater than 5 feet (1.5 m) when tested in accordance with NFPA 262.
- B. Perform Work in accordance with all applicable Federal, State, and local Codes and Ordinances.
- C. Maintain one copy of each document on site.

## 1.9 QUALIFICATIONS

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

## 1.10 FIELD MEASUREMENTS

- A. Verify field measurements are as indicated on Drawings.

## 1.11 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Where wire and cable destination is indicated and routing is not shown, determine routing and lengths required.
- C. Wire and cable routing indicated is approximate unless dimensioned. Include wire and cable lengths within 10 ft of length shown.

## PART 2 - PRODUCTS

### 2.1 BUILDING WIRE

- A. Manufacturers:
  - 1. Cerro Wire LLC.
  - 2. General Cable; General Cable Corporation.
  - 3. Southwire Company.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Product Description: Single conductor insulated wire.
- C. Conductor: Copper.
- D. Insulation Voltage Rating: 600 volts.
- E. Insulation Temperature Rating: 105 degrees C.
- F. Insulation Material: Thermoplastic.

### 2.2 NONMETALLIC-SHEATHED CABLE

- A. Manufacturers:
  - 1. Cerro Wire LLC.
  - 2. General Cable; General Cable Corporation.
  - 3. Southwire Company.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Conductor: Copper.

C. Insulation Voltage Rating: 600 volts.

### 2.3 DIRECT BURIAL CABLE

A. Manufacturers:

1. Cerro Wire LLC.
2. General Cable; General Cable Corporation.
3. Southwire Company.
4. Substitutions: Section 01 60 00 - Product Requirements.

B. Conductor: Copper.

C. Insulation Voltage Rating: 600 volts.

D. Insulation Temperature Rating: 90 degrees C.

### 2.4 SERVICE ENTRANCE CABLE

A. Manufacturers:

1. Cerro Wire LLC.
2. General Cable; General Cable Corporation.
3. Southwire Company.
4. Substitutions: Section 01 60 00 - Product Requirements.

B. Conductor: Copper.

C. Insulation Voltage Rating: 600 volts.

D. Insulation: Type USE, SE, or USE-2, as approved by Utility Company.

### 2.5 ARMORED CABLE

A. Manufacturers:

1. Cerro Wire LLC.
2. General Cable; General Cable Corporation.
3. Southwire Company.
4. Substitutions: Section 01 60 00 - Product Requirements.

B. Conductor: Copper.

C. Insulation Voltage Rating: 600 volts.

D. Insulation Temperature Rating: 90 degrees C.

E. Insulation Material: Thermoplastic.

F. Armor Material: Aluminum.

G. Armor Design: Interlocked metal tape.

## 2.6 METAL CLAD CABLE

- A. Manufacturers:
  - 1. Cerro Wire LLC.
  - 2. General Cable; General Cable Corporation.
  - 3. Southwire Company.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Conductor: Copper.
- C. Insulation Voltage Rating: 600 volts.
- D. Insulation Temperature Rating: 90 degrees C.
- E. Insulation Material: Thermoplastic.
- F. Armor Material: Aluminum.
- G. Armor Design: Interlocked metal tape.
- H. Jacket: Where required.

## 2.7 TRAY CABLE

- A. Manufacturers:
  - 1. EGS/Appleton Electric.
  - 2. General Cable; General Cable Corporation.
  - 3. Thomas & Betts Corporation.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Product Description: Multiconductor power and control cable NFPA 70 Type TC.
- C. Conductor: Copper.
- D. Insulation: Flame-retardant.
- E. Overall Jacket: Polyvinyl Chlorine (PVC) in accordance with UL 1277.
- F. Insulation Voltage Rating: 600 volts.
- G. Insulation Temperature Rating: 90 degrees C.
- H. Listings: Finished cable UL listed as Type TC, and sunlight resistant.

## 2.8 UNSHIELDED NETWORK CABLE

- A. Manufacturers:
  - 1. Belden.

2. Panduit.
3. Southwire.
4. Substitutions: Section 016000 - Product Requirements.

- B. Product Description: TIA/EIA 568, 100-ohm, unshielded twisted pair plenum rated cable with 4 pairs, 22 AWG copper conductor.

## 2.9 SHIELDED NETWORK CABLE

A. Manufacturers:

1. Belden.
2. Panduit.
3. Southwire.
4. Substitutions: Section 016000 - Product Requirements.

- B. Product Description: TIA/EIA 568, 150-ohm shielded, twisted-pair plenum rated cable with 2 pairs, 22 AWG copper conductor.

## 2.10 WIRING CONNECTORS

A. Split Bolt Connectors:

1. Manufacturers:
  - a. Burndy: Part of Hubbell Electrical Systems.
  - b. ILSCO.
  - c. Thomas & Betts Corporation.
  - d. Substitutions: Section 01 60 00 - Product Requirements.

B. Solderless Pressure Connectors:

- a. Burndy: Part of Hubbell Electrical Systems.
- b. ILSCO.
- c. Thomas & Betts Corporation.
- d. Substitutions: Section 01 60 00 - Product Requirements.

C. Spring Wire Connectors:

1. Manufacturers:
  - a. Burndy: Part of Hubbell Electrical Systems.
  - b. ILSCO.
  - c. Thomas & Betts Corporation.
  - d. Substitutions: Section 01 60 00 - Product Requirements.

D. Compression Connectors:

1. Manufacturers:
  - a. Burndy: Part of Hubbell Electrical Systems.
  - b. ILSCO.
  - c. Thomas & Betts Corporation.
  - d. Substitutions: Section 01 60 00 - Product Requirements.



## 2.11 TERMINATIONS

- A. Terminal Lugs for Wires 6 AWG and Smaller: Solderless, compression type copper.
- B. Lugs for Wires 4 AWG and Larger: Color keyed, compression type copper, with insulating sealing collars.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify interior of building has been protected from weather.
- C. Verify mechanical work likely to damage wire and cable has been completed.
- D. Verify raceway installation is complete and supported.

### 3.2 PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.

### 3.3 INSTALLATION

- A. Route wire and cable to meet Project conditions.
- B. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- C. Identify and color code wire and cable under provisions of Section 26 05 53. Identify each conductor with its circuit number or other designation indicated.
- D. Special Techniques--Building Wire in Raceway:
  - 1. Pull conductors into raceway at same time.
  - 2. Install building wire 4 AWG and larger with pulling equipment.
- E. Special Techniques - Cable:
  - 1. Protect exposed cable from damage.
  - 2. Support cables above accessible ceiling, using spring metal clips or metal cable ties to support cables from structure or ceiling suspension system. Do not rest cable on ceiling panels.
  - 3. Use suitable cable fittings and connectors.
- F. Special Techniques - Direct Burial Cable:
  - 1. Trench and backfill for direct burial cable installation. Refer to Section 31 23 23 and Section 31 23 17. Install warning tape along entire length of direct burial cable, within 3 inches of grade.
  - 2. Use suitable direct burial cable fittings and connectors.

- G. Special Techniques - Wiring Connections:
1. Clean conductor surfaces before installing lugs and connectors.
  2. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
  3. Tape uninsulated conductors and connectors with electrical tape to 150 percent of insulation rating of conductor.
  4. Install split bolt connectors for copper conductor splices and taps, 6 AWG and larger.
  5. Install solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
  6. Install insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.
  7. Terminate aluminum conductors with tin-plated, aluminum-bodied compression connectors only. Fill with anti-oxidant compound before installing conductor.
  8. Install suitable reducing connectors or mechanical connector adaptors for connecting aluminum conductors to copper conductors.
- H. Install stranded conductors for branch circuits 10 AWG and smaller. Install crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under screws.
- I. Install terminal lugs on ends of 600-volt wires unless lugs are furnished on connected device, such as circuit breakers.
- J. Size lugs in accordance with manufacturer's recommendations terminating wire sizes. Install 2-hole type lugs to connect wires 4 AWG and larger to copper bus bars.
- K. For terminal lugs fastened together such as on motors, transformers, and other apparatus, or when space between studs is small enough that lugs can turn and touch each other, insulate for dielectric strength of 2-1/2 times normal potential of circuit.

### 3.4 WIRE COLOR

- A. General:
1. For wire sizes 10 AWG and smaller, install wire colors in accordance with the following:
    - a. Black and red for single phase circuits at 120/240 volts.
    - b. Black, red, and blue for circuits at 120/208 volts single or three phase.
    - c. Orange, brown, and yellow for circuits at 277/480 volts single or three phase.
  2. For wire sizes 8 AWG and larger, identify wire with colored tape at terminals, splices and boxes. Colors are as follows:
    - a. Black and red for single phase circuits at 120/240 volts.
    - b. Black, red, and blue for circuits at 120/208 volts single or three phase.
    - c. Orange, brown, and yellow for circuits at 277/480 volts single or three phase.
- B. Neutral Conductors: White. When two or more neutrals are located in one conduit, individually identify each with proper circuit number.
- C. Branch Circuit Conductors: Install three or four wire home runs with each phase uniquely color coded.
- D. Feeder Circuit Conductors: Uniquely color code each phase.

- E. Ground Conductors:
  - 1. For 6 AWG and smaller: Green.
  - 2. For 4 AWG and larger: Identify with green tape at both ends and visible points including junction boxes.

### 3.5 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements
- B. Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- C. Inspect and test in accordance with NETA ATS, except Section 4.
- D. Perform inspections and tests listed in NETA ATS, Section 7.3.1.

END OF SECTION

SECTION 26 05 26  
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Rod electrodes.
  - 2. Active electrodes.
  - 3. Wire.
  - 4. Grounding well components.
  - 5. Mechanical connectors.
  - 6. Exothermic connections.

1.2 UNIT PRICE – MEASUREMENT AND PAYMENT

- A. Electrical, Complete:
  - 1. Basis of Measurement: Included in the lump sum price bid for electrical as stated in the Proposal.
  - 2. Basis of Payment: Includes all associated labor, material, equipment coordination, transport, loading/unloading, storage, etc. required for a complete and operable system.

1.3 REFERENCES

- A. Institute of Electrical and Electronics Engineers:
  - 1. IEEE 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.
  - 2. IEEE 1100 - Recommended Practice for Powering and Grounding Electronic Equipment.
- B. International Electrical Testing Association:
  - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- C. National Fire Protection Association:
  - 1. NFPA 70 - National Electrical Code.
  - 2. NFPA 99 - Standard for Health Care Facilities.

1.4 SYSTEM DESCRIPTION

- A. Grounding systems use the following elements as grounding electrodes:
  - 1. Edit the following list to meet Project requirements. Generally, two separate electrodes are required.
  - 2. Metal underground water pipe.
  - 3. Metal building frame.
  - 4. Concrete-encased electrode.
  - 5. Rod electrode.
  - 6. Plate electrode.

## 1.5 PERFORMANCE REQUIREMENTS

- A. Grounding System Resistance: 5 ohms maximum.

## 1.6 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data on grounding electrodes and connections.
- C. Test Reports: Indicate overall resistance to ground and resistance of each electrode.
- D. Manufacturer's Installation Instructions: Submit for active electrodes.
- E. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

## 1.7 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations of components and grounding electrodes.

## 1.8 QUALITY ASSURANCE

- A. Provide grounding materials conforming to requirements of NEC, IEEE 142, and UL labeled.
- B. Perform Work in accordance with all applicable Federal, State, and local Codes and Ordinances.
- C. Maintain one copy of each document on site.

## 1.9 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum three (3) years documented experience or approved by manufacturer.

## 1.10 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

## 1.11 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

- C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.
- D. Do not deliver items to project before time of installation. Limit shipment of bulk and multiple-use materials to quantities needed for immediate installation.

#### 1.12 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Complete grounding and bonding of building reinforcing steel prior to concrete placement.

### PART 2 - PRODUCTS

#### 2.1 ROD ELECTRODES

- A. Manufacturers:
  - 1. ERICO International Corporation.
  - 2. Harger Lightning & Grounding.
  - 3. Substitutions: Section 01 60 00 - Product Requirements.
- B. Product Description:
  - 1. Material: Copper.
  - 2. Diameter: 3/4 inch or as indicated on drawings.
  - 3. Length: 10 feet, unless otherwise indicated.
- C. Connector: Connector for exothermic welded connection.
  - 1. U-bolt clamp only allowed upon approval by Engineer.

#### 2.2 WIRE

- A. Material: Stranded copper.
- B. Foundation Electrodes: 2 AWG.
- C. Grounding Electrode Conductor: Copper conductor bare.
- D. Bonding Conductor: Copper conductor bare.

#### 2.3 GROUNDING WELL COMPONENTS

- A. Well Pipe: 8 inches NPS by 24 inches long concrete pipe with belled end.
- B. Well Cover: Fiberglass with legend "GROUND" embossed on cover.

#### 2.4 MECHANICAL CONNECTORS

- A. Manufacturers:

1. Burndy: Part of Hubbell Electrical Systems.
2. ERICO International Corporation.
3. Harger Lightning & Grounding.
4. Substitutions: Section 01 60 00 - Product Requirements.

B. Description: Bronze connectors, suitable for grounding and bonding applications, in configurations required for particular installation.

## 2.5 EXOTHERMIC CONNECTIONS

A. Manufacturers:

1. Cadweld.
2. ERICO International Corporation.
3. Harger Lightning & Grounding.
4. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: Exothermic materials, accessories, and tools for preparing and making permanent field connections between grounding system components.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

B. Verify final backfill and compaction has been completed before driving rod electrodes.

### 3.2 PREPARATION

A. Remove paint, rust, mill oils, and surface contaminants at connection points.

### 3.3 EXISTING WORK

A. Modify existing grounding system to maintain continuity to accommodate renovations.

B. Extend existing grounding system using materials and methods compatible with existing electrical installations, or as specified.

### 3.4 INSTALLATION

A. Install in accordance with IEEE 142

1. Where sensitive equipment is present, install in accordance with IEEE 1100.

B. Install rod electrodes at locations as indicated on Drawings. Install additional rod electrodes to achieve specified resistance to ground.

C. Install grounding and bonding conductors concealed from view.

- D. Install grounding well pipe with cover at rod locations as indicated on Drawings. Install well pipe top flush with finished grade.
- E. Install 2 AWG bare copper wire in foundation footing as indicated on Drawings.
- F. Bond together metal siding not attached to grounded structure; bond to ground.
- G. Bond together reinforcing steel and metal accessories in water containment structures.
- H. Install ground grid under access floors. Construct grid of 2 AWG bare copper wire installed on 24 inch centers both ways. Bond each access floor pedestal to grid.
- I. Bond together each metallic raceway, pipe, duct and other metal object entering space under access floors. Bond to underfloor ground grid. Install 2 AWG bare copper bonding conductor.
- J. Install isolated grounding conductor for circuits supplying, personal computers and other such sensitive electronics in accordance with IEEE 1100.
- K. Equipment Grounding Conductor: Install separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.
- L. Connect to site grounding system.
- M. Bond to lightning protection system where present.
- N. Install continuous grounding using underground cold-water system and building steel as grounding electrode. Where water piping is not available, install artificial station ground by means of driven rods or buried electrodes.
- O. Permanently ground entire light and power system in accordance with NEC, including service equipment, distribution panels, lighting panelboards, switch and starter enclosures, motor frames, grounding type receptacles, and other exposed non-current carrying metal parts of electrical equipment.
- P. Install branch circuits feeding isolated ground receptacles with separate insulated grounding conductor, connected only at isolated ground receptacle, ground terminals, and at ground bus of serving panel.
- Q. Accomplish grounding of electrical system by using insulated grounding conductor installed with feeders and branch circuit conductors in conduits. Size grounding conductors in accordance with NEC. Install from grounding bus of serving panel to ground bus of served panel, grounding screw of receptacles, lighting fixture housing, light switch outlet boxes or metal enclosures of service equipment. Ground conduits by means of grounding bushings on terminations at panelboards with installed number 12 conductor to grounding bus.
- R. Grounding electrical system using continuous metal raceway system enclosing circuit conductors in accordance with NEC.
- S. Permanently attach equipment and grounding conductors prior to energizing equipment.



### 3.5 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements.
- B. Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- C. Inspect and test in accordance with NETA ATS, except Section 4.
- D. Grounding and Bonding: Perform inspections and tests listed in NETA ATS, Section 7.13.
- E. Perform ground resistance testing in accordance with IEEE 142.
- F. Perform leakage current tests in accordance with NFPA 99.
- G. Perform continuity testing in accordance with IEEE 142.
- H. When improper grounding is found on receptacles, check receptacles in entire project and correct. Perform retest.

END OF SECTION

SECTION 26 05 29  
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Conduit supports.
  2. Formed steel channel.
  3. Spring steel clips.
  4. Sleeves.
  5. Mechanical sleeve seals.
  6. Firestopping relating to electrical work.
  7. Firestopping accessories.
  8. Equipment bases and supports.

1.2 UNIT PRICE – MEASUREMENT AND PAYMENT

- A. Electrical, Complete:
1. Basis of Measurement: Included in the lump sum price bid for electrical as stated in the proposal.
  2. Basis of Payment: Includes all associated labor, material, equipment coordination, transport, loading/unloading, storage, etc. required for a complete and operable system.

1.3 REFERENCES

- A. ASTM International:
1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
  2. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
  3. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
  4. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.
- B. FM Global:
1. FM - Approval Guide, A Guide to Equipment, Materials & Services Approved by Factory Mutual Research For Property Conservation.
- C. National Fire Protection Association:
1. NFPA 70 - National Electrical Code.
- D. Underwriters Laboratories Inc.:
1. UL 263 - Fire Tests of Building Construction and Materials.
  2. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
  3. UL 1479 - Fire Tests of Through-Penetration Firestops.
  4. UL 2079 - Tests for Fire Resistance of Building Joint Systems.
  5. UL - Fire Resistance Directory.

- E. Intertek Testing Services (Warnock Hersey Listed):
  - 1. WH - Certification Listings.

#### 1.4 DEFINITIONS

- A. Firestopping (Through-Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction.

#### 1.5 SYSTEM DESCRIPTION

- A. Firestopping Materials: ASTM E119, ASTM E814, UL 263, UL 1479 to achieve fire ratings as noted on Drawings for adjacent construction, but not less than 1 hour fire rating.
  - 1. Ratings may be 3-hours for firestopping in through-penetrations of 4-hour fire rated assemblies unless otherwise required by applicable codes.
- B. Firestop interruptions to fire rated assemblies, materials, and components.

#### 1.6 PERFORMANCE REQUIREMENTS

- A. Firestopping: Conform to applicable codes FM, UL, WH for fire resistance ratings and surface burning characteristics.
- B. Firestopping: Provide certificate of compliance from authority having jurisdiction indicating approval of materials used.

#### 1.7 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Indicate system layout with location and detail of trapeze hangers.
- C. Product Data:
  - 1. Hangers and Supports: Submit manufacturers catalog data including load capacity.
  - 2. Firestopping: Submit data on product characteristics, performance and limitation criteria.
- D. Firestopping Schedule (Where Applicable): Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance rating of adjacent assembly.
- E. Design Data: Indicate load carrying capacity of trapeze hangers and hangers and supports.
- F. Manufacturer's Installation Instructions:
  - 1. Hangers and Supports: Submit special procedures and assembly of components.
  - 2. Firestopping: Submit preparation and installation instructions.
- G. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

- H. Firestopping Engineering Judgments: For conditions not covered by UL or WH listed designs, submit judgments by licensed professional engineer suitable for presentation to authority having jurisdiction for acceptance as meeting code fire protection requirements.

## 1.8 QUALITY ASSURANCE

- A. Through Penetration Firestopping of Fire Rated Assemblies: UL 1479 or ASTM E814 with 0.10 inch water gage minimum positive pressure differential to achieve fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.
  - 1. Wall Penetrations: Fire F-Ratings as indicated on Drawings, but not less than 1-hour.
  - 2. Floor and Roof Penetrations: Fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.
    - a. Floor Penetrations Within Wall Cavities: T-Rating is not required.
- B. Through Penetration Firestopping of Non-Fire Rated Floor and Roof Assemblies: Materials to resist free passage of flame and products of combustion.
  - 1. Noncombustible Penetrating Items: Noncombustible materials for penetrating items connecting maximum of three stories.
  - 2. Penetrating Items: Materials approved by authorities having jurisdiction for penetrating items connecting maximum of two stories.
- C. Fire Resistant Joints in Fire Rated Floor, Roof, and Wall Assemblies: ASTM E1966 or UL 2079 to achieve fire resistant rating as indicated on Drawings for assembly in which joint is installed.
- D. Fire Resistant Joints Between Floor Slabs and Exterior Walls: ASTM E119 with 0.10 inch water gage minimum positive pressure differential to achieve fire resistant rating as indicated on Drawings for floor assembly.
- E. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
- F. Perform Work in accordance with all applicable standards.
- G. Maintain two copies of each document on site.

## 1.9 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum three years documented experience or approved by manufacturer.

## 1.10 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

## 1.11 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
- C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

## 1.12 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Do not apply firestopping materials when temperature of substrate material and ambient air is below 60 degrees F.
- C. Maintain this minimum temperature before, during, and for minimum 3 days after installation of firestopping materials.
- D. Provide ventilation in areas to receive solvent cured materials.

## PART 2 - PRODUCTS

### 2.1 CONDUIT SUPPORTS

- A. Manufacturers:
  - 1. ERICO International Corporation.
  - 2. Thomas & Betts Corporation.
  - 3. Unistrut: Part of Atkore International.
  - 4. Substitutions; Section 01 60 00 – Product Requirements.
- B. Hanger Rods: Threaded high tensile strength galvanized carbon steel with free running threads.
- C. Beam Clamps: Malleable Iron, with tapered hole in base and back to accept either bolt or hanger rod. Set screw: hardened steel.
- D. Conduit clamps for trapeze hangers: Galvanized steel, notched to fit trapeze with single bolt to tighten.
- E. Conduit clamps - general purpose: One hole malleable iron for surface mounted conduits.
- F. Cable Ties: High strength nylon temperature rated to 185 degrees F. Self-locking.

### 2.2 FORMED STEEL CHANNEL

- A. Manufacturers:
  - 1. B-Line, and Eaton Business.

2. Unistrut: Part of Atkore International.
3. Substitutions: Section 01 60 00 – Product Requirements.

B. Product Description: Galvanized 12 gage thick steel. With holes 1-1/2 inches on center.

## 2.3 SPRING STEEL CLIPS

### A. Manufacturers:

1. B-line, an Eaton Business.
2. Minerallac Company.
3. Morris Products, Inc.
4. Substitutions: Section 01 60 00 – Product Requirements.

B. Product Description: Mounting hole and screw closure.

## 2.4 SLEEVES

A. Furnish materials in accordance with all applicable Federal, State, and Local Codes and Ordinances.

B. Sleeves for Through Non-Fire Rated Floors: 18 gage thick galvanized steel.

C. Sleeves for Through Non-Fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage thick galvanized steel.

D. Sleeves for Through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL listed.

E. Stuffing or Fire-stopping Insulation: Glass fiber type, non-combustible.

## 2.5 MECHANICAL SLEEVE SEALS

### A. Manufacturers:

1. Pipeline Seal and Insulator, Inc.
2. Substitution: Section 01 60 00 – Product Requirements.

B. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

## 2.6 FIRESTOPPING

### A. Manufacturers:

1. 3M Fire Protection Products.
2. Nelson Firestop.
3. United States Gypsum Company.
4. Substitutions: Section 01 60 00 - Product Requirements.

- B. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.
  - 1. Select one or more of the following products. Coordinate with list manufacturers acceptable for this Project.
  - 2. Silicone Firestopping Elastomeric Firestopping: Single or Multiple component silicone elastomeric compound and compatible silicone sealant.
  - 3. Foam Firestopping Compounds: Single or Multiple component foam compound.
  - 4. Formulated Firestopping Compound of Incombustible Fibers: Formulated compound mixed with incombustible non-asbestos fibers.
  - 5. Fiber Stuffing and Sealant Firestopping: Composite of mineral or ceramic fiber stuffing insulation with silicone elastomer for smoke stopping.
  - 6. Mechanical Firestopping Device with Fillers: Mechanical device with incombustible fillers and silicone elastomer, covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.
  - 7. Intumescent Firestopping: Intumescent putty compound which expands on exposure to surface heat gain.
  - 8. Firestop Pillows: Formed mineral fiber pillows.
- C. Color: As selected from manufacturer's full range of colors.

## 2.7 FIRESTOPPING ACCESSORIES

- A. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.
- B. Dam Material: Permanent:
  - 1. Mineral fiberboard.
  - 2. Mineral fiber matting.
  - 3. Sheet metal.
  - 4. Plywood or particle board.
  - 5. Alumina silicate fire board.
- C. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.
- D. General:
  - 1. Furnish UL listed products.
  - 2. Select products with rating not less than rating of wall or floor being penetrated.
- E. Non-Rated Surfaces:
  - 1. Stamped steel, chrome plated, hinged, split ring escutcheons or floor plates or ceiling plates for covering openings in occupied areas where conduit is exposed.
  - 2. For exterior wall openings below grade, furnish modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill annular space between conduit and cored opening or water-stop type wall sleeve.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify openings are ready to receive sleeves.
- C. Verify openings are ready to receive firestopping.

### 3.2 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.
- B. Remove incompatible materials affecting bond.
- C. Install backing and/or damming materials to arrest liquid material leakage where required.
- D. Obtain permission from Engineer before using powder-actuated anchors.
- E. Do not drill or cut structural members.

### 3.3 INSTALLATION - HANGERS AND SUPPORTS

- A. Anchors and Fasteners:
  - 1. Concrete Structural Elements: Provide precast inserts, expansion anchors, powder actuated anchors and preset inserts.
  - 2. Steel Structural Elements: Provide beam clamps, spring steel clips, steel ramset fasteners, and welded fasteners.
  - 3. Concrete Surfaces: Provide self-drilling anchors and expansion anchors.
  - 4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Provide toggle bolts and hollow wall fasteners.
  - 5. Solid Masonry Walls: Provide expansion anchors and preset inserts.
  - 6. Sheet Metal: Provide sheet metal screws.
  - 7. Wood Elements: Provide wood screws.
- B. Inserts:
  - 1. Install inserts for placement in concrete forms.
  - 2. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
  - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
  - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
  - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above flush with top of or recessed into and grouted flush with slab as indicated on drawings.
- C. Install conduit and raceway support and spacing in accordance with NEC.



- D. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
- E. Install multiple conduit runs on common hangers.
- F. Supports:
  1. Fabricate supports from structural steel or formed steel channel. Install hexagon head bolts to present neat appearance with adequate strength and rigidity. Install spring lock washers under nuts.
  2. Install surface mounted cabinets and panelboards with minimum of four anchors.
  3. In wet and damp locations install steel channel supports to stand cabinets and panelboards 1 inch off wall.
  4. Support vertical conduit at every floor.

### 3.4 INSTALLATION - FIRESTOPPING

- A. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, conduit and other items, requiring firestopping.
- B. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.
- C. Apply firestopping material in sufficient thickness to achieve required fire and smoke rating, to uniform density and texture.
- D. Where each material is installed:
  1. Compress fibered material to maximum 40 percent of its uncompressed size.
  2. Place foamed material in layers to ensure homogenous density, filling cavities and spaces. Place sealant to completely seal junctions with adjacent dissimilar materials.
  3. Place intumescent coating in sufficient coats to achieve rating required.
- E. Remove dam material after firestopping material has cured, unless otherwise indicated on drawings.
- F. Fire Rated Surface:
  1. Seal opening at floor, wall, partition, ceiling, and roof as follows:
    - a. Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.
    - b. Size sleeve allowing minimum of 1 inch void between sleeve and building element.
    - c. Pack void with backing material.
    - d. Seal ends of sleeve with UL listed fire resistive silicone compound to meet fire rating of structure penetrated.
  2. Where cable tray, bus, cable bus, conduit, wireway, trough, and other raceways penetrate fire rated surface, install firestopping product in accordance with manufacturer's instructions.
- G. Non-Rated Surfaces:
  1. Seal opening through non-fire rated wall, partition floor, ceiling, and roof opening as follows:
    - a. Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.

- b. Size sleeve allowing minimum of 1 inch void between sleeve and building element.
- c. Install type of firestopping material recommended by manufacturer.
- 2. Install escutcheons floor plates or ceiling plates where conduit, penetrates non-fire rated surfaces in occupied spaces. Occupied spaces include rooms with finished ceilings and where penetration occurs below finished ceiling.
- 3. Exterior wall openings below grade: Assemble rubber links of mechanical seal to size of conduit and tighten in place, in accordance with manufacturer's instructions.
- 4. Interior partitions: Seal pipe penetrations at each partition between different room types. Apply sealant to both sides of penetration to completely fill annular space between sleeve and conduit.

### 3.5 INSTALLATION - EQUIPMENT BASES AND SUPPORTS

- A. Provide housekeeping pads of concrete, minimum 4 inches thick and extending 6 inches beyond supported equipment.
- B. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.
- C. Construct supports of steel members. Brace and fasten with flanges bolted to structure.

### 3.6 INSTALLATION - SLEEVES

- A. Exterior watertight entries: Seal with adjustable interlocking rubber links.
- B. Conduit penetrations not required to be watertight: Sleeve and fill with silicon foam.
- C. Set sleeves in position in forms. Provide reinforcing around sleeves.
- D. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- E. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.
- F. Where conduit or raceway penetrates floor, ceiling, or wall, close off space between conduit or raceway and adjacent work with stuffing or fire stopping insulation and caulk airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- G. Install chrome plated steel plastic or stainless-steel escutcheons at finished surfaces.

### 3.7 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements
- B. Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- C. Inspect installed firestopping for compliance with specifications and submitted schedule.

3.8 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.
- B. Clean adjacent surfaces of firestopping materials.

3.9 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 26 05 33  
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes conduit and tubing, surface raceways, wireways, outlet boxes, pull and junction boxes, and handholes.
- B. Related Sections:
  - 1. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
  - 2. Section 26 05 29 - Hangers and Supports for Electrical Systems.
  - 3. Section 26 05 53 - Identification for Electrical Systems.
  - 4. Section 26 27 16 - Electrical Cabinets and Enclosures.
  - 5. Section 26 27 26 - Wiring Devices.

1.2 UNIT PRICE – MEASUREMENT AND PAYMENT

- A. Electrical, Complete:
  - 1. Basis of Measurement: Included in the lump sum price bid for electrical as stated in the proposal.
  - 2. Basis of Payment: Includes all associated labor, material, equipment coordination, transport, loading/unloading, storage, etc. required for a complete and operable system.

1.3 REFERENCES

- A. American National Standards Institute:
  - 1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
  - 2. ANSI C80.3 - Specification for Electrical Metallic Tubing, Zinc Coated.
  - 3. ANSI C80.5 - Aluminum Rigid Conduit - (ARC).
- B. National Electrical Manufacturers Association:
  - 1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
  - 2. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
  - 3. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
  - 4. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports.
  - 5. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
  - 6. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
  - 7. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

1.4 SYSTEM DESCRIPTION

- A. Raceway and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements.

Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.

- B. Underground More than 5 feet outside Foundation Wall: Provide rigid steel conduit, plastic coated conduit, or thickwall nonmetallic conduit. Provide cast metal boxes or nonmetallic handhole.
- C. Underground Within 5 feet from Foundation Wall: Provide rigid steel conduit or plastic coated conduit. Provide cast metal or nonmetallic boxes.
- D. In or Under Slab on Grade: Provide rigid steel conduit, plastic coated conduit or thickwall nonmetallic conduit. Provide cast or nonmetallic metal boxes.
- E. Outdoor Locations, Above Grade: Provide rigid steel conduit. Provide cast metal or nonmetallic outlet, pull, and junction boxes.
- F. In Slab Above Grade: Provide rigid steel conduit, intermediate metal conduit or thickwall nonmetallic conduit. Provide sheet metal boxes.
- G. Wet and Damp Locations: Provide rigid steel conduit, plastic coated conduit or thickwall nonmetallic conduit. Provide cast metal or nonmetallic outlet, junction, and pull boxes. Provide flush mounting outlet box in finished areas.
- H. Concealed Dry Locations: Provide rigid steel conduit or thickwall nonmetallic conduit. Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes.
- I. Exposed Dry Locations: Provide rigid steel conduit or electrical metallic tubing. Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes.

## 1.5 DESIGN REQUIREMENTS

- A. Minimum Raceway Size: 3/4 inch unless otherwise specified.

## 1.6 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit for the following:
  - 1. Flexible metal conduit.
  - 2. Liquidtight flexible metal conduit.
  - 3. Nonmetallic conduit.
  - 4. Flexible nonmetallic conduit.
  - 5. Nonmetallic tubing.
  - 6. Raceway fittings.
  - 7. Conduit bodies.
  - 8. Surface raceway.
  - 9. Wireway.

- 10. Pull and junction boxes.
- 11. Handholes.

- C. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

## 1.7 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents:
  - 1. Record actual routing of conduits larger than 1 inch.
  - 2. Record actual locations, dimensions, and mounting heights of outlet, pull, and junction boxes.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- C. Protect PVC conduit from sunlight.

## 1.9 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate installation of outlet boxes for equipment.
- C. Coordinate mounting heights, orientation and locations of outlets mounted above counters, benches, and backsplashes.

## PART 2 - PRODUCTS

### 2.1 METAL CONDUIT

- A. Manufacturers:
  - 1. Allied Tube & Conduit; a part of Atkore International.
  - 2. EGS/Appleton Electric.
  - 3. Thomas & Betts Corporation.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Rigid Steel Conduit: ANSI C80.1.
- C. Rigid Aluminum Conduit: ANSI C80.5.

- D. Intermediate Metal Conduit (IMC): Rigid steel.
- E. Fittings and Conduit Bodies: NEMA FB 1; material to match conduit.

## 2.2 PVC COATED METAL CONDUIT

- A. Manufacturers:
  - 1. Plasti-Bond.
  - 2. Thomas & Betts Corporation.
  - 3. Substitutions: Section 01 60 00 - Product Requirements.
- B. Product Description: NEMA RN 1; rigid steel conduit with external PVC coating, 20 mil thick.
- C. Fittings and Conduit Bodies: NEMA FB 1; steel fittings with external PVC coating to match conduit.

## 2.3 FLEXIBLE METAL CONDUIT

- A. Manufacturers:
  - 1. AFC Cable Systems; a part of Atkore International.
  - 2. EGS/Appleton Electric.
  - 3. Southwire Company.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Product Description: Interlocked steel construction.
- C. Fittings: NEMA FB 1.

## 2.4 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

- A. Manufacturers:
  - 1. AFC Cable Systems; a part of Atkore International.
  - 2. EGS/Appleton Electric.
  - 3. Southwire Company.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Product Description: Interlocked steel construction with PVC jacket.
- C. Fittings: NEMA FB 1.

## 2.5 ELECTRICAL METALLIC TUBING (EMT)

- A. Manufacturers:
  - 1. Carlon; a brand of Thomas & Betts Corporation.
  - 2. Republic Conduit.
  - 3. Western Tube and Conduit Corporation.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Product Description: ANSI C80.3; galvanized tubing.

C. Fittings and Conduit Bodies: NEMA FB 1; steel, set screw type.

## 2.6 NONMETALLIC CONDUIT

A. Manufacturers:

1. Carlon; a brand of Thomas & Betts Corporation.
2. EGS/Appleton Electric.
3. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: NEMA TC 2; Schedule 40 PVC and Schedule 80 PVC, as indicated.

C. Fittings and Conduit Bodies: NEMA TC 3.

## 2.7 NONMETALLIC TUBING

A. Manufacturers:

1. Carlon; a brand of Thomas & Betts Corporation.
2. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: NEMA TC 2.

C. Fittings and Conduit Bodies: NEMA TC 3.

## 2.8 SURFACE METAL RACEWAY

A. Manufacturers:

1. Niedax Inc.
2. Panduit Corp.
3. Wiremold / Legrand.
4. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: Sheet metal channel with fitted cover, suitable for use as surface metal raceway.

C. Size: Per Code plus additional 25% spare, unless otherwise indicated.

D. Finish: Gray enamel. Stainless steel in hazardous locations or where corrosive elements are present.

E. Fittings, Boxes, and Extension Rings: Furnish manufacturer's standard accessories; match finish on raceway.

## 2.9 SURFACE NONMETAL RACEWAY

A. Manufacturers:

1. Panduit Corp.
2. Wiremold / Legrand.
3. Substitutions: Section 01 60 00 - Product Requirements.



- B. Product Description: Fiberglass channel with fitted cover, suitable for use as surface raceway.
- C. Size: Per Code plus additional 25% spare, unless otherwise indicated.
- D. Finish: Gray.
- E. Fittings, Boxes, and Extension Rings: Furnish manufacturer's standard accessories, finish to match raceway.

## 2.10 WIREWAY

- A. Manufacturers:
  - 1. Carlon; a brand of Thomas & Betts Corporation.
  - 2. Hoffman; a brand of Pentair Equipment Protection.
  - 3. Square D; by Schneider Electric.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Product Description: General purpose, Oiltight and dust-tight, or Raintight type wireway. Product rating shall match NEMA Rating for enclosures in same location.
- C. Knockouts: Manufacturer's standard. Bottom only in Wet, Damp or Outdoor locations.
- D. Size: 4 x 4 inch, 6 x 6 inch, 8 x 8 inch, and 12 x 12 inch; length as indicated on Drawings.
- E. Cover: Hinged or Screw cover with full gaskets.
- F. Connector: Slip-in or Flanged.
- G. Fittings: Lay-in type with removable top, bottom, and side; captive screws and drip shield.
- H. Finish: Rust inhibiting primer coating with gray enamel finish.

## 2.11 OUTLET BOXES

- A. Manufacturers:
  - 1. Allied Moulded Products, Inc.
  - 2. Carlon; a brand of Thomas & Betts Corporation.
  - 3. RACO; Hubbell.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
  - 1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; furnish 1/2 inch male fixture studs where required.
  - 2. Concrete Ceiling Boxes: Concrete type.
- C. Nonmetallic Outlet Boxes: NEMA OS 2.
- D. Cast Boxes: NEMA FB 1, Type FD, cast ferrous alloy. Furnish gasketed cover by box manufacturer. Furnish threaded hubs.

E. Wall Plates for Finished Areas: As specified in Section 26 27 26.

F. Wall Plates for Unfinished Areas: Furnish gasketed cover.

## 2.12 PULL AND JUNCTION BOXES

A. Manufacturers:

1. Emerson Process Management; Rosemount Division.
2. Hoffman; a brand of Pentair Equipment Protection.
3. RACO; Hubbell.
4. Substitutions: Section 01 60 00 - Product Requirements.

B. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

C. Hinged Enclosures: As specified in Section 26 27 16.

D. Surface Mounted Cast Metal Box: NEMA 250, Type 4, 4X, or 6 (per environmental conditions); flat-flanged, surface mounted junction box:

1. Material: Galvanized cast iron.
2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

E. In-Ground Cast Metal Box: NEMA 250, Type 6, flanged, recessed cover box for flush mounting:

1. Material: Galvanized cast iron.
2. Cover: Smooth or Nonskid cover (to match surrounding surfaces) with neoprene gasket and stainless steel cover screws.
3. Cover Legend: "ELECTRIC" unless otherwise indicated.

F. Fiberglass Concrete composite Handholes: Die-molded, glass-fiber concrete composite hand holes:

1. Cable Entrance: Pre-cut 6 inch x 6 inch cable entrance at center bottom of each side.
2. Cover: Glass-fiber concrete composite, weatherproof cover with nonskid finish.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify outlet locations and routing and termination locations of raceway prior to rough-in.

### 3.2 INSTALLATION

A. Ground and bond raceway and boxes in accordance with Section 26 05 26.

B. Fasten raceway and box supports to structure and finishes in accordance with Section 26 05 29.

C. Identify raceway and boxes in accordance with Section 26 05 53.

D. Arrange raceway and boxes to maintain headroom and present neat appearance.

### 3.3 INSTALLATION - RACEWAY

- A. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.
- B. Arrange raceway supports to prevent misalignment during wiring installation.
- C. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- D. Group related raceway; support using conduit rack. Construct rack using steel channel specified in Section 26 05 29; provide space on each for 25 percent additional raceways.
- E. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports
- F. Do not attach raceway to ceiling support wires or other piping systems.
- G. Construct wireway supports from steel channel specified in Section 26 05 29.
- H. Route exposed raceway parallel and perpendicular to walls.
- I. Route raceway installed above accessible ceilings parallel and perpendicular to walls.
- J. Route conduit in and under slab from point-to-point.
- K. Maximum Size Conduit in Slab Above Grade: 3/4 inch. Do not cross conduits in slab.
- L. Maintain clearance between raceway and piping for maintenance purposes.
- M. Maintain 12 inch clearance between raceway and surfaces with temperatures exceeding 104 degrees F.
- N. Cut conduit square using saw or pipe cutter; de-burr cut ends.
- O. Bring conduit to shoulder of fittings; fasten securely.
- P. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for minimum 20 minutes.
- Q. Install conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.
- R. Install no more than equivalent of three 90 degree bends between boxes. Install conduit bodies to make sharp changes in direction, as around beams. Install factory elbows for bends in metal conduit larger than 2 inch size.

- S. Avoid moisture traps; install junction box with drain fitting at low points in conduit system.
- T. Install fittings to accommodate expansion and deflection where raceway crosses seismic, control and expansion joints.
- U. Install suitable pull string or cord in each empty raceway except sleeves and nipples.
- V. Install suitable caps to protect installed conduit against entrance of dirt and moisture.
- W. Surface Raceway: Install flat-head screws, clips, and straps to fasten raceway channel to surfaces; mount plumb and level. Install insulating bushings and inserts at connections to outlets and corner fittings.
- X. Close ends and unused openings in wireway.

### 3.4 INSTALLATION - BOXES

- A. Install wall mounted boxes at elevations to accommodate mounting heights specified in section for outlet device, unless indicated on Drawings.
- B. Adjust box location up to 10 feet prior to rough-in to accommodate intended purpose.
- C. Orient boxes to accommodate wiring devices oriented as specified in Section 26 27 26.
- D. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- E. In Accessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
- F. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
- G. Do not install flush mounting box back-to-back in walls; install with minimum 6 inches separation. Install with minimum 24 inches separation in acoustic rated walls.
- H. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- I. Install stamped steel bridges to fasten flush mounting outlet box between studs.
- J. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- K. Install adjustable steel channel fasteners for hanging ceiling outlet box.
- L. Do not fasten boxes to ceiling support wires or other piping systems.
- M. Support boxes independently of conduit.
- N. Install gang box where more than one device is mounted together. Do not use sectional box.

- O. Install gang box with plaster ring for single device outlets.

### 3.5 INTERFACE WITH OTHER PRODUCTS

- A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods in accordance with applicable codes.
- B. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Coordinate location with roofing installation as required.
- C. Locate outlet boxes to allow luminaires positioned as indicated on Drawings.
- D. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

### 3.6 ADJUSTING

- A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.
- B. Adjust flush-mounting outlets to make front flush with finished wall material.
- C. Install knockout closures in unused openings in boxes.

### 3.7 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
- B. Clean interior of boxes to remove dust, debris, and other material.
- C. Clean exposed surfaces and restore finish.

END OF SECTION

SECTION 26 05 53  
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Nameplates.
  - 2. Labels.
  - 3. Wire markers.
  - 4. Conduit markers.
  - 5. Stencils.
  - 6. Underground Warning Tape.
  - 7. Lockout Devices.
  
- B. Related Sections:
  - 1. Section 09 90 00 - Painting and Coating.

1.2 UNIT PRICE – MEASUREMENT AND PAYMENT

- A. Electrical, Complete:
  - 1. Basis of Measurement: Included in the lump sum price bid for electrical as stated in the proposal.
  - 2. Basis of Payment: Includes all associated labor, material, equipment coordination, transport, loading/unloading, storage, etc. required for a complete and operable system.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
  
- B. Product Data:
  - 1. Submit manufacturer's catalog literature for each product required.
  - 2. Submit electrical identification schedule including list of wording, symbols, letter size, color coding, tag number, location, and function.
  
- C. Samples:
  - 1. Submit one sample of each type of identification products applicable to project.
  - 2. Submit one nameplate, 4 x 4 inch in size illustrating materials and engraving quality.
  
- D. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
  
- B. Project Record Documents: Record actual locations of tagged devices; include tag numbers.

## 1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with all applicable Federal, State, and local code and ordinances.

## 1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience or approved by manufacturer.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept identification products on site in original containers. Inspect for damage.
- C. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- D. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

## 1.8 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Install labels and nameplates only when ambient temperature and humidity conditions for adhesive are within range recommended by manufacturer.

## 1.9 EXTRA MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for extra materials.
- B. Furnish two containers of any spray-on adhesives used.

## PART 2 - PRODUCTS

### 2.1 NAMEPLATES

- A. Manufacturers:
  - 1. Craftmark Pipe Markers.
  - 2. Kolbi Pipe Marker Co.
  - 3. Seton Identification Products.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.

- B. Product Description: Laminated three-layer plastic with engraved black letters on white contrasting background color, unless otherwise indicated.
- C. Letter Size:
  - 1. 1/8 inch high letters for identifying individual equipment and loads.
  - 2. 1/4 inch high letters for identifying grouped equipment and loads.
  - 3. Minimum 1/8 inch high letters for identifying any required information, not otherwise specified.
- D. Minimum nameplate thickness: 1/8 inch.

## 2.2 LABELS

- A. Manufacturers:
  - 1. Brady ID.
  - 2. Seton Identification Products.
  - 3. Substitutions: Section 01 60 00 - Product Requirements.
- B. Labels: Embossed adhesive tape, with 3/16 inch black letters on white background.

## 2.3 WIRE MARKERS

- A. Manufacturers:
  - 1. Brady ID.
  - 2. Grafoplast Wire Markers.
  - 3. Ideal Industries, Inc.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Description: Cloth tape, split sleeve, or tubing type wire markers.
- C. Legend:
  - 1. Power and Lighting Circuits: Branch circuit or feeder number as indicated on Drawings.
  - 2. Control Circuits: Control wire number as indicated on schematic and interconnection diagrams. Where shop drawings indicate a different labeling methodology at the same location, EACH wire shall bear BOTH labels for clarity.
  - 3. Communication Cables: Labels shall state both connected devices, unless otherwise indicated on Drawings.
    - a. Example 1: MODEM / FW-1 (Internet Modem -to- Firewall)
    - b. Example 2: ENET-2 / PLC-2 (Ethernet Switch 2 -to- Control Panel 2)

## 2.4 CONDUIT AND RACEWAY MARKERS

- A. Manufacturers:
  - 1. Brady ID.
  - 2. Ideal Industries, Inc.
  - 3. Seton Identification Products.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.



- B. Description:
  - 1. Where susceptible to mechanical damage: Nameplate fastened with straps
  - 2. With flat smooth surface not susceptible to mechanical damage: Nameplate fastened with adhesive
  - 3. Without flat smooth surface: Labels fastened with adhesive
  - 4. All other locations, where identification is required: Stencils.
- C. Color:
  - 1. Medium Voltage System: Black lettering on white background.
  - 2. 480 Volt System: Black lettering on white background.
  - 3. 208 Volt System: Black lettering on white background.
  - 4. All other Systems: Black lettering on white background.
- D. Legend:
  - 1. Medium Voltage System: HIGH VOLTAGE.
  - 2. 480 Volt System: 480 VOLTS.
  - 3. 208 Volt System: 208 VOLTS.
  - 4. Instrumentation & Controls: I & C.
  - 5. Communications: COMMUNICATIONS

## 2.5 STENCILS

- A. Manufacturers:
  - 1. Kolbi Pipe Marker Co.
  - 2. Pipemarket.com; Brimar Industries, Inc.
  - 3. Seton Identification Products.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Stencils: With clean cut symbols and letters of following size:
  - 1. Up to 2 inches Outside Diameter of Raceway: 1/2 inch high letters.
  - 2. 2-1/2 to 6 inches Outside Diameter of Raceway: 1 inch high letters.
- C. Stencil Paint: As specified in Section 09 90 00, semi-gloss enamel, colors conforming to the following:
  - 1. Black lettering on white background.
  - 2. White lettering on gray background.
  - 3. Red lettering on white background.
  - 4. Blue lettering on white background.

## 2.6 UNDERGROUND WARNING TAPE

- A. Manufacturers:
  - 1. Brady ID.
  - 2. Kolbi Pipe Marker Co.
  - 3. Seton Identification Products.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Description: 4 inch wide plastic tape, detectable type, colored red or yellow, based on warning type, with suitable warning legend describing buried electrical lines.

## 2.7 LOCKOUT DEVICES

- A. Lockout Hasps:
  - 1. Manufacturers:
    - a. Brady ID.
    - b. Master Lock Company, LLC.
    - c. Substitutions: Section 01 60 00 - Product Requirements.
  - 2. Anodized aluminum with erasable label surface; size minimum 7-1/4 x 3 inches.
    - a. Reinforced nylon hasp may be allowed in hazardous or corrosive locations per Engineer's approval.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Section 09 90 00 for stencil painting.

### 3.2 INSTALLATION

- A. Install identifying devices after completion of painting.
- B. Nameplate Installation:
  - 1. Install nameplate parallel to equipment lines.
  - 2. Install nameplate for each electrical distribution and control equipment enclosure with corrosive-resistant mechanical fasteners, or adhesive.
  - 3. Install nameplates for each control panel and major control components located outside panel with corrosive-resistant mechanical fasteners, or adhesive.
  - 4. Secure nameplate to equipment front using screws, rivets, or adhesive.
    - a. Screws shall be Standard or Philips type.
    - b. Rivets must be approved by Engineer prior to purchase and installation.
  - 5. Secure nameplate to inside surface of door on recessed panelboard in finished locations.
  - 6. Install nameplates for the following:
    - a. Switchboards.
    - b. Panelboards.
    - c. Transformers.
    - d. Service Disconnects.
    - e. Control Cabinets.
    - f. Remote Instrumentation and Control Enclosures.
    - g. Terminal Boxes.
- C. Label Installation:
  - 1. Install label parallel to equipment lines.
  - 2. Install label for identification of individual control device stations.
  - 3. Install labels for permanent adhesion and seal with clear lacquer.

- D. Wire Marker Installation:
  - 1. Install wire marker for each conductor at panelboard gutters, pull boxes, outlet and junction boxes, and each load connection.
  - 2. Mark data cabling at each end. Install additional marking at accessible locations along the cable run.
  - 3. Install labels at data outlets identifying patch panel and port designation.
    - a. If otherwise indicated on Drawings, BOTH designations shall be labeled.
  
- E. Conduit and Raceway Marker Installation:
  - 1. Install Conduit and Raceway marker for each Conduit and Raceway longer than 6 feet.
  - 2. Conduit and Raceway Marker Spacing: 20 feet on center.
  - 3. Raceway Painting: Identify conduit using field painting in accordance with Section 09 90 00.
    - a. Paint colored band on each conduit longer than 6 feet.
    - b. Paint bands 20 feet on center.
    - c. Color:
      - 1) 480 Volt System: Blue.
      - 2) 208 Volt System: Yellow.
      - 3) Other Systems: As indicated on Drawings.
  
- F. Stencil Installation:
  - 1. Apply stencil painting in accordance with Section 09 90 00.
  
- G. Underground Warning Tape Installation:
  - 1. Install underground warning tape along length of each underground conduit, raceway, or cable 6 to 8 inches below finished grade, directly above buried conduit, raceway, or cable.

END OF SECTION

SECTION 26 05 83  
WIRING CONNECTIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes electrical connections to equipment.
- B. Related Sections:
  - 1. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.
  - 2. Section 26 05 33 - Raceway and Boxes for Electrical Systems.

1.2 UNIT PRICE – MEASUREMENT AND PAYMENT

- A. Electrical and Controls, Complete:
  - 1. Basis of Measurement: Included in the lump sum price bid as stated in the proposal.
  - 2. Basis of Payment: Includes all associated labor, material, equipment coordination, transport, loading/unloading, storage, etc. required for a complete and operable system.

1.3 REFERENCES

- A. National Electrical Manufacturers Association:
  - 1. NEMA WD 1 - General Requirements for Wiring Devices.
  - 2. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit wiring device manufacturer's catalog information showing dimensions, configurations, and construction.
- C. Manufacturer's installation instructions.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Submittal procedures.
- B. Project Record Documents: Record actual locations, sizes, and configurations of equipment connections.

1.6 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.

- C. Determine connection locations and requirements.
- D. Sequence rough-in of electrical connections to coordinate with installation of equipment.
- E. Sequence electrical connections to coordinate with start-up of equipment.

## PART 2 - PRODUCTS

### 2.1 CORD AND PLUGS

- A. Manufacturers:
  - 1. Leviton Manufacturing Co., Inc.
  - 2. Pass & Seymour/Legrand (Pass & Seymour).
  - 3. Square D; by Schneider Electric.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Attachment Plug Construction: Conform to NEMA WD 1.
- C. Configuration: NEMA WD 6; match receptacle configuration at outlet furnished for equipment.
- D. Cord Construction: Type SO or SJO (to match power configuration) multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
- E. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify equipment is ready for electrical connection, for wiring, and to be energized.

### 3.2 INSTALLATION

- A. Make electrical connections.
- B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Install receptacle outlet to accommodate connection with attachment plug.
- E. Install cord and cap for field-supplied attachment plug.

- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.
- I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

### 3.3 ADJUSTING

- A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.
- B. Cooperate with utilization equipment installers and field service personnel during checkout and starting of equipment to allow testing and balancing and other startup operations. Provide personnel to operate electrical system and checkout wiring connection components and configurations.

END OF SECTION

SECTION 26 09 19  
ENCLOSED CONTACTORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes enclosed contactors for lighting and general purposes.
- B. Related Sections:
  - 1. Section 26 28 13 - Fuses.

1.2 UNIT PRICE – MEASUREMENT AND PAYMENT

- A. Electrical, Complete:
  - 1. Basis of Measurement: Included in the lump sum price bid for electrical as stated in the proposal.
  - 2. Basis of Payment: Includes all associated labor, material, equipment coordination, transport, loading/unloading, storage, etc. required for a complete and operable system.

1.3 REFERENCES

- A. National Electrical Manufacturers Association:
  - 1. NEMA FU 1 - Low Voltage Cartridge Fuses.
  - 2. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.
  - 3. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices.
  - 4. NEMA ICS 6 - Industrial Control and Systems: Enclosures.
  - 5. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
- B. International Electrical Testing Association:
  - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- C. Underwriters Laboratories Inc.:
  - 1. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit dimensions, size, voltage ratings and current ratings.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

- B. Project Record Documents: Record actual locations and ratings of enclosed contactors.
- C. Operation and Maintenance Data: Submit instructions for replacing and maintaining coil and contacts.

## 1.6 QUALIFICATIONS

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

## PART 2 - PRODUCTS

### 2.1 GENERAL PURPOSE CONTACTORS

- A. Manufacturers:
  - 1. Eaton.
  - 2. Square-D; by Schneider Electric.
  - 3. SIEMENS.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Product Description: NEMA ICS 2, AC general purpose magnetic contactor.
- C. Coil operating voltage: 120 volts, 60 Hertz.
- D. Poles: To match circuit configuration and control function.
- E. Product Features:
  - 1. Cover Mounted Pilot Devices: NEMA ICS 5, heavy-duty oiltight type with Form Z contacts, rated A150.
  - 2. Pushbutton: ON/OFF function, with recessed configuration.
  - 3. Selector Switch: ON/OFF/AUTOMATIC function, with rotary action.
  - 4. Indicating Light: RED lens, transformer or resistor type, with incandescent or led lamp.
  - 5. Auxiliary Contacts: One, field convertible in addition to seal-in contact.
  - 6. Relays: NEMA ICS 2, SPDT.
  - 7. Control Power Transformers: 120 volt secondary, sized as required for complete functional system, in each enclosed contactor. Furnish fused primary and secondary, and bond unfused leg of secondary to enclosure.
- F. Combination Contactors: Combine contactors with enclosed knife switch conforming to NEMA KS 1, with externally operable handle and fuse clips designed to accommodate NEMA FU 1, Class J fuses.
- G. Enclosure: NEMA ICS 6, to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard gray enamel.
  - 1. Interior Dry Locations: Type 1.
  - 2. Exterior Locations: Type 3R or 4.
  - 3. Hazardous Locations: Type 4X.



## 2.2 LIGHTING CONTACTORS

- A. Manufacturers:
  - 1. Eaton.
  - 2. Square D; by Schneider Electric.
  - 3. SIEMENS.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Product Description: NEMA ICS 2, magnetic lighting contactor.
- C. Configuration: Mechanically held, 2 or 3 wire control.
- D. Coil operating voltage: 120 volts, 60 Hertz.
- E. Poles: To match circuit configuration and control function.
- F. Contact Rating: Match branch circuit overcurrent protection, considering derating for continuous loads.
- G. Accessories:
  - 1. Cover Mounted Pilot Devices: NEMA ICS 5, heavy-duty oiltight type with Form Z contacts, rated A150.
  - 2. Pushbutton: ON/OFF function, with recessed configuration.
  - 3. Selector Switch: ON/OFF/AUTOMATIC function, with rotary action.
  - 4. Indicating Light: GREEN lens, transformer or resistor type, with incandescent or led lamp.
  - 5. Auxiliary Contacts: One, field convertible in addition to seal-in contact.
  - 6. Relays: NEMA ICS 2, SPDT.
  - 7. Control Power Transformers: 120 volt secondary, sized as required for complete functional system, in each enclosed contactor. Furnish fused primary and secondary, and bond unfused leg of secondary to enclosure.
- H. Combination Contactors: Combine contactors with enclosed knife switch conforming to NEMA KS 1, with externally operable handle and fuse clips designed to accommodate NEMA FU 1, Class J fuses.
- I. Enclosure: NEMA ICS 6, to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard gray enamel.
  - 1. Interior Dry Locations: Type 1.
  - 2. Exterior Locations: Type 3R or 4.
  - 3. Hazardous Locations: Type 4X.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install enclosed contactors as indicated on Drawings, in accordance with NECA "Standard of Installation."

- B. Install enclosed contactors plumb. Provide supports in accordance with Section 26 05 29.
- C. Height: 5 ft to operating handle.
- D. Install fuses for fusible switches. Refer to Section 26 28 13 for product requirements.
- E. Install engraved plastic nameplates. Refer to Section 26 05 53 for product requirements and location.

### 3.2 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.16.1.

END OF SECTION

SECTION 26 27 16  
ELECTRICAL CABINETS AND ENCLOSURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Hinged cover enclosures.
  - 2. Cabinets.
  - 3. Terminal blocks.
  - 4. Accessories.
  
- B. Related Requirements:
  - 1. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
  - 2. Section 26 05 29 - Hangers and Supports for Electrical Systems.
  - 3. Section 26 05 33 - Raceway and Boxes for Electrical Systems.

1.2 UNIT PRICE – MEASUREMENT AND PAYMENT

- A. Electrical, Complete:
  - 1. Basis of Measurement: Included in the lump sum price bid for electrical as stated in the proposal.
  - 2. Basis of Payment: Includes all associated labor, material, equipment coordination, transport, loading/unloading, storage, etc. required for a complete and operable system.

1.3 REFERENCE STANDARDS

- A. National Electrical Manufacturers Association:
  - 1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
  - 2. NEMA ICS 4 - Industrial Control and Systems: Terminal Blocks.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
  
- B. Product Data: Submit manufacturer's standard data for enclosures, cabinets, and terminal blocks.
  
- C. Manufacturer's Instructions: Submit application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
  
- D. Qualification Statements
  - 1. Submit manufacturer, installer, and licensed professional experience qualifications.
  - 2. Submit manufacturer's approval of installer.

## 1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for maintenance materials.
- B. Extra Stock Materials:
  - 1. Furnish two of each key.

## 1.6 QUALIFICATIONS

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

## PART 2 - PRODUCTS

### 2.1 HINGED COVER ENCLOSURES

- A. Manufacturers:
  - 1. Saginaw Control Engineering
  - 2. Hoffman.
  - 3. Wiegmann; Hubbell Inc.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Description: NEMA 250, steel, stainless steel, or fiberglass enclosure.
  - 1. Indoor, Dry Locations: NEMA 1, steel
  - 2. Wet, Damp, or Outdoor Locations: NEMA 3R, steel
  - 3. Hazardous Locations: NEMA 4X, fiberglass or stainless-steel
  - 4. Covers: Continuous hinge, held closed by flush latch operable by screwdriver or key (as indicated), hasp and staple for padlock.
  - 5. Furnish interior metal panel for mounting terminal blocks and electrical components; finish with white enamel.
  - 6. Enclosure Finish: Manufacturer's standard enamel, unless stainless steel.

### 2.2 CABINETS

- A. Manufacturers:
  - 1. Saginaw Control Engineering
  - 2. Hammond Mfg. Co. Inc.
  - 3. Hoffman.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Description:
  - 1. Boxes: Galvanized steel.
  - 2. Box Size: As required for wiring and components plus 25% spare, or as shown on drawings.
  - 3. Backplate: Furnish interior metal panel for mounting terminal blocks and electrical components; finish with white enamel.
  - 4. Fronts: Steel, flush or surface type (as indicated) with concealed trim clamps, screw cover front, door with concealed hinge, and flush lock keyed to match branch circuit panelboard.

5. Knockouts: Manufacturer's standard, unless otherwise indicated.
6. Ratings: NEMA ICS 6:
  - a. Indoor, Dry Locations: Type 1 or 12
  - b. Wet, Damp, or Outdoor Locations: Type 3R, 4 or 4X or as listed on drawings.

C. Fabrication

1. Furnish metal barriers to form separate compartments wiring of different systems and voltages.
2. Furnish accessory feet for free-standing equipment.

D. Finishes:

1. Finish with gray baked enamel.

## 2.3 TERMINAL BLOCKS

A. Manufacturers:

1. Allen-Bradley/Rockwell Automation.
2. Bussmann, an Eaton business.
3. Square D; by Schneider Electric.
4. Substitutions: Section 01 60 00 - Product Requirements.

B. Description:

1. Terminal Blocks: NEMA ICS 4.
2. Power Terminals: Unit construction type with closed back and tubular pressure screw connectors, rated 600 volts.
3. Signal and Control Terminals: Modular construction type, suitable for channel mounting, with tubular pressure screw connectors, rated 300 volts.
4. Furnish ground bus terminal block, with each connector bonded to enclosure.

## 2.4 PLASTIC RACEWAY

A. Manufacturers:

1. Panduit Corp.
2. Wiremold / Legrand.
3. Substitutions: Section 01 60 00 - Product Requirements.

B. Description: Plastic channel with hinged or snap-on cover.

## 2.5 CORROSION PROTECTION

A. Manufacturers; Emitter:

1. Cortec Corporation.
2. Substitutions: Section 01 60 00 - Product Requirements.
3. Description: Foam emitter to provide long term protection against corrosion by airborne contaminants.
  - a. For each enclosure, furnish quantity as indicated in manufacturer's instructions to protect the enclosure.

B. Manufacturers; Absorber:

1. Cortec Corporation.
2. Substitutions: Section 01 60 00 - Product Requirements.
3. Description: Plastic cup with breathable membrane to absorb corrosive gasses from the enclosure.
  - a. For each enclosure, furnish quantity as indicated in manufacturer's instructions to protect the enclosure.

### PART 3 - EXECUTION

#### 3.1 REPAIR AND RESTORATION

- A. Repair existing cabinets and enclosures to remain or to be reinstalled.

#### 3.2 INSTALLATION

- A. Install enclosures and boxes plumb. Anchor securely to wall and structural supports at each corner in accordance with Section 26 05 29.
- B. Install cabinet fronts plumb.

#### 3.3 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
- B. Clean existing cabinets and enclosures to remain or to be reinstalled.
- C. Clean electrical parts to remove conductive and harmful materials.
- D. Remove dirt and debris from enclosure.
- E. Clean finishes and touch up damage.

END OF SECTION

SECTION 26 27 26  
WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes wall switches; wall dimmers; receptacles; multioutlet assembly; and device plates and decorative box covers.
- B. Related Sections:
  - 1. Section 26 05 33 - Raceway and Boxes for Electrical Systems.

1.2 UNIT PRICE – MEASUREMENT AND PAYMENT

- A. Electrical, Complete:
  - 1. Basis of Measurement: Included in the lump sum price bid for electrical as stated in the proposal.
  - 2. Basis of Payment: Includes all associated labor, material, equipment coordination, transport, loading/unloading, storage, etc. required for a complete and operable system.

1.3 REFERENCES

- A. National Electrical Manufacturers Association:
  - 1. NEMA WD 1 - General Requirements for Wiring Devices.
  - 2. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit manufacturer's catalog information showing dimensions, colors, and configurations.
- C. Samples: Submit two samples of each wiring device and wall plate illustrating materials, construction, color, and finish.

1.5 QUALIFICATIONS

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

1.6 EXTRA MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Furnish two of each style, size, and finish wall plate.

## PART 2 - PRODUCTS

### 2.1 WALL SWITCHES

- A. Manufacturers; Wall Switch:
  - 1. Leviton Manufacturing Co., Inc.
  - 2. Lutron Electronics Co., Inc.
  - 3. Pass & Seymour/Legrand (Pass & Seymour).
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Product Description: NEMA WD 1, Heavy-Duty, AC only general-use snap switch.
- C. Body and Handle: Ivory plastic with toggle handle.
- D. Indicator Light: Lighted handle type switch or Separate pilot strap; red color handle or lens.
- E. Locator Light: Lighted handle type switch; green color handle.
- F. Ratings:
  - 1. Voltage: 120-277 volts, AC.
  - 2. Current: 20 amperes.

### 2.2 RECEPTACLES

- A. Manufacturers:
  - 1. Eaton (Arrow Hart).
  - 2. Hubbell Premise Wiring.
  - 3. Leviton Manufacturing Co., Inc.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Product Description: NEMA WD 1, Heavy-duty general use receptacle.
- C. Device Body: Ivory plastic.
- D. Configuration: NEMA WD 6, type.
- E. Convenience Receptacle: Type 5-20.
- F. GFCI Receptacle: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements.

### 2.3 WALL PLATES

- A. Manufacturers:
  - 1. Leviton Manufacturing Co., Inc.
  - 2. RACO; Hubbell.
  - 3. Square D; by Schneider Electric.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.



- B. Decorative Cover Plate: Smooth 302 stainless steel.
- C. Jumbo Cover Plate: Smooth 302 stainless steel.
- D. Weatherproof Cover Plate: Stainless steel plate with threaded and gasketed device cover.

#### 2.4 MULTIOUTLET ASSEMBLY

- A. Manufacturers:
  - 1. Cutler-Hammer.
  - 2. Wiremold / Legrand.
  - 3. Substitutions: Section 01 60 00 - Product Requirements.
- B. Multi-outlet Assembly: Sheet metal channel with fitted cover, with pre-wired receptacles, suitable for use as multi-outlet assembly.
- C. Size: As required or indicated on Drawings.
- D. Receptacles: Furnish covers and accessories to accept receptacles specified in this Section.
- E. Receptacle Spacing: As indicated on Drawings.
- F. Receptacle Color: Ivory.
- G. Channel Finish: Stainless steel.
- H. Fittings: Furnish manufacturer's standard couplings, elbows, outlet and device boxes, and connectors.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify outlet boxes are installed at proper height.
- C. Verify wall openings are neatly cut and completely covered by wall plates.
- D. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

#### 3.2 PREPARATION

- A. Clean debris from outlet boxes.

#### 3.3 INSTALLATION

- A. Install devices plumb and level.

- B. Install switches with OFF position down.
- C. Install receptacles with grounding pole on bottom.
- D. Connect wiring device grounding terminal to outlet box with bonding jumper and branch circuit equipment grounding conductor.
- E. Install wall plates on flush mounted switches, receptacles, and blank outlets.
- F. Install decorative plates on switch, receptacle, and blank outlets in finished areas.
- G. Connect wiring devices by wrapping solid conductor around screw terminal. Install stranded conductor for branch circuits 10 AWG and smaller. When stranded conductors are used in lieu of solid, use crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under device screws.
- H. Use jumbo size plates for outlets installed in masonry walls.
- I. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

### 3.4 INTERFACE WITH OTHER PRODUCTS

- A. Coordinate locations of outlet boxes provided under Section 26 05 33 to obtain mounting heights as specified and as indicated on drawings.
- B. Install wall switch 48 inches above finished floor.
- C. Install convenience receptacle Minimum 18 inches above finished floor.

### 3.5 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements
- B. Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- C. Inspect each wiring device for defects.
- D. Operate each wall switch with circuit energized and verify proper operation.
- E. Verify each receptacle device is energized.
- F. Test each receptacle device for proper polarity.
- G. Test each GFCI receptacle device for proper operation.

### 3.6 ADJUSTING

- A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.

B. Adjust devices and wall plates to be flush and level.

3.7 CLEANING

A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.

B. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION

SECTION 26 28 13  
FUSES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Fuses.

1.2 UNIT PRICE – MEASUREMENT AND PAYMENT

- A. Electrical, Complete:
  - 1. Basis of Measurement: Included in the lump sum price bid for electrical as stated in the proposal.
  - 2. Basis of Payment: Includes all associated labor, material, equipment coordination, transport, loading/unloading, storage, etc. required for a complete and operable system.

1.3 REFERENCE STANDARDS

- A. National Electrical Manufacturers Association:
  - 1. NEMA FU 1 - Low Voltage Cartridge Fuses.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data sheets showing electrical characteristics, including time-current curves.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual sizes, ratings, and locations of fuses.

1.6 MAINTENANCE MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for maintenance materials
- B. Spare Parts:
  - 1. Furnish two fuse pullers.
- C. Extra Materials:
  - 1. Furnish three spare fuses of each Class, size, and rating installed.

## 1.7 QUALITY ASSURANCE

### A. Qualifications:

1. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

#### A. Manufacturers:

1. Bussmann, an Eaton business.
2. Substitutions: Section 01 60 00 - Product Requirements.

### 2.2 DESIGN REQUIREMENTS

- A. Select fuses to provide appropriate levels of short circuit and overcurrent protection for the following components: wire, cable, bus structures, and other equipment. Design system to maintain component damage within acceptable levels during faults.
- B. Select fuses to coordinate with time current characteristics of other overcurrent protective elements, including other fuses, circuit breakers, and protective relays. Design system to maintain operation of device closest to fault operates.

### 2.3 FUSES PERFORMANCE REQUIREMENTS

- A. Main Service Switches Larger than 600 amperes: Class L (time delay).
- B. Main Service Switches: Class RK1 (time delay). RK5. J (time delay).
- C. Power Load Feeder Switches Larger than 600 amperes: Class L (time delay).
- D. Power Load Feeder Switches: Class RK1 (time delay). RK5. J (time delay).
- E. Motor Load Feeder Switches: Class RK1 (time delay). RK5. J (time delay).
- F. Lighting Load Feeder Switches Larger than 600 amperes: Class L time delay.
- G. Lighting Load Feeder Switches: Class RK1 (time delay). RK5. J (time delay).
- H. Other Feeder Switches Larger than 600 amperes: Class L time delay.
- I. Other Feeder Switches: Class RK1 (time delay). RK5. J (time delay).
- J. General Purpose Branch Circuits: Class RK1 (time delay). RK5. J (time delay).
- K. Motor Branch Circuits: Class RK1 (time delay). RK5. J (time delay).
- L. Lighting Branch Circuits: Class G.

## 2.4 FUSES

- A. Dimensions and Performance: NEMA FU 1, Class as specified or as indicated on Drawings.
- B. Voltage: Rating suitable for circuit phase-to-phase voltage.

## 2.5 CLASS RK1 (TIME DELAY) FUSES

- A. Dimensions and Performance: NEMA FU 1.
- B. Voltage: Rating suitable for circuit phase-to-phase voltage.

## 2.6 CLASS RK1 (NON-TIME-DELAY) FUSES

- A. Dimensions and Performance: NEMA FU 1.
- B. Voltage: Rating suitable for circuit phase-to-phase voltage.

## 2.7 CLASS RK5 FUSES

- A. Dimensions and Performance: NEMA FU 1.
- B. Voltage: Rating suitable for circuit phase-to-phase voltage.

## 2.8 CLASS J (TIME DELAY) FUSES

- A. Dimensions and Performance: NEMA FU 1.
- B. Voltage: Rating suitable for circuit phase-to-phase voltage.

## 2.9 CLASS J (NON-TIME-DELAY) FUSES

- A. Dimensions and Performance: NEMA FU 1.
- B. Voltage: Rating suitable for circuit phase-to-phase voltage.

## 2.10 CLASS T FUSES

- A. Dimensions and Performance: NEMA FU 1.
- B. Voltage: Rating suitable for circuit phase-to-phase voltage.

## 2.11 CLASS L (FAST-ACTING) FUSES

- A. Dimensions and Performance: NEMA FU 1.
- B. Voltage: Rating suitable for circuit phase-to-phase voltage.

## 2.12 CLASS L (TIME DELAY) FUSES

- A. Dimensions and Performance: NEMA FU 1.
- B. Voltage: Rating suitable for circuit phase-to-phase voltage.

## 2.13 CLASS G FUSES

- A. Dimensions and Performance: NEMA FU 1.
- B. Voltage: Rating suitable for circuit phase-to-phase voltage.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install fuse with label oriented so manufacturer, type, and size are easily read.
- B. Spare Parts – Provide 10% spare fuses of each type and size provided for this project.

END OF SECTION

SECTION 26 28 16.16  
ENCLOSED SWITCHES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fusible.
2. Non-fusible switches.

B. Related Sections:

1. Section 26 05 29 - Hangers and Supports for Electrical Systems.
2. Section 26 05 53 - Identification for Electrical Systems.
3. Section 26 28 13 - Fuses.

1.2 UNIT PRICE – MEASUREMENT AND PAYMENT

A. Electrical, Complete:

1. Basis of Measurement: Included in the lump sum price bid for electrical as stated in the proposal.
2. Basis of Payment: Includes all associated labor, material, equipment coordination, transport, loading/unloading, storage, etc. required for a complete and operable system.

1.3 REFERENCE STANDARDS

A. National Electrical Manufacturers Association:

1. NEMA FU 1 - Low Voltage Cartridge Fuses.
2. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

B. International Electrical Testing Association:

1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit switch ratings and enclosure dimensions.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of enclosed switches and ratings of installed fuses.



## 1.6 QUALIFICATIONS

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

## PART 2 - PRODUCTS

### 2.1 FUSIBLE SWITCH ASSEMBLIES

- A. Manufacturers:
  - 1. Eaton.
  - 2. Siemens.
  - 3. Square D; by Schneider Electric.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Description: NEMA KS 1, Type HD, enclosed load interrupter knife switch. Handle lockable in OFF position.
- C. Operation:
  - 1. Switch Ratings
    - a. Switch Rating: Horsepower rated for AC or DC as indicated on Drawings.
    - b. Short Circuit Current Rating: UL listed for 10,000 rms symmetrical amperes when used with or protected by Class H or K fuses (30-600 ampere). 200,000 rms symmetrical amperes when used with or protected by Class R or Class J fuses (30-600 ampere switches employing appropriate fuse rejection schemes). 200,000 rms symmetrical amperes when used with or protected by Class L fuses (800-1200 ampere).
- D. Materials:
  - 1. Coordinate selection in the following paragraph with fuses specified for application in enclosed switches.
  - 2. Fuse clips: Designed to accommodate NEMA FU 1 fuses.
    - a. Fuse Class to match required application.
  - 3. Enclosure: NEMA KS 1, to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard gray enamel.
    - a. Interior Dry Locations: Type 1.
    - b. Exterior Locations: Type 3R or 4.
    - c. Industrial Locations: Type 4X.
  - 4. Service Entrance: Switches identified for use as service equipment are to be labeled for this application. Furnish solid neutral assembly and equipment ground bar.
  - 5. Furnish switches with entirely copper current carrying parts.

### 2.2 NONFUSIBLE SWITCH ASSEMBLIES

- A. Manufacturers:
  - 1. Eaton.
  - 2. Siemens.
  - 3. Square D; by Schneider Electric.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.

- B. Description: NEMA KS 1, Type HD enclosed load interrupter knife switch. Handle lockable in OFF position.
- C. Operation:
  - 1. Switch Ratings
    - a. Switch Rating: Horsepower rated for AC or DC as indicated on Drawings.
    - b. Short Circuit Current Rating: UL listed for 10,000 rms symmetrical amperes when used with or protected by Class H or K fuses (30-600 ampere). 200,000 rms symmetrical amperes when used with or protected by Class R or Class J fuses (30-600 ampere switches employing appropriate fuse rejection schemes). 200,000 rms symmetrical amperes when used with or protected by Class L fuses (800-1200 ampere).
- D. Materials:
  - 1. Enclosure: NEMA KS 1, to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard gray enamel.
    - a. Interior Dry Locations: Type 1.
    - b. Exterior Locations: Type 3R or 4.
    - c. Industrial Locations: Type 4X.
  - 2. Service Entrance: Switches identified for use as service equipment are to be labeled for this application. Furnish solid neutral assembly and equipment ground bar.
  - 3. Furnish switches with entirely copper current carrying parts.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install enclosed switches where indicated.
- B. Install enclosed switches plumb. Provide supports in accordance with Section 26 05 29.
- C. Height: 5 feet to operating handle.
- D. Install fuses for fusible disconnect switches. Refer to Section 26 28 13 for product requirements.
- E. Install engraved plastic nameplates in accordance with Section 26 05 53. Engrave nameplates with the equipment served and the panel and circuit number supplying the switch.
- F. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.

### 3.2 FIELD QUALITY CONTROL

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.5.

3.3 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.
- B. Clean existing enclosed switches to remain or to be reinstalled.

END OF SECTION

## SECTION 31 10 00

### SITE CLEARING

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Site Clearing
  - 2. Channel Clearing, Grubbing, and Herbicide Application
  - 3. Topsoil Excavation
  - 4. Debris Management
  - 5. Marketable Timber
  - 6. Fences and/or other private property
  
- B. Related Sections:
  - 1. Section 31 22 13 - Rough Grading.
  - 2. Section 31 25 00 - Erosion and Sedimentation Controls.
  - 3. Section 31 23 16 - Excavation.
  - 4. Section 32 91 19 - Landscape Grading.

##### 1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Site Clearing:
  - 1. Basis of Measurement: At the lump sum price bid as stated in the proposal.
  - 2. Basis of Payment: Includes material, labor, and equipment for removal and disposal of trees, stumps, brush, and equipment for clearing of site, loading and removing waste material as indicated in specifications and/or drawings, loading and removing of unsalvageable structures, excavation, and removing and hauling all trees, debris, stumps and root balls to upland locations or off site as specified on the drawings. Also includes, root raking of spoils in farm areas, and culverts as indicated, and applying herbicide to designated plant life and cutting stumps as specified.

##### 1.3 SUBMITTALS

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

## PART 2 - PRODUCTS

### 2.1 MATERIALS

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

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 PREPARATION

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

### 3.3 PROTECTION

- A. Locate, identify, and protect utilities indicated to remain, from damage.
- B. Protect bench marks, survey control points, and existing structures from damage or displacement. Protect survey stakes and survey monuments. If monuments, stakes or benchmarks are damaged or destroyed, the Contractor will be responsible for replacements costs.
- C. All trees outside of right-of-way and those trees within right-of-way specified by Owner shall be protected.

### 3.4 CLEARING, GRUBBING AND HERBICIDE APPLICATION

- A. Notify Engineer forty-eight (48) hours prior to clearing, grubbing, or applying herbicide.
- B. Clear all trees, shrubs, and brush located between top of drain banks in accordance with the following:
  - 1. In reaches proposed for cleanout and restoration, the Contractor shall not excavate.
  - 2. In reaches proposed for clearing and grubbing, the Contractor shall remove and/or excavate all stumps, trees, and brush.
  - 3. In reaches proposed for sloping one bank, the Contractor shall excavate and grub side slope proposed for excavation and shall hand clear, without grubbing, on opposite side. Ground vegetation on opposite side shall not be disturbed. Spray all stumps.
  - 4. In reaches proposed for sloping two banks, clear and grub.
- C. Stumps located in drain bottom toe of slope, or in proposed excavation areas shall be grubbed.
- D. Stumps not indicated for grubbing shall be trimmed within six (6) inches of proposed grade and sprayed with herbicide to inhibit future growth.
- E. Apply herbicide to all trees, shrubs, brush and stumps located between tops of drain banks.
- F. Clear areas required for access to site and execution of work or as indicated on plans.
- G. Channel clearing and grubbing to be done according to the plans.
- H. Burying of wood, stumps and debris is permitted in wooded areas and must be buried a minimum of 3 feet below the existing ground surface.
- I. All wood, stumps or debris shall be hauled from agricultural and lawn areas. No wood, stumps or debris shall be buried in agricultural and lawn areas.

### 3.5 REMOVAL

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

### 3.6 TOPSOIL EXCAVATION

- A. Excavate topsoil from areas to be further excavated, re-landscaped, or regraded without mixing with foreign materials for use in finish grading.

- B. Do not excavate wet topsoil.
- C. Stockpile in area designated on site to depth not exceeding 8 feet and protect from erosion.
- D. Do not remove topsoil from site.

### 3.7 DEBRIS MANAGEMENT

- A. Coordinate debris management with Engineer, prior to construction.
- B. Debris, stumps, and root balls **shall not be buried in residential lawn, agricultural areas, or within dikes**. Coordinate locations with landowners. Landowner agreement forms shall be provided where burying debris outside of existing drain right-of-way
- C. Burnable debris will be burned in agricultural areas. Other areas must be approved by the Engineer.
- D. The Contractor must obtain burning permits from the proper authority.
- E. Woody Debris.
  - 1. Wooded areas – Stumps shall be chipped or buried in wooded areas or hauled. Trees shall be topped, and placed outside drain right-of-way if landowner requests to keep wood or chipped. Treetops and small trees must be chipped, hauled or buried. Wood chips shall be spread along backside of spoil piles.
  - 2. Agricultural areas – Debris shall be chipped or hauled. Wood chips shall be spread along backside of spoil piles.
  - 3. Residential areas – As indicated on drawings. All debris shall be disposed of. All stumps shall be removed from the site and disposed of.
- F. In agricultural areas, root rake and hand pick sticks and rocks so that foreign debris 1' in length or 6" in diameter is disposed of.
- G. Non-Woody Debris.
  - 1. Wooded areas – Debris to be buried within the Drain right-of-way.
  - 2. Agricultural areas – Debris to be removed and disposed of.
  - 3. Residential areas – Debris to be removed and disposed of.
  - 4. Existing spoils do not require leveling unless the proposed construction activity requires it. Any leveling of existing spoils will be incidental to other work items.

### 3.8 MARKETABLE TIMBER

- A. Contractor may remove timber from site provided landowner is not opposed to timber removal.
- B. Top trees, remove stumps and windrow outside drain right-of-way for landowners requesting timber. Treetops and small trees shall be chipped or removed from the site. Wood chips shall be spread along backside of spoil banks. In lawn and landscaped areas, all debris must be removed unless requested by landowner.

### 3.9 FENCES AND/OR OTHER PRIVATE PROPERTY

- A. Fences and other private property located within drain right-of-way are the responsibility of the landowner.
- B. Contractor shall notify landowners and engineer of conflicts and provide reasonable cooperation and assistance.
- C. Any structures outside of drain right-of-way shall not be disturbed. Contractor shall correct all damage outside of right-of-way at his expense.
- D. Contractor shall disassemble fence, etc. and stockpile off right-of-way, and landowner is responsible for reassembly. No extra payment will be made for fences, etc.

END OF SECTION



## SECTION 31 22 13

### ROUGH GRADING

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Excavating topsoil.
  - 2. Excavating subsoil.
  - 3. Filling.
  - 4. Spoil Leveling.
  - 5. Cutting, grading and rough contouring the site.
  
- B. Related Sections:
  - 1. Section 31 10 00 - Site Clearing.
  - 2. Section 31 23 16 - Excavation.
  - 3. Section 31 23 23 – Fill.
  - 4. Section 32 91 19 - Landscape Grading.

##### 1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Rough Grading:
  - 1. Basis of Measurement: Included in the unit price bid for dike and channel reconstruction, drain crossings, spoil leveling and cleanup and site restoration.
  - 2. Basis of Payment: Includes all labor and equipment required for excavation, filling and grading to provide required contours and grades.
  
- B. Site Work and Grading
  - 1. Basis of Measurement: At the lump sum price bid as stated in the proposal.
  - 2. Basis of Payment: Includes all labor, equipment, and material for all miscellaneous site improvements, and perform/construct grading as shown on plans that do not have a dedicated bid item.

##### 1.3 REFERENCES

- A. American Association of State Highway and Transportation Officials:
  - 1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
  
- B. ASTM International:
  - 1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - 2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).

3. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
4. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).
5. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
6. ASTM D2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
7. ASTM D2434 - Standard Test Method for Permeability of Granular Soils (Constant Head).
8. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
9. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

C. Michigan Department of Transportation (MDOT)

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

#### 1.4 SUBMITTALS

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

#### 1.5 CLOSEOUT SUBMITTALS

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

#### 1.6 QUALITY ASSURANCE

- A. MDOT Density Control Handbook, current edition.
- B. MDOT Standard Specifications for Construction, current edition.
- C. Test Method for Density of Soil in Place with loss by wash less than 15 percent – One Point Michigan Cone Test.
- D. Test Method for Density of Soil with loss by wash greater than 15 percent – One Point T-99 Test.

- E. ASTM D2922 – Test Methods of Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. See Section 31 23 23 Fill
- B. Topsoil: Excavated material, graded, free of roots, rocks, subsoil, debris, and large weeds.
- C. Subsoil: Excavated material, graded, free of lumps larger than 6 inches, rocks larger than 3 inches and debris.
- D. Granular Fill: Type B: MDOT Class II for dry excavation. Substitute with Type A MDOT 6A coarse stone for wet excavation.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting Work.
- B. Verify survey bench mark and intended elevations for the Work are as indicated on Drawings.
- C. Verify that fill materials to be used are acceptable.

### 3.2 PREPARATION

- A. Call Miss Dig service not less than three Working days before performing Work.
  - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum.
- C. Notify utility company to remove and relocate utilities.
- D. Protect utilities indicated to remain from damage.
- E. Protect plant life, lawns, rock outcropping and other features remaining as portion of final landscaping.
- F. Protect bench marks, survey control point, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

### 3.3 TOPSOIL EXCAVATION

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

### 3.4 SUBSOIL EXCAVATION

- A. Excavate subsoil from areas to be further excavated, re-landscaped, or re-graded.
- B. Do not excavate wet subsoil or excavate and process wet material to obtain optimum moisture content.
- C. When excavating through roots, perform Work by hand and cut roots with sharp axe.
- D. Stockpile excavated material in area designated on site in accordance with the drawings.
- E. Benching Slopes: Horizontally bench existing slopes greater than 1: 4 to key placed fill material to slope to provide firm bearing.
- F. Stability: Replace damaged or displaced subsoil as specified for fill.
- G. Spoil leveling shall be done in accordance with Section 31 23 16 – Excavation.

### 3.5 FILLING

- A. Fill areas to contours and elevations with unfrozen materials.
- B. Place fill material in continuous layers and compact.
- C. Place material in continuous layers as follows:
  - 1. Subsoil Fill: Maximum 12 inches compacted depth.
  - 2. Structural Fill: Maximum 8 inches compacted depth.
  - 3. Granular Fill: Maximum 8 inches compacted depth.
- D. Maintain optimum moisture content of fill materials to attain required compaction density.
- E. Slope grade away from building minimum 5 percent slope for minimum distance of 10 ft, unless noted otherwise.
- F. Make grade changes gradual. Blend slope into level areas.
- G. Repair or replace items indicated to remain damaged by excavation or filling.

### 3.6 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Top Surface of Subgrade: Plus or minus 1/10 foot from required elevation.

### 3.7 FIELD QUALITY CONTROL

- A. Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Perform laboratory material tests in accordance with AASHTO T180.
- C. Perform in place compaction tests in accordance with the following:
  - 1. Density Tests: ASTM D1556 or ASTM D2922.
  - 2. Moisture Tests: ASTM D3017.
- D. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
  - 1. Remove Work, replace and retest at no cost to Owner.
- E. Frequency of Tests: As required to ensure installation meets specifications.

### 3.8 SCHEDULES

- A. Fill under Grass Areas: Subsoil Type D fill, to 6 inches below finish grade.
- B. Fill Under Asphalt Paving: Type B fill, to subgrade elevation.
- C. Fill Under Concrete Building Pads, Concrete Pads, Concrete Curb and Gutter and Sidewalks:
  - 1. Type B fill, to within 4" of underside of concrete slab.
- D. Backfill for Utility Trenches:
  - 1. Bedding as specified in individual utility specification section.
  - 2. Backfill material as specified in Section 31 23 17 - Trenching and as defined here in for typed fill.
- E. Fill for Subgrade and Undercutting:
  - 1. Type B fill to proposed subgrade elevation, in dry areas.
  - 2. Type A in wet areas and for undercutting backfill, unless otherwise directed by the Engineer.

END OF SECTION

## SECTION 31 23 16

### EXCAVATION

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Open Channel Excavation.
  - 2. Spoil removal and hauling.
  - 3. Spoil leveling.
  
- B. Related Sections:
  - 1. Section 31 22 13 - Rough Grading.
  - 2. Section 31 23 23 - Fill.
  - 3. Section 31 10 00 - Site Clearing.
  - 4. Section 33 42 13 – Public Pipe Culverts.

##### 1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Dike and Channel Reconstruction:
  - 1. Basis of Measurement: At the unit price bid per linear foot as stated in the proposal.
  - 2. Basis of Payment: Includes material, labor, and equipment to construct the side slopes, maintenance shelves and dikes to required contours as shown on the drawings, diversion of water and/or dewatering. Also includes construction of access ramps as shown on plans.
  
- B. Sediment Sump:
  - 1. Basis of Measurement: At the lump sum price bid as stated in the proposal.
  - 2. Basis of Payment: Includes material, labor, and equipment necessary to excavate/construct a sediment sump as indicated on drawings and specifications.
  
- C. Subgrade Undercutting and Backfilling:
  - 1. Basis of Measurement: At the unit price bid per cubic yard for subgrade undercut.
  - 2. Basis of Payment: Includes all labor, materials, and equipment to remove poor subgrade below the proposed subgrade elevations shown on the drawings. Replace with Type A fill as indicated on plans or as directed by Engineer. Compact as specified in Section 31 23 23 – Fill.

##### 1.3 REFERENCES

- A. Local utility standards when working within 24 inches of utility lines.

#### 1.4 SUBMITTALS

- A. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan.
- B. Shop Drawings: Indicate soil densification grid for each size and configuration footing requiring soils densification.

#### 1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with MDOT Standard Specifications for Construction, current edition.

#### 1.6 QUALIFICATIONS

- A. Prepare excavation protection plan under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Michigan.

### PART 2 - PRODUCTS

#### 2.1 Not Used.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Call Miss Dig service not less than three working days before performing Work.
  - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum.
- C. Notify utility company when specified to remove and relocate utilities.
- D. Protect utilities indicated to remain from damage.
- E. Protect plant life, lawns, rock outcroppings and other features remaining as portion of final landscaping.
- F. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- G. Protect grade and slope stakes.

#### 3.2 EXCAVATION

- A. Clear site in accordance with Section 31 10 00 – Site Clearing.

- B. Excavate drain to the dimensions and cross sections specified on drawings.
- C. Contractor shall check flow line elevations every 100 ft. (Engineer will provide Grade stakes). Over excavation of 0.3 ft. or greater will be filled with Type A stone to the proposed flow line as incidental cost to the Contractor.
- D. Contractor shall remove all sediment from existing culverts to remain.
- E. When drain parallels a road, all excavation will be on field side slope, unless stated on drawing or required by Engineer.
- F. Underpin adjacent structures, which may be damaged by excavation work, including utilities and pipe chases.
- G. Machine slope banks to required slopes.
- H. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- I. Correct unauthorized excavation at no extra cost to Owner.
- J. Seed excavated areas daily in accordance with Section 32 92 19 – Seeding.
- K. Repair and replace field tile outlets, as directed by Engineer and in accordance with Section 33 42 14 – Lateral Tile Drains.
- L. Match existing side slopes in reaches identified channel cleanout.
- M. Excess spoils on roadsides and lawn areas are to be hauled away.
- N. When excavating one side slope of drain. The opposite ditch bank shall be cleared in accordance with Section 311000 – Site Clearing. Grass vegetation should not be removed on opposite side slopes.
- O. Earth Excavation:
  1. Clear site in accordance with Section 31 10 00 - Site Clearing.
  2. Excavate detention areas to the subgrade elevations, dimensions and cross sections specified on drawings.
  3. Underpin, brace, or shore adjacent structures, which may be damaged by excavation work, including utilities and pipe chases.
  4. Machine slope banks to required slopes.
  5. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume Work.
  6. Correct unauthorized excavation at no cost of Owner.
  7. Remove and haul material from site or dispose of materials on Site as specified on the drawings. Payment for these items is included in the Earth Excavation pay item.
  8. Dewater excavations as necessary for construction.
  9. Grade top perimeter of excavation to prevent surface water from draining into excavation.
  10. Provide, operate and maintain pumping equipment to keep excavation free of water.
  11. Remove lumped subsoil, boulders, and rock.
  12. Correct areas over excavated by error in accordance with Section 31 23 23 – Fill.



- P. Subgrade Undercutting and Backfilling
1. In areas that are suspect and may require subgrade undercutting, notify Engineer immediately. Do not proceed until it is agreed subgrade undercutting is required and quantities can be documented.
  2. Remove the subgrade undercut quantity of material as determined adequate by Engineer.
  3. Backfill with Type A fill for Work under structures, crossings, etc. Backfill with embankment material for embankment construction. All work shall be according to the drawings and directed by the Engineer.
  4. Compact fill material as specified in Section 31 23 23 – Fill.
- Q. Spoil Leveling
1. Spoils in all areas shall be placed according to the plan details.
  2. Seed spoils in accordance with Section 32 92 19 - Seeding.
  3. Spoils are to be leveled in drain right-of-way or on Site, as shown on drawings, unless Contractor receives written permission from Landowner to stockpile utilizing Landowner Agreement Form.
  4. Spoils placed on tillable land shall be spread evenly as shown on drawings.
  5. Spoils are to be kept a minimum 3 feet from excavation area.
  6. No excavated materials shall be placed on roads without written permission of the authorities having jurisdiction of said road.
  7. Spoils excavated in areas adjacent to residential or lawn areas are to be removed from the area unless directed by the Engineer, shown on drawings, or Contractor receives written permission from Landowner to level in area.
  8. No spoils are to be placed in any watercourse or drain.
  9. Side grade outs for watercourse and ditches shall be done at the time of open drain excavation or channel cleanout.
  10. Non-combustible items (i.e. roots and stumps), brush, or debris shall not be mixed with leveled spoil material.
  11. Shape leveled spoils to prevent the ponding of water behind spoil piles.
  12. Level spoils on the same side of the drain which excavation occurs. If excavation occurs from both sides of drain then make even spoil piles on both sides of drain unless otherwise directed by the Engineer.
  13. In agricultural, lawn, landscaped, or otherwise developed areas, root rake and hand pick sticks and rocks so that all foreign debris is disposed of.
  14. Prior to completion, spoil piles must be raked to remove wood and rocks.
  15. Topsoil must be placed on spoil piles in which the native excavated material is not suitable for establishing vegetation as determined by the Engineer.
- R. Spoil Hauling
1. Contractor is responsible for identifying and disposing of spoils in acceptable locations in accordance with all local, state and or federal requirements.
  2. Spoils must be hauled from lawn and landscaped areas and as indicated in the drawings. No extra payment will be made for spoil hauling in areas not indicated to be hauled; however, for ease of construction, Contractor may choose to haul spoils.

### 3.3 FIELD QUALITY CONTROL

- A. Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

- B. Request visual inspection of bearing surfaces by Architect/Engineer before installing subsequent work.
- C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to the Owner.
- D. Frequency of Tests: As directed by the Engineer.

#### 3.4 PROTECTION

- A. Prevent displacement or loose soil from falling into excavation; maintain soil stability.
- B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.
- C. Protect structures, utilities and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth operations.
- D. Protect landscape areas, mailboxes, trees, fences, lawns, etc. Any damage to these areas are the responsibility of the Contractor.

END OF SECTION

## SECTION 31 23 17

### TRENCHING

#### PART 1 - GENERAL

##### 1.1 SUMMARY

###### A. Section Includes:

1. Excavating trenches for utilities from 5 feet outside building to utility service.
2. Compacted fill from top of utility bedding to subgrade elevations.
3. Backfilling and compaction.
4. Trenching for Storm Sewer.

###### B. Related Sections:

1. Section 03 30 00 - Cast-In-Place Concrete: Concrete materials.
2. Section 31 22 13 - Rough Grading: Topsoil and subsoil removal from site surface.
3. Section 31 23 16 - Excavation: General building excavation.
4. Section 31 23 23 - Fill: General Backfilling.
5. Section 31 37 00 - Riprap.
6. Section 32 91 19 - Landscape Grading: Filling of topsoil over backfilled trenches to finish grade elevation.

##### 1.2 REFERENCES

###### A. American Association of State Highway and Transportation Officials:

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

###### B. ASTM International:

1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
2. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).
4. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
5. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
6. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
7. ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
8. ASTM C12 - Standard Practice for Installing Vitrified Clay Pipe Lines.
9. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Gravity - Flow Applications.

### 1.3 DEFINITIONS

- A. Utility: Any buried pipe, duct, conduit, or cable.

### 1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan.
- C. Product Data: Submit data for geotextile fabric indicating fabric and construction.
- D. Samples: Submit, in air-tight containers, 10 lb sample of each type of fill to testing laboratory.
- E. Materials Source: Submit name of imported fill materials suppliers.
- F. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

### 1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with MDOT Standard Specifications for Construction, current edition.

### 1.6 QUALIFICATIONS

- A. Prepare excavation protection plan under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Michigan.

### 1.7 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.
  - 1. Verify that survey benchmarks and intended elevations for the Work are as shown on the drawings.

### 1.8 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

## PART 2 - PRODUCTS

### 2.1 FILL MATERIALS

- A. See Section 31 23 23.

## PART 3 - EXECUTION

### 3.1 LINES AND GRADES

- A. Lay pipes to lines and grades indicated on Drawings.
  - 1. Architect/Engineer reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.
- B. Use laser-beam instrument with qualified operator to establish lines and grades when required by Engineer.
- C. Maintain grade alignment of pipe using string line parallel with grade line and vertically above centerline of pipe.
  - 1. Establish string line on level batter boards at intervals of not more than 25 feet.
  - 2. Install batter boards spanning trench, rigidly anchored to posts driven into ground on both sides of trench.
  - 3. Set three adjacent batter boards before laying pipe to verify grades and line.
  - 4. Determine elevation and position of string line from elevation and position of offset points or stakes located along pipe route.
  - 5. Do not locate pipe using side lines for line or grade.

### 3.2 PREPARATION

- A. Call Miss Dig service not less than three working days before performing Work.
  - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum locations.
- C. Protect plant life, lawns, rock outcropping and other features remaining as portion of final landscaping.
- D. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
  - 1. Protect grade and slope stakes.
- E. Maintain and protect above and below grade utilities indicated to remain.
- F. Establish temporary traffic control and detours when trenching is performed in public right-of-way. Relocate controls and reroute traffic as required during progress of Work.

### 3.3 TRENCHING

- A. Excavate subsoil required for utilities to utility service.
- B. Remove lumped subsoil, boulders, and rock up to 1/6 cubic yard, measured by volume.
  - 1. Remove lumped subsoil, boulders, and rock 6 inches below bottom of pipe.
  - 2. Where soil in the bottom of the trench is unsuitable in the opinion of the Engineer, excavate below the trench bottom and place Type A fill, as directed by the Engineer. See Section 31 23 16 – Excavation, Subgrade Undercutting and Section 31 23 23 – Fill.

- C. Perform excavation within 24 inches of existing utility service in accordance with utility's requirements.
- D. Do not advance open trench more than 200 feet ahead of installed pipe.
- E. Cut trenches sufficiently wide to enable installation and allow inspection. Remove water or materials that interfere with Work.
  - 1. Excavate on the required line to the depth required below the pipe grade for bedding thickness required.
  - 2. Grade top perimeter of excavation to prevent surface water from draining into excavation.
  - 3. Notify Owner's representative of unexpected subsurface conditions and discontinue affected Work in area until notified to resume Work.
  - 4. Protect excavation by methods required to prevent cave-in or loose soil from falling into excavation.
  - 5. Provide, operate, and maintain pumping equipment to keep trench free of water. Payment for dewatering shall be included in the pay item being installed.
- F. Trenches for pipe shall be excavated to the following minimum of and maximum widths measured at the top of the pipe:

<u>Pipe Size</u>	<u>Trench Width</u>	
	<u>Minimum</u>	<u>Maximum</u>
6" and smaller	18"	24"
8" & 10"	24"	30"
12" & 15"	30"	36"
18"	34"	40"
21"	38"	42"
24"	42"	46"
27"	45"	49"
30"	49"	53"
36"	56"	60"
Larger than 36"	I.D. + 20"	I.D. + 24"

- 1. Where trench widths exceed the maximum specified above, the Owner's representative may require special bedding or the use of extra strength pipe at the Contractor's expense.
- 2. Minimum trench width is 18 inches.
- G. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material, pipe, and utilities.
  - 1. Place and compact bedding below the pipe to the depth specified on the drawings.
  - 2. Support pipe and conduit during placement and compaction of bedding fill.
- H. Do not interfere with 45 degree bearing splay of foundations.
- I. When Project conditions permit, slope side walls of excavation starting 2 feet above top of pipe. When side walls can not be sloped, provide sheeting and shoring to protect excavation as specified in this section.

- J. When subsurface materials at bottom of trench are loose or soft, excavate to greater depth as directed by Architect/Engineer until suitable material is encountered. Notify Architect/Engineer prior to completing Undercut and Backfill Operations and request instructions.
- K. Cut out soft areas of subgrade not capable of compaction in place. Backfill with Fill Type A and compact to density equal to or greater than requirements for subsequent backfill material.
- L. Trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.
- M. Correct areas over excavated areas with compacted backfill as specified for authorized excavation or replace with fill concrete as directed by Architect/Engineer.
  - 1. Correct unauthorized excavation at no cost to Owner.
  - 2. Correct overexcavated by error with Type A fill in accordance with Section 31 23 23 Fill.
- N. Stockpile subsoil in area designated on site to depth not exceeding 8 feet and protect from erosion.
- O. Stockpile excavated material in area designated on site.
- P. Level subsoil in the right-of-way on site except in yard areas.

### 3.4 SHEETING AND SHORING

- A. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.
- B. Support trenches more than 5 feet deep excavated through unstable, loose, or soft material. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation.
- C. Design sheeting and shoring to be removed at completion of excavation work.
  - 1. Use trench boxes or other form of temporary protection when required by OSHA and MIOSHA Standards or when protection of existing utilities is necessary.
- D. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.
- E. Repair damage to new and existing Work from settlement, water or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing.

### 3.5 BACKFILLING

- A. Backfill trenches to contours and elevations with unfrozen fill materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.
- C. Place geotextile fabric over Fill Type A prior to placing subsequent fill materials.
- D. Place fill material in continuous layers and compact.
  - 1. See Section 31 23 23 – Fill.

2. Place 4 inches tamped Type B fill along the side of the pipe, filling any void space under the pipe. Execute tamping with a T bar or other tamping device approved by the Engineer.
  3. Place additional tamped Type B fill along side the pipe to a height equal to the top of the pipe.
  4. Place and compact Type B fill material to 12 inches above the top of the pipe unless shown otherwise on the Project drawings.
- E. Place material in continuous layers as follows:
1. Subsoil Fill: Maximum 12 inches compacted depth.
  2. Structural Fill: Maximum 8 inches compacted depth.
  3. Granular Fill: Maximum 8 inches compacted depth.
- F. Employ placement method that does not disturb or damage foundation perimeter drainage or utilities in trench.
- G. Maintain optimum moisture content of fill materials to attain required compaction density.
- H. Do not leave more than 30 feet of trench open at end of working day.
- I. Protect open trench to prevent danger to the public.

### 3.6 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Top Surface of Backfilling Under Paved Areas: Plus or minus 1/2 inch from required elevations.
- C. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

### 3.7 FIELD QUALITY CONTROL

- A. Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. MDOT Standard Specifications for Construction, current edition.
- C. Perform in place compaction tests in accordance with the following:
  1. Density Tests: ASTM D1556, or ASTM D2922.
  2. Moisture Tests: ASTM D3017.
- D. When tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest at no cost to the Owner.
- E. Frequency of Tests: As directed by the Engineer.
- F. Proof roll compacted fill surfaces under pavement. See Section 31 23 23 – Fill.

### 3.8 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished work.



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

END OF SECTION

## SECTION 31 23 19

### DEWATERING AND COFFERDAM

#### PART 1 - GENERAL

##### 1.1 SUMMARY

###### A. Section Includes:

1. Dewatering system.
2. Surface water control system.
3. Monitoring wells.
4. System operation and maintenance.
5. Water disposal.

###### B. Related Sections:

1. Section 31 05 16 - Aggregates for Earthwork: Filter sand.
2. Section 31 23 16 - Excavation: Excavation for structures below ground water table.
3. Section 31 23 17 - Trenching: Trenching for utilities below ground water table.
4. Section 31 25 00 - Erosion and Sedimentation Controls: Surface water runoff control.
5. Section 31 22 13 - Rough Grading.

##### 1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

###### A. Temporary Dewatering and Cofferd Dams (Division I)

1. Basis of Measurement: At the lump sum price bid as state in the proposal.
2. Basis of Payment: Includes all labor, equipment, and material to perform any damming and/or water control needed to perform the work shown on the plans.

###### B. Dewatering (Division II):

1. Basis of Measurement: Included in the price bid for other bid items requiring dewatering. (Division II)
2. Basis of Payment: Includes dewatering system design, material, equipment and labor necessary for dewatering as necessary for construction and/or determined by the Engineer.

##### 1.3 REFERENCES

###### A. ASTM International:

1. ASTM C33 - Standard Specification for Concrete Aggregates.

##### 1.4 DEFINITIONS

###### A. Dewatering includes the following:

1. Lowering of ground water table and intercepting horizontal water seepage to prevent ground water from entering excavations or trenches.

2. Reducing piezometric pressure within strata to prevent failure or heaving of excavations or trenches.
  3. Disposing of removed water.
- B. Surface Water Control: Removal of surface water within open excavations.
- C. Cofferd Dam:
1. Temporary barrier to isolate surface water from open excavation and prevent flooding during construction.

## 1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Signed and sealed by Professional Engineer. (Division I Only)**
- 1. Indicate dewatering system layout, dewatering pump locations, pipe sizes and capacities, surface water control devices, valves, and water disposal method and location.**
  - 2. Indicate primary and standby power system location and capacity.**
  - 3. Include detailed description of dewatering and monitoring system installation procedures and maintenance of equipment.**
  - 4. Include description of emergency procedures to follow when problems arise.**
  - 5. Provide sealed draining for cofferdam layout, design, and calculations.**
- C. Product Data: Submit data for each of the following:
1. Dewatering Pumps: Indicate sizes, capacities, priming method, motor characteristics.
  2. Pumping equipment for control of surface water within excavation.
  3. Cofferdam materials, layout, and construction sequence.
- D. Design Data: Signed and sealed by Professional Engineer.
1. Indicate design values, analyses, and calculations to support design.

## 1.6 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations and depths of capped wells and piping abandoned in place.

## 1.7 QUALITY ASSURANCE

- A. Comply with authorities having jurisdiction for the following:
1. Drilling and abandoning of wells used for dewatering systems.
  2. Water discharge and disposal from pumping operations.
- B. Obtain permit from EPA under National Pollutant Discharge Elimination System (NPDES), for storm water discharge from construction sites.
- C. Perform Work in accordance with Michigan department of Transportation standard.

D. Maintain one copy of each document on site.

## 1.8 QUALIFICATIONS

- A. Installer: Company with minimum 5 years documented experience and responsible for design, operation, and maintenance of dewatering system and cofferdams.
  - 1. Assume sole responsibility for dewatering and surface water control systems and for loss or damage resulting from partial or complete failure of protective measures and settlement or resultant damage caused by ground water control operations.
- B. Design, install, and monitor operation of dewatering and cofferdam under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Michigan.

## 1.9 SEQUENCING

- A. Section 01 10 00 - Summary: Requirements for sequencing.
- B. Sequence work to obtain required permits before start of dewatering operations.
- C. Sequence work to install and test systems minimum 7 days before operating dewatering systems.
- D. Sequence work to install and test dewatering and surface water control systems minimum 7 days before starting excavation and trenching.

## 1.10 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate work to permit the following construction operations to be completed on dry stable substrate.
  - 1. Excavation for structures specified in Section 31 23 16.
  - 2. Trenching for utilities specified in Section 31 23 17.
  - 3. Drilled piers and shafts specified in Section 31 63 29.

## PART 2 - PRODUCTS

### 2.1 NOT USED

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Conduct additional borings and investigations to supplement subsurface investigations as required to complete dewatering and cofferdam system design.

- C. Check MISS DIG at 1-800-482-7171 and Call Local Utility Line Information service not less than three working days before performing Work.
  - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- D. Contractor shall be aware of and conform to the requirements of the State of Michigan in all dewatering operations.
- E. The Contractor shall provide and maintain adequate dewatering equipment to remove and dispose of all surface and ground water from all excavations and trenches or other parts of Work.
- F. Excavation shall be kept dry during the preparation of the subgrade and continually thereafter until Work within that excavation etc. is complete as approved by the Engineer.
- G. Contractor shall repair all Work damaged due to failure of dewatering operation as determined by Engineer.
- H. All excavations for concrete structures or trenches, which extend down to or below the static ground water elevations, shall be dewatered by lowering the ground water surface a minimum of 24 inches below the bottom of the excavation as approved by the Engineer.
- I. Surface water shall be diverted or prevented from entering the excavations without leaving the Project Site.

### 3.2 PREPARATION

- A. Protect existing adjacent buildings, structures, and improvements from damage caused by dewatering operations.

### 3.3 DEWATERING SYSTEM

- A. Install Work in accordance with Michigan Department of Transportation standards.

### 3.4 SURFACE WATER CONTROL SYSTEM

- A. Provide ditches, berms, and other devices to divert and drain surface water from excavation area as directed by Engineer.
- B. Divert surface water and seepage water within excavation areas into sumps and pump water into drainage channels and storm drains in accordance with requirements of agencies having jurisdiction.
- C. Control and remove unanticipated water seepage into excavation.

### 3.5 WATER DISPOSAL

- A. Discharge water into existing drainage channels as directed by Engineer.

- B. Contractor is responsible for stabilizing existing drainage channel as needed to prevent soil erosion at no additional cost to the project.

### 3.6 SYSTEM REMOVAL

- A. Remove dewatering and surface water control systems after dewatering operations are discontinued.

END OF SECTION

## SECTION 31 23 23

### FILL

#### PART 1 - GENERAL

##### 1.1 SUMMARY

###### A. Section Includes:

1. Backfilling building perimeter to subgrade elevations.
2. Backfilling site structures to subgrade elevations.
3. Fill under slabs-on-grade.
4. Fill under paving.
5. Fill for over-excavation.
6. Consolidation and Compaction.
7. Fill Under Roadways, Driveways, Sidewalks, Parking Lots, and Other Traveled Surfaces.
8. Utility Trench Backfilling.
9. Backfill for Drain Crossing and Traveled Surfaces.
10. Fill Materials.
11. Building Pads Filling to Subgrade Elevations.
12. Site Berming.
13. Fill Under Slabs-on-Grade Pads.
14. Fill Subgrade Undercutting.

###### B. Related Sections:

1. Section 31 22 13 - Rough Grading: Site filling.
2. Section 31 23 16 - Excavation.
3. Section 31 37 00 - Riprap.
4. Section 32 91 19 - Landscape Grading: Filling of topsoil to finish grade elevation.
5. Section 33 41 13 - Public Storm Utility Drainage Piping.
6. Section 33 42 13 – Public Pipe Culverts.

##### 1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

###### A. Backfill Materials:

1. Basis of Measurement: Included in unit price bid for the pay item being installed or constructed as stated.
2. Basis of Payment: Includes material, labor, and equipment necessary to backfill and compact to proposed subgrade as specified for this Project.

###### B. Granular Subbase:

1. Basis of Measurement: Included in unit price bid for the pay item being installed or constructed unless otherwise noted.
2. Basis of Payment: Includes all labor, material, and equipment necessary to place, grade, and compact granular subbase to the thickness specified on the drawings.

##### 1.3 REFERENCES

###### A. American Association of State Highway and Transportation Officials:

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

- B. ASTM International:
  1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
  2. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
  3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).
  4. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
  5. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
  6. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
  
- C. Michigan Department of Transportation (MDOT)
  1. MDOT Standard Specification for Construction, current edition.
  2. MDOT Density Control Handbook, current edition.
  
- D. ANSI/ASTM
  1. ANSI/ASTM C136 or MTM 108 & 109 - Method for Sieve Analysis of Fine and Coarse Aggregates.
  2. ANSI/ASTM C117 or MTM 108 - Test method for materials finer than 15mm (No. 200 Sieve) in mineral aggregates by washing.

#### 1.4 SUBMITTALS

- A. Product Data: Submit data for geotextile fabric indicating fabric and construction.
- B. Samples: Submit, in air-tight containers, 10 lb sample of each type of fill to testing laboratory.
- C. Materials Source: Submit name of imported fill materials suppliers.
- D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

#### 1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with MDOT Standard Specifications for Construction, current edition.

### PART 2 - PRODUCTS

#### 2.1 FILL MATERIALS

- A. Type A - Coarse Stone Fill: MDOT 6A, 100% crushed limestone - for wet excavation, excavation within open drain, backfill for subgrade undercutting for poor soil or in pipe trench, compacted to a minimum of 95 percent of the materials maximum dry density as determined by modified proctor method in layers not to exceed 12 inches loose depth, unless otherwise specified. A ballast type crushed stone free of shale, clay, friable material, sand, and debris graded in accordance with ANSI/ASTM C136.



- B. Type B - Granular Fill: MDOT Class II - for dry excavation, pipe bedding to 12” above pipe, and trench backfill within roadway influence or dry excavation. Compacted to a minimum of 95 percent of the materials maximum dry density as determined by modified proctor method in layers not to exceed 12 inches loose depth. Substitute with Type A MDOT 6A coarse stone for wet excavation.
- C. Type C - Structural Fill: MDOT Class I - for lower area of excess excavation over 24”, compacted to a minimum of 95 percent of the materials maximum dry density as determined by modified proctor method in layers not to exceed 12 inches loose depth.
- D. Type D - Native Subsoil: Site soils reused, free of gravel larger than 3 inch size, organic material, and debris, backfill above bedding of pipe to subgrade in greenbelt area. Compacted to a minimum of 90 percent of the materials maximum dry density as determined by modified proctor method in layers not to exceed 12 inches loose depth, unless otherwise specified or as approved by the Engineer.
- E. Type E - Dense Aggregate: MDOT 22A dense graded aggregate - for driveway and temporary patches on traveled surfaces, compacted to a minimum of 95 percent of its maximum dry density as determined by modified proctor method in layers not to exceed 12 inches loose depth.
- F. Type F – MDOT Standard Flowable Fill (Fill Class C concrete) – for headwall, sheet piling repair, and culvert storm sewer backfilling.
- G. Type G - Clay Embankment: Silty or sandy clay soils meeting the criteria for the designation of “CL” in accordance with the United Soil Classification System – for clay embankment construction, compacted to a minimum of 90 percent of its maximum dry density and at a moisture content ranging from 0 to 3 percent above of the optimum moisture as determined by the modified proctor method in layers not to exceed 12 inches loose depth. The Contractor shall provide samples of the proposed clay embankment material to the Geotechnical Engineer for visual examination and possible laboratory testing/analysis to confirm the material meets the criteria for the designation of “CL.” Approved material shall be excavated from the borrow area free from frozen soil, organics, or other deleterious materials.
- H. Type H - Granular Embankment: MDOT Class I, Class II, or Class III – for granular embankment construction, compacted to a minimum of 95 percent of its maximum dry density as determined by the modified proctor method in layers not to exceed 12 inches loose depth. The Contractor shall provide samples of the proposed sand embankment material to the Geotechnical Engineer for visual examination and possible laboratory testing/analysis to confirm the material meets the specified material type. Approved material shall be excavated from the borrow area free from frozen soil, organics, or other deleterious materials.

## 2.2 ACCESSORIES

- A. Filter Fabric: Section 31 32 21 – Filter Fabric

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and Project conditions.

- B. Verify sub-drainage, damp proofing, or waterproofing installation has been inspected.
- C. Verify underground tanks are anchored to their own foundations to avoid flotation after backfilling.
- D. Verify structural ability of unsupported walls to support loads imposed by fill.
- E. Verify that all fill materials to be used are acceptable.
- F. Verify foundation and/or perimeter drainage installation has been inspected.

### 3.2 PREPARATION

- A. Compact subgrade to density requirements for subsequent backfill materials.
- B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with structural fill and compact to density equal to or greater than requirements for subsequent fill material.
  - 1. In areas that are suspect and may require subgrade undercutting, notify Engineer immediately. Do not proceed until it is agreed subgrade undercutting is required and quantities can be documented. See Section 31 23 16 - Excavation.
- C. Scarify subgrade surface to depth of 6 inches.
- D. Proof roll to identify soft spots; fill and compact to density equal to or greater than requirements for subsequent fill material.
  - 1. Thoroughly proof-roll all areas of building pads, slabs-on-grade, bituminous pavement, concrete curb and gutter and sidewalks with a fully loaded tandem-axle truck, or its equivalent.
  - 2. Loose or soft areas revealed during the proof-rolling operations are to be compacted or removed and replaced according to See Section 31 23 16 - Excavation.

### 3.3 BACKFILLING

- A. Backfill areas to contours and elevations with unfrozen materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
- C. Place geotextile fabric over Type A fill prior to placing next lift of fill.
- D. Place material in continuous layers as follows:
  - 1. Subsoil Fill: Maximum 12 inches compacted depth.
  - 2. Structural Fill: Maximum 8 inches compacted depth.
  - 3. Granular Fill: Maximum 8 inches compacted depth.
- E. Employ placement method that does not disturb or damage other Work or foundation perimeter drainage conduit in trenches.
- F. Maintain optimum moisture content of backfill materials to attain required compaction density.
- G. Backfill against supported foundation walls. Do not backfill against unsupported foundation walls.

- H. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.
- I. Slope grade away from building minimum 2 percent slope for minimum distance of 10 ft, unless noted otherwise.
- J. Make gradual grade changes. Blend slope into level areas.
- K. Remove surplus backfill materials from site.
- L. Leave fill material stockpile areas free of excess fill materials.
- M. Type B – Granular Fill: Place and compact materials as specified in Part 2 of this Section.
- N. Type D – Native Subsoil: Place on compact materials as specified in Part 2 of this Section.
- O. Machine compact under springline of pipe with T-bar or Engineer approved equivalent.
- P. Backfill simultaneously on all side of utility structures, manholes, and catchbasins.
- Q. Type F – Flowable Fill: Place in locations indicated on drawings. Protect from freezing temperatures for 24 hours after placement.
- R. Backfill wet excavation and subgrade undercutting according to Section 31 23 16 - Excavation.
- S. Backfill subgrade undercutting in open drain according to See Section 31 23 16 - Excavation.

#### 3.4 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Top Surface of Backfilling Within Building Areas: Plus or minus 1 inch from required elevations.
- C. Top Surface of Backfilling Under Paved Areas: Plus or minus 0.10 foot, inch from required elevations.
- D. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

#### 3.5 FIELD QUALITY CONTROL

- A. Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Perform laboratory material tests in accordance with AASHTO T180.
- C. Perform in place compaction tests in accordance with the following:
  1. Density Tests: ASTM D1556 or ASTM D2922.
  2. Moisture Tests: ASTM D3017.
- D. When tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

- E. Tests and analysis of fill material will be performed in accordance with One Point Michigan Cone Test.
- F. Compaction testing will be performed in accordance with MDOT standard requirements.
- G. Frequency of tests: At the discretion of the Engineer.
- H. Proof roll compacted fill surfaces under slabs-on-grade.

3.6 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished Work.
- B. Reshape and re-compact fills subjected to vehicular traffic.

END OF SECTION

## SECTION 31 25 00

### EROSION AND SEDIMENTATION CONTROLS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

###### A. Section Includes:

1. System Description.
2. Quality Assurance.
3. Regulatory Requirements.
4. Method of Payment.

###### B. Related Sections:

1. Section 31 10 00 - Site Clearing.
2. Section 31 23 16 - Excavation.
3. Section 31 23 23 - Fill.
4. Section 31 37 00 - Riprap.
5. Section 32 91 19 - Landscape Grading.
6. Section 32 92 19 - Seeding.

##### 1.2 SYSTEM DESCRIPTION

- A. Methods of control are identified on drawings by numbers corresponding to the keying system found in the Michigan Association of County Drain Commissioner's Soil Erosion and Sedimentation Control Authorized Public Agency Procedures Manual.
- B. The notation "T" or "P" following the number (as shown on the Drawings) indicates whether the control measure is temporary or permanent.
- C. Additional control measures shall be employed as required by the site conditions and applicable enforcing agency having project jurisdiction.

##### 1.3 UNIT PRICE - MEASUREMENT AND PAYMENT

###### A. Soil Erosion and Sedimentation Control:

1. Basis of Measurement: Included in the unit price bid for dike and channel reconstruction, drain crossings and clean up and site restoration.
2. Basis of Payment: Includes all material, equipment, and labor required for soil erosion prevention and sedimentation control for this project including but not limited to dust control, silt fence, inlet protection, site access stabilization, and other soil erosion and sedimentation control prevention measures for this project. Also includes all maintenance throughout the project including the removal of all temporary measures once disturbed areas have been stabilized and approved at the end of construction.

#### 1.4 REGULATORY REQUIREMENTS

- A. Submit installation time schedule for temporary and permanent soil erosion prevention and sedimentation control measures to applicable enforcing agency having jurisdiction, as well as to Engineer. Make submittals prior to start of construction.
- B. Part 91, Soil Erosion and Sedimentation Control of the Natural Resources and Environmental Protection Act 1994 PA 451, as Amended:
  - 1. The Contractor is responsible for compliance to Part 91 Soil Erosion and Sedimentation Control of the Natural Resources and Environmental Protection Act 1994 PA 451, as Amended and is responsible for compliance in accordance with the Michigan Association of County Drain Commissioner's (MACDC) Soil Erosion and Sedimentation Control (SESC) Authorized Public Agency (APA) procedures manual. If for any reason, the Owner is found to be in violation of Act 91 due to the Contractor found in non-compliance, the Contractor will be fully responsible for any fines and costs incurred by Owner, including legal defense and any and all costs associated with a violation.
  - 2. The Contractor acknowledges that the procedures manual is available at [www.macdc.net](http://www.macdc.net) and has reviewed and understands the manual.
  - 3. The Contractor acknowledges the Owner's right to enter on to the project and install or repair any soil erosion control measures at Contractor's expense after notice to Contractor allowing time for the repair or installation to be made by Contractor. Such repair or installation may be made by Owner or by a third party Contactor of Owner.
- C. Contractor shall obtain all permits and pay all fees for plan review and inspection as required by applicable enforcing agency having jurisdiction.

#### 1.5 SUBMITTALS

- A. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

#### 1.6 CLOSEOUT SUBMITTALS

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

#### 1.7 QUALITY ASSURANCE

- A. Perform Work in accordance with the Soil Erosion and Sedimentation Control, Part 91 of Act 451 of 1994.

#### 1.8 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

#### 1.9 ENVIRONMENTAL REQUIREMENTS

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

- B. Do not place grout when air temperature is below freezing.
- C. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. In accordance with applicable Section for specified materials.

## PART 3 - EXECUTION

### 3.1 EXAMINATION AND PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Field locate known utility locations. Notify Engineer of conflicts and attain removal or relocation instructions prior to continuing installation activities.
- C. Maintain and protect existing utilities to remain.

### 3.2 PROTECTION OF ADJACENT WORK

- A. Protect adjacent structures and property which may be damaged by execution of work.
- B. Protect existing trees, shrubs, landscaping and lawn areas designated to remain.

### 3.3 INSTALLATION AND MAINTENANCE

- A. Construct soil erosion prevention and sedimentation control measures in accordance with the plans and manufacture's recommendations.
- B. Schedule planned control measures with construction operation to limit the area of any disturbed land to the shortest possible period of exposure.
- C. Conduct all earth changes so as to effectively reduce accelerated soil erosion and resulting sedimentation.
- D. Remove all sediment from runoff water before it leaves the site.
- E. Inspect, maintain, and repair temporary control measures until permanent control measures are implemented. Remove all temporary control measures once permanent protection is established.
- F. Maintain permanent control measures until final acceptance by Owner.
- G. Protect all installed and existing catchbasin inlets. Remove protection after final inspection of the project.

- H. Execute work by methods to minimize raising dust from construction operations.
- I. Do not deposit trash, debris, or sediment in tile or open drains.
- J. Immediately repair trenches located within the traveled surface or roadways.
- K. Landscape construction areas as soon as practical after work is completed.

END OF SECTION



## SECTION 31 32 21

### FILTER FABRIC

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Filter Fabric for Groundwater Infiltration Applications.
  - 2. Filter Fabric for Plain Riprap Applications.
  - 3. Filter Fabric for Heavy Riprap Applications.
- B. Related Sections:
  - 1. Section 31 22 13 – Rough Grading
  - 2. Section 31 35 21 – Slope Protection and Erosion Control

##### 1.2 UNIT PRICE – MEASUREMENT AND PAYMENT

- A. Filter Fabric:
  - 1. Basis of Measurement: Included in unit price for riprap, plain riprap spillway, field tile outlets, drain crossings, plain riprap splash pad, sedimentation basins, or other Work item being accomplished, whichever applies.
  - 2. Basis of Payment: Includes material, labor, and equipment for installation according to plans, specifications, and manufacturer's instructions.

##### 1.3 REFERENCES

- A. ASTM D-4632 - Test method for Tensile Strength and Elongation
- B. ASTM D-3786 - Test method for Mullen Burst.
- C. ASTM D-4533 - Test method for Trapezoidal Tear Strength.
- D. ASTM D-3787 - Test method for Puncture Strength.
- E. ASTM D-4751 - Test method for Apparent Opening Size.
- F. ASTM D-4491 - Test method for Coefficient of Permeability

##### 1.4 COORDINATION

- A. Section 01 30 00 – Administrative Requirements specifies requirements for coordination.
- B. Coordinate Work of this Section with Section 31 37 00 – Riprap.

## 1.5 SUBMITTALS

- A. Submit shop drawings and product data for all items to be installed and/or constructed within this Section.
- B. Submit manufacturer's instructions for all product data.
- C. Submit manufacturer's certificate, which shall show actual test values obtained for the physical properties as tested for compliance with the specifications, for all product data.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Mechanically bonded, non-woven, long-chain polymeric fibers or yarns. The edges of the fabric shall be finished to prevent the outer fiber from pulling away from the fabric.
  - 1. Filter fabric for groundwater infiltration applications (french drains, trench drains, pipe joint wrap, etc.) and embankment filter fabric is to have, at minimum, the following properties:

Tensile Strength	100 lbs
Tensile Elongation (max)	100 %
Mullen Burst	210 psi
Trapezoidal Tear Strength	40 lbs
Puncture Strength	65 lbs
Apparent Opening Size (max)	70 sieve
Flow Rate	140 gal/min/ft <sup>2</sup>

- 2. Filter fabric for plain riprap applications (riprap, riprap spillways, etc.) and concrete box culvert joints are to have, at minimum, the following properties:

Tensile Strength	155 lbs
Tensile Elongation (max)	100 %
Mullen Burst	315 psi
Trapezoidal Tear Strength	65 lbs
Puncture Strength	95 lbs
Apparent Opening Size (max)	70 sieve
Flow Rate	110 gal/min/ft

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements specifies requirements for installation examination.
- B. Verify the correct fabric is specified for the specific use.

- C. At the time of installation, the filter fabric may be rejected at the discretion of the Engineer if it has been removed from its protective cover for over 72 hours or has defects, tears, punctures, flow deterioration, or damage incurred during manufacture, transportation or storage.
- D. No torn, punctured, or otherwise damaged fabric shall be installed.

### 3.2 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements specifies requirements for installation preparation.
- B. Remove large stones or other debris, which could damage the filter fabric.
- C. Adjacent Surfaces: Protect adjacent surfaces.

### 3.3 STORAGE

- A. During all periods of shipment and storage, the filter fabric shall be protected from abrasion, direct sunlight, ultraviolet rays, and temperatures greater than 140 degrees Fahrenheit (or as directed by the manufacturer). To the extent possible, the fabric shall be maintained wrapped in its protective covering.

### 3.4 INSTALLATION

- A. All joints/overlaps in material shall be a minimum of 2 feet.
- B. Any damaged material shall be repaired by placing a piece of fabric that is sufficiently large to cover the damaged area plus 2 feet of adjacent undamaged geotextile in all directions.
- C. Finish according to specific use requirements.
- D. Edges of filter fabric shall be toed in 12 inches unless specified otherwise. Work will not pass inspection if filter fabric is not "toed in."

### 3.5 PROTECTION

- A. Section 01 70 00 - Execution and Closeout Requirements specifies requirements for protecting finished Work.
- B. Do not permit Traffic over unprotected surface.
- C. Take care placing material over filter fabric so as not to damage the material.

END OF SECTION

## SECTION 31 37 00

### RIPRAP

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Riprap placed loose.
- B. Related Sections:
  - 1. Section 31 22 13 - Rough Grading.
  - 2. Section 31 23 16 - Excavation: Excavating for riprap.
  - 3. Section 31 23 23 - Fill.
  - 4. Section 32 91 19 - Landscape Grading: Topsoil placement.

##### 1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Miscellaneous Riprap (Plain or Heavy):
  - 1. Basis of Measurement: At the unit price bid per square yard, as stated in the proposal.
  - 2. Basis of Payment: Includes material, labor, and equipment for installation of filter fabric, placement of riprap to a depth of 1 foot, excavation, and grading to provide required contours as shown on the plans and as indicated in the specifications.
- B. Plain Riprap Toe of Slope:
  - 1. Basis of Measurement: At the unit price bid per linear foot as stated in the proposal.
  - 2. Basis of Payment: Includes material, labor, and equipment for installation of filter fabric, placement of riprap, excavation, and grading to provide required contours. Toe of slope riprap is paid based on extending 3 feet vertically up the drain bank, as shown on details.
- C. Plain Riprap Spillway:
  - 1. Basis of Measurement: At the unit price bid per linear foot, as stated in the proposal.
  - 2. Basis of Payment: Includes materials, labor, and equipment for installation of filter fabric, placement of riprap, excavation, and grading to required contours. Riprap shall be a minimum width of 8 ft. and bowl shaped.
- D. Plain Riprap Splash Pad:
  - 1. Basis of Measurement: At the unit price bid per each as stated in the proposal.
  - 2. Basis of Payment: Includes material, labor, and equipment for installation of filter fabric, placement of riprap, excavation, and grading to provide required splash pad.

##### 1.3 QUALITY ASSURANCE

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

- B. Perform Work in accordance with MDOT Standard Specifications for Construction, current edition.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Plain Riprap – Sound, tough, durable rock or uniformly white crushed limestone free from structural defects. Material to be uniform in size and range in dimension from 8 inches to 16 inches conforming to MDOT 916.01. No rebar, steel, or paint by-products shall be mixed with the material. Concrete and bituminous/asphalt material is not acceptable.
- B. Heavy Riprap – Sound, tough, durable rock or uniformly white crushed limestone free from structural defects. Material to be uniform in size and not less than 16 inches in the least dimension, with an average of 18 inches to 24 inches diameter conforming to MDOT 916.01. No rebar, steel, or paint by-products shall be mixed with the material. Concrete and bituminous/asphalt material is not acceptable.
- C. All materials must be approved by Owner before use on project.
- D. Filter Fabric – As specified in Section 31 32 21 – Filter Fabric.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Exact location of plain riprap, plain riprap spillways, riprap cross vanes, and splash pads shall be determined by Engineer during construction.

### 3.2 RIPRAP AND RIPRAP TOE OF SLOPE

- A. Clear topsoil and rough grade to required contours. Over excavate protection area equal to the thickness of the protection.
- B. Place filter fabric with all edges "toed in" a minimum of 12 inches. Riprap will not pass inspection if filter fabric is not "toed in."
- C. Place protection on filter fabric; tamp protection until individual pieces are firmly bedded.
- D. Hand place stone, if necessary, to assure that there are no void spaces in protection. Upon completion the filter fabric should not be visible.
- E. Bank and grade protection shall be installed as needed per location as directed by the Engineer.
- F. Toe of slope protection shall be installed along the bank to a height of 3 feet vertically above the flow line of the drain.

### 3.3 PLAIN RIPRAP SPILLWAY

- A. Clear topsoil and rough grade to required dimensions. Over excavate spillway so that upon completion the flow line of the spillway is recessed 18 inches below the proposed side slope of the open drain.
- B. Spillway shall be constructed with a 4 feet bottom and 2 horizontal to 1 vertical side slope unless directed otherwise by the Engineer. Riprap should be placed to a width of 12 foot across the spillway.
- C. Filter fabric shall be placed under riprap and toed-in as shown on construction plans.
- D. Place filter fabric with all edges "toed in" a minimum of 12 inches. Riprap will not pass inspection if filter fabric is not "toed in."
- E. Spillway will not pass inspection if filter fabric is not "toed in."
- F. Riprap should be placed starting at the toe of slope and extend to 3 feet beyond same side top of bank.
- G. Tamp riprap until individual pieces are firmly bedded.
- H. Hand place stone, if necessary, to assure that there are no void spaces in protection. Upon completion the filter fabric should not be visible.

### 3.4 PLAIN RIPRAP SPLASHPAD

- A. Place filter fabric with all edges "toed in" a minimum of 12 inches. Riprap will not pass inspection if filter fabric is not "toed in."
- B. A splash pad shall be placed at the outlet of each tile outlet and surface outlet tube as directed by Engineer.
- C. Splash pads must be a minimum of 2 feet wide and must be a minimum of 1.5 feet wider than the diameter of the tile outlet.
- D. Splash pads range from 1 to 5 square yards of riprap depending on field conditions.
- E. Splash pad must be constructed in a "V" shape with center of splash pad excavate 1 foot deeper than edges of splash pad.

END OF SECTION

## SECTION 31 50 13

### EXCAVATION SUPPORT SYSTEMS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Sheeting, Shoring, and Bracing.
- B. Related Sections:
  - 1. Section 31 22 13 – Rough Grading.
  - 2. Section 31 23 16 – Excavation.

##### 1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Excavation Support Systems:
  - 1. Basis of Measurement: Included in the unit bid price for drain crossings, storm sewer and other pay items being installed as stated in proposal.
  - 2. Basis of Payment: Includes material, equipment and labor necessary to install temporary excavation support to construct proposed Project. This includes, but is not limited to sheet piling, cofferdams, trench boxes, tiebacks, and any other items to support trenching and excavations. All excavation support shall be designed and sealed by the Contractor's registered professional engineer and submitted to the Owner's Engineer for review. Design costs to be paid for by the Contractor.

##### 1.3 REFERENCE STANDARDS

- A. Standards:
  - 1. ASTM A-328 - Standard Specifications for Sheet Piling.
  - 2. ASTM A-572 - Grades 50, High Strength.
  - 3. ASTM A-690 - High Strength, Corrosion Resistant.
- B. Conform to applicable OSHA regulations.

##### 1.4 PREINSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements specifies requirements for preinstallation meeting.
- B. Convene minimum one week prior to commencing Work of this Section.

##### 1.5 SUBMITTALS

- A. Submit shop drawings and product data for all items to be installed and/or constructed within this Section.

- B. Submit manufacturer's instructions for all product data.
- C. Shop drawings shall include sheeting, shoring, and bracing design and calculations prepared and sealed by a registered professional engineer.
- D. Product shall include component sizes, dimensions, and finishes.

#### 1.6 QUALITY ASSURANCE

- A. Perform Work according to Michigan Department of Transportation Standard Specifications for Construction, current edition.

#### 1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.
- B. Fabricator: Company specializing in fabricating products specified in this Section with minimum three years' documented experience.
- C. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience and approved by manufacturer.
- D. Licensed Professional: Professional engineer experienced in design of specified Work and licensed in State of Michigan.

#### 1.8 EXISTING CONDITIONS

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

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Timber and lumber for shoring and bracing shall be new, merchantable pine, Douglas Fir or spruce, unless otherwise shown or specified. Secondhand timber or lumber shall not be used where strength and/or appearance are important considerations.
- B. Steel for sheeting, shoring, and bracing shall be as per the referenced ASTM specifications.
- C. Temporary Sheeting: Select section modulus, embedment depth and bracing required to complete the work unless noted on the drawings.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Installation Standards: Install Work according to OSHA standards.



- B. The Contractor is responsible for the design and location of all sheeting, shoring, and bracing.
- C. Where required to properly support the surfaces of excavations and to protect the construction Work and workmen, sheeting, bracing and shoring shall be provided.
- D. If the Engineer is of the opinion that at any point sufficient or proper supports have not been provided, he may order additional supports at the expense of the Contractor, but neither the placing of such additional supports by the order of the Engineer nor the failure of the Engineer to order such additional supports placed shall release the Contractor from his responsibility for the sufficiency of such supports and the integrity of the Work.
- E. Damage to new or existing structures occurring through settlements due to failure or lack of sheeting or bracing shall be repaired by the Contractor at his own expense.
- F. Conflict of opinion as to whether the settlement is due to the Work of the Contractor or to any other cause will be determined by the Engineer.
- G. In general, the sheeting and bracing shall be removed, as the trench or excavation is refilled, in such a manner as to avoid the caving in of the Work.
- H. Fill voids left by the withdrawal of the sheeting by ramming, or otherwise as directed.
- I. Obtain permission of the Engineer prior to the removal of any shoring, sheeting or bracing.
- J. When sheeting and bracing is removed, the Contractor shall assume full responsibility for injury to structures or to other property or persons arising from failure to leave in place such sheeting or bracing.
- K. For the purpose of preventing injury to the structures, or to other property or to persons, the Contractor shall leave in place any sheeting or bracing shown on the drawings or ordered in writing by the Engineer.
- L. Cut off sheeting left in place at the elevation ordered but not less than 24" below the final ground surface.
- M. Bracing remaining in place shall be driven up tight.
- N. Measurements and payment for sheeting and bracing ordered by Engineer left in place will be made as extra work, unless noted otherwise.
- O. The right of the Engineer to order sheeting and bracing left in place shall not be construed as creating any obligation on his part to issue such orders.

END OF SECTION

## SECTION 32 91 13

### SOIL PREPARATION

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Preparation of subsoil.
  - 2. Soil testing.
  - 3. Placing topsoil.
  
- B. Related Sections:
  - 1. Section 31 22 13 - Rough Grading: Rough grading of site.
  - 2. Section 32 91 19 - Landscape Grading: Preparation of subsoil and placement of topsoil in preparation for the Work of this section.
  - 3. Section 32 92 19 - Seeding

#### PART 2 - PRODUCTS

##### 2.1 SOIL MATERIALS

- A. Topsoil: Excavated from site and free of weeds.

#### PART 3 - EXECUTION

##### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
  
- B. Verify prepared soil base is ready to receive the Work of this section.

##### 3.2 PREPARATION OF SUBSOIL

- A. Prepare sub-soil to eliminate uneven areas and low spots. Maintain lines, levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
  
- B. Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated sub-soil.
  
- C. Scarify subsoil to depth of 3 inches where topsoil is to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted sub-soil.

### 3.3 PLACING TOPSOIL

- A. Spread topsoil to minimum depth of 4 inches over area to be seeded. Rake until smooth.
- B. Place topsoil during dry weather and on dry unfrozen subgrade.
- C. Remove vegetable matter and foreign non-organic material from topsoil while spreading.
- D. Grade topsoil to eliminate rough, low or soft areas, and to ensure positive drainage.
- E. Install edging at periphery of seeded areas in straight lines to consistent depth.

END OF SECTION

## SECTION 32 91 19

### LANDSCAPE GRADING

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Final grade topsoil for finish landscaping.
  - 2. Topsoil.
- B. Related Sections:
  - 1. Section 31 22 13 - Rough Grading.
  - 2. Section 31 23 23 - Fill.
  - 3. Section 32 92 19 - Seeding.

##### 1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Landscape Grading:
  - 1. Basis of Measurement: Included in the unit price bid for cleanup and restoration.
  - 2. Basis of Payment: Includes all labor, excavation, fill for landscape grading necessary to obtain the required contours, guard rail, mail boxes, and other landscaping necessary to return Work area to preconstruction conditions. Includes final grading during construction or from settling. Includes installation of 4 inches of topsoil, which matches quality of existing topsoil in lawn areas.
- B. Topsoil:
  - 1. Basis of Measurement: Included in the unit price bid for cleanup and restoration and seeding, fertilizing, and mulching.
  - 2. Basis of Payment: Includes all labor, material, and equipment necessary to furnish, salvage, place, grade, and lightly compact topsoil to the depth and grades as shown on the drawings. Onsite topsoil may be reused as shown on the drawings and as directed by the Engineer.

#### PART 2 - PRODUCTS

##### 2.1 MATERIAL

- A. Topsoil: Min. 4 inches compacted depth, unless otherwise stated.
- B. Topsoil: Friable loam; free of subsoil, roots, grass, excessive amount of weeds, stone, and foreign matter; acidity range (pH) of 5.5 to 7.5; containing a minimum of 4 percent and a maximum of 25 percent organic matter. Topsoil shall be imported as specified on the plans.

- C. Contractor shall conduct fertility and calcium tests on all topsoil to be used in lawn and planting areas to assure that soil conditions are ready to receive plantings.
- D. Submit lab results or samples for testing as requested by the Owner or Engineer if imported topsoil is used.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify substrate base has been contoured and compacted.
- C. Beginning Work of this Section requires acceptance of existing conditions.

### 3.2 SUBSOIL PREPARATION

- A. Eliminate uneven areas and low spots. Remove debris, roots, branches, and stones, in excess of 1/2 inch in size. Remove and dispose of offsite any subsoil contaminated with petroleum products.
- B. Scarify subgrade to minimum depth of 8 inches where topsoil is scheduled. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

### 3.3 PLACING TOPSOIL

- A. Place topsoil to a minimum 4 inches compacted depth in areas where seeding, sodding and planting is scheduled.
- B. Use topsoil in relatively dry state. Do not place topsoil when weather conditions are excessively windy.
- C. Handle and place topsoil only when weather and soil moisture permits.
- D. Placement of topsoil in frozen or muddy conditions shall not be permitted.
- E. Fine grade topsoil eliminating rough or low areas. Maintain levels, profiles, and contours of subgrade.
- F. Remove stone, roots, grass, weeds, debris, and foreign material while spreading.
- G. Manually spread topsoil around trees and plants to prevent damage.
- H. Lightly compact placed topsoil in preparation for seeding, fertilizing, and mulching.

- I. Fertilizer and lime shall be applied at the minimum rates indicated by tests and shall be raked into the top 2 inches of the topsoil.
- J. Remove surplus subsoil and topsoil from Site.
- K. Import topsoil as necessary to match the depths as specified on the plans.
- L. Leave stockpile area and site clean and raked, ready to receive landscaping.
- M. Place required trees, shrubs, fences, and mail boxes in their proper locations.
- N. All grades must have positive drainage. No ponding must occur in graded areas. Contractor will be required to regrade if ponding occurs in landscaped or yard areas.

#### 3.4 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Top of Topsoil: Plus or minus 1/2 inch.

#### 3.5 PROTECTION OF INSTALLED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Prohibit construction traffic over topsoil.

END OF SECTION

## SECTION 32 92 19

### SEEDING

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Fertilizing.
  - 2. Seeding.
  - 3. Hydroseeding.
  - 4. Mulching.
  - 5. Maintenance.
  
- B. Related Sections:
  - 1. Section 31 10 00 – Site Clearing.
  - 2. Section 31 22 13 - Rough Grading.
  - 3. Section 31 23 16 – Excavation.
  - 4. Section 31 23 23 – Fill.
  - 5. Section 32 91 13 - Soil Preparation
  - 6. Section 32 91 19 - Landscape Grading.

##### 1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Seeding, Fertilizing, and Mulching:
  - 1. Basis of Measurement: At the lump sum price bid as stated in the proposal.
  - 2. Basis of Payment: Includes labor, equipment, and material necessary to seed, fertilize, and mulch all disturbed areas not specified to receive other seeding or planting treatments. This includes finish grading, subsoil, daily seeding with approved seed mix, and maintenance to provide for uniform grass growth and any reseeding and erosion repair. Re-seeding and erosion repair is included to provide for uniform grass growth at the completion of the project and up to one year after completion.

##### 1.3 REFERENCES

- A. ASTM International:
  - 1. ASTM C602 - Standard Specification for Agricultural Liming Materials.

##### 1.4 DEFINITIONS

- A. Weeds: Vegetative species other than specified species to be established in given area.

## 1.5 SUBMITTALS

- A. Product Data: Submit data for seed mix, fertilizer, mulch, erosion control blankets, and other accessories.
- B. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.
  - 1. Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, any tags from seed bags and any receipts associated with seeding.

## 1.6 QUALITY ASSURANCE

- A. Provide seed mixture in containers showing percentage of seed mix, germination percentage, inert matter percentage, weed percentage, year of production, net weight, date of packaging, and location of packaging.
- B. The Contractor shall make arrangements to obtain seed materials with nurseries a maximum 30 days after he/she is awarded contract and provide a list of suppliers to the Engineer.
- C. The Contractor will provide a final list of all species purchased to the Engineer a minimum of 90 days prior to seeding

## 1.7 QUALIFICATIONS

- A. Seed Supplier: Company specializing in manufacturing Products specified in this section.
- B. Installer: The seeding Contractor must be experienced and specialized in seeding the respective species as determined by the Engineer. He/she shall properly supervise a competent staff. The Contractor must have the necessary equipment to complete this task.
- C. Maintenance Services: Shall be provided by the Contractor for up to one year to guarantee establishment of growth.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable.
- C. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

## 1.9 MAINTENANCE SERVICE

- A. Maintain seeded and sodded areas immediately after placement until grass is well established, exhibits a vigorous growing condition and is accepted by the Owner. Guarantee reseeding of bare areas for one year following acceptance.



## 1.10 COORDINATION

- A. Coordinate Work under provisions of Section 01 30 00 – Administrative Requirements.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Topsoil:
  - 1. Reused - free of subsoil, roots, grass, excessive amount of weeds, stone, and foreign matter.
  - 2. Topsoil: Imported, friable loam; free of subsoil, roots, grass, excessive amount of weeds, stone, and foreign matter; acidity range (ph) of 5.5 to 7.5; containing a minimum of 4 percent and a maximum of 25 percent organic matter.
  - 3. Topsoil furnished from outside the project limits shall be approved by the Engineer.

- B. MDOT General Roadside Seed Mix, TGM (Turf Medium to Heavy Soil)

<b>% by Weight</b>	<b>Common Name</b>
10	Kentucky Blue Grass
20	Perennial Ryegrass
30	Hard Fescue
40	Creeping Red Fescue

Apply per MDOT standards and specifications, minimum 220 lb/acre

- C. Fertilizer:
  - 1. Apply 500 pounds per acre (12 pounds per 1000 square feet) of 12-12-12 commercial grade fertilizer or Engineer approved equivalent
- D. Mulch:
  - 1. Apply 1200 pounds per acre (28 pounds per 1000 square feet) small grain straw mulch that is clean and weed free on all seeded areas unless otherwise indicated.
  - 2. Apply tackifier to mulch according to manufacturer's recommendations as approved by the Engineer.
- E. Hydroseeding Mulching Material:
  - 1. Apply 1400 pounds/acre of Conwed Verdoyl #2000 with hydraulic seeder.
- F. Mulch Blankets:
  - 1. Install North American Green S75BN or SC150BN as indicated on the plans or directed by the Engineer.
  - 2. Install all mulch blankets with wooden stakes. Stake according to manufacturer's recommendations as approved by the Engineer.
- G. Lime: ASTM C602, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent.

H. Stakes: Softwood lumber, chisel pointed.

## 2.2 SOURCE QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Testing, inspection and analysis requirements.
- B. Analyze to ascertain percentage of nitrogen, phosphorus, potash, soluble salt content, organic matter content, and pH value.
- C. Provide recommendation for fertilizer and lime application rates for specified seed mix as result of testing.
- D. Testing is not required when recent tests and certificates are available for imported topsoil. Submit these test results to testing laboratory. Indicate, by test results, information necessary to determine suitability.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify that prepared soil base is ready to receive the Work of this section and that the necessary excavation Work has been completed. See Section 32 91 19 - Landscape Grading and Section 31 23 16 – Excavation
- C. Disc and cultipack (roll) site to ensure a flat and firm seedbed.

### 3.2 FERTILIZING

- A. Apply lime at application rate recommended by soil analysis. Work lime into top 6 inches of soil.
- B. Apply fertilizer at application rate recommended by soil analysis.
- C. Apply after smooth raking of topsoil and prior to roller compaction.
- D. Do not apply fertilizer at same time or with same machine used to apply seed.
- E. Mix fertilizer thoroughly into upper 2 inches of topsoil.
- F. Lightly water soil to aid dissipation of fertilizer. Irrigate top level of soil uniformly.

### 3.3 SEEDING

- A. Daily seed and mulch all finished graded areas with approved seed mix.
- B. Apply mixes at the specified rates.

- C. Additional seeding is required until uniform growth of grass is established.
- D. Apply seed at rate specified above evenly in two intersecting directions. Rake in lightly.
- E. Do not seed areas in excess of that which can be mulched on same day.
- F. Do not sow when ground is too dry or when winds are over 12 mph.
- G. Immediately following seeding, apply mulch as specified.
- H. Apply water with fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.
- I. Seeding method:
  - 1. Hand broadcast native seed mix, and cover crop in designated areas. Mix seed with a lightweight inert material such as damp sawdust or vermiculite.
  - 2. For areas larger than 1 acre a mechanical planter, such as a Truax drill, may be used.
  - 3. Upon completion of seeding, rake or drag seed so that it is lightly covered with soil (approx. ¼ inch deep). The site should then be rolled to firm the seed into the soil. Approximately 25 percent of the seed should still be visible on the surface.
- J. Apply mulch or mulch blankets at specified rates of application evenly on prepared seedbed and maintain clear of trees and shrubs. Allow sunlight to penetrate mulch so as not to cover more than 70% of the soil surface or as directed by the Engineer.

### 3.4 MAINTENANCE

- A. Immediately reseed areas, which show bare spots.
- B. Repair any eroded areas and reseed immediately.
- C. Final payment will not be issued until a uniform growth of grass is established for period of one year on all areas disturbed as a result of the construction of this Project. A minimum of eighty percent of the species seeded shall be established prior to final payment.
- D. Protection from traffic and erosion in newly seeded areas is the responsibility of the Contractor. Safety fences and/or silt fences with appropriate signage may be used at the Contractor's expense until the grasses are fully established.

END OF SECTION

## SECTION 33 05 13

### MANHOLES AND STRUCTURES

#### PART 1 - GENERAL

##### 1.1 SUMMARY

###### A. Section Includes:

1. Cast-in-place concrete manholes and structures with transition to cover frame, covers, anchorage, and accessories.
2. Modular precast concrete manholes and structures with tongue-and-groove joints and transition to cover frame, covers, anchorage, and accessories.
3. Masonry manhole and structure sections with masonry transition to cover frame, covers, anchorage, and accessories.
4. Doghouse manhole connections to existing storm sewer lines.
5. Bedding and cover materials.
6. Pile support systems.

###### B. Related Sections:

1. Section 03 10 00 - Concrete Forming and Accessories.
2. Section 03 20 00 - Concrete Reinforcing.
3. Section 03 30 00 - Cast-in-Place Concrete.
4. Section 31 23 16 - Excavation.
5. Section 31 23 23 - Fill.
6. Section 33 41 13 - Public Storm Utility Drainage Piping.

##### 1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

###### A. Manholes:

1. Basis of Measurement: At the unit price bid per linear foot measured vertically.
2. Basis of Payment: Includes all material, labor, and equipment necessary for trenching, backfilling, bedding, structure installation, connection to sewer piping, adjusting rings, castings, grates, and shop drawings. Manhole complete as shown on the plans and as stated in the specifications.

###### B. Precast Concrete Headwall:

1. Basis of Measurement: At the unit price bid per each.
2. Basis of Payment: Includes all labor, equipment, and material to install precast headwall on proposed pipe. Headwall shall follow MDOT standard layout, and the headwall shall be sized appropriately to accept the proposed flapgate that is being anchored to the headwall. Headwall shall include a knee wall. The headwall may not contain an energy dissipation baffle.

##### 1.3 REFERENCE STANDARDS

###### A. American Association of State Highway Transportation Officials:

1. AASHTO M91 - Standard Specification for Sewer and Manhole Brick (Made from Clay or Shale).
2. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
3. AASHTO M306 - Standard Specification for Drainage, Sewer, Utility, and Related Castings.

B. American Concrete Institute:

1. ACI 530/530.1 - Building Code Requirements and Specification for Masonry Structures.

C. ASTM International:

1. ASTM A48 - Standard Specification for Gray Iron Castings.
2. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM C32 - Standard Specification for Sewer and Manhole Brick (Made From Clay or Shale).
4. ASTM C55 - Standard Specification for Concrete Building Brick.
5. ASTM C361 - Standard Specification for Reinforced Concrete Low-Head Pressure Pipe.
6. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.
7. ASTM C497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.
8. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures.
9. ASTM C923 - Standard Specification for Resilient Connectors between Reinforced Concrete Manhole Structures, Pipes, and Laterals.

#### 1.4 SUBMITTALS

- A. Product Data: Submit data for manhole covers, component construction, features, configuration, dimensions.
- B. Shop Drawings:
  1. Indicate structure locations and elevations.
  2. Indicate sizes and elevations of piping, conduit, and penetrations.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
- E. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- F. Qualifications Statements:
  1. Submit qualifications for manufacturer and installer.
  2. Submit manufacturer's approval of installer.

#### 1.5 QUALITY ASSURANCE

- A. Perform Work according to MDOT Standard Specifications for Construction, current edition.

## 1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.
- B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Comply with precast concrete manufacturer's instructions and ASTM C913 for unloading, storing, and moving precast manholes and drainage structures.
- D. Storage:
  - 1. Store precast concrete manholes and drainage structures to prevent damage to Owner's property or other public or private property.
  - 2. Repair property damaged from materials storage.

## 1.8 AMBIENT CONDITIONS

- A. Section 01 50 00 - Temporary Facilities and Controls: Requirements for ambient condition control facilities for product storage and installation.
- B. Cold Weather Requirements: Comply with ACI 530/530.1.

## PART 2 - PRODUCTS

### 2.1 MANHOLES AND STRUCTURES

- A. Manhole and Structure Sections:
  - 1. Concrete: Barrel and conical top and flat top sections. (Nominal Diameters of 2' to 8')
    - a. Reinforced, precast concrete pipe section conforming to ASTM C-478.
    - b. Nominal diameter as indicated on the drawings.
    - c. Precast reinforced concrete base as indicated as drawing and approved by Engineer, or integral base.
    - d. Tongue and groove premium joints with o-ring gaskets or approved equal.

### 2.2 FRAMES AND COVERS

- A. Castings as indicated on the Drawings.

### 2.3 RISER RINGS

- A. Manufacturers:

1. Furnish materials in accordance to MDOT Standard Specifications for Construction, current edition.
2. Comply with ASTM C478

#### 2.4 ACCESSORIES

- A. Geotextile Filter Fabric per Section 31 32 21 – Filter Fabric.
- B. Bedding/Backfill Materials: See Section 31 23 23 – Fill.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify that items provided by other Sections of Work are properly sized and located.
- C. Verify that built-in items are in proper location and are ready for roughing into Work.
- D. Verify correct size of manhole and structure excavation.

#### 3.2 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.
- B. Mark each precast structure by indentation or waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers as indicated on Drawings to indicate its intended use.
- C. Coordinate placement of inlet and outlet pipe or duct sleeves required by other Sections.
- D. Do not install manholes and structures where Site conditions induce loads exceeding structural capacity of manholes or structures.
- E. Inspect precast concrete manholes and structures immediately prior to placement in excavation to verify that they are internally clean and free from damage; remove and replace damaged units.

#### 3.3 INSTALLATION

- A. Excavation and Backfill:
  1. Excavate for manholes and structures as specified in Section 31 23 16 - Excavation and in indicated locations and depths.
  2. Provide clearance around sidewalls of manhole or structure for construction operations including placing backfill and placement of geotextile filter fabric.
  3. If groundwater is encountered, prevent accumulation of water in excavations; place manhole or structure in dry trench.

4. Where possibility exists of watertight manhole or structure becoming buoyant in flooded excavation, anchor manhole or structure to avoid flotation, as approved by Architect/Engineer.
- B. Install manholes and structures supported at proper grade and alignment on crushed stone bedding as indicated on Drawings.
  - C. Backfill excavations for manholes and structures as specified in Section 31 23 16 – Excavation and Section 31 23 23 - Fill.
  - D. Form and place manhole or structure cylinder plumb and level, to correct dimensions and elevations.
  - E. Cut and fit for pipe.
  - F. Grout base of shaft sections to achieve slope to exit piping, trowel smooth, and contour to form continuous drainage channel as indicated on Drawings.
  - G. Set cover frames and covers level to correct elevations without tipping.
  - H. Precast Concrete Manholes and Structures:
    1. Lift precast components at lifting points designated by manufacturer.
    2. When lowering manholes and structures into excavations and joining pipe to units, take precautions to ensure that interior of pipeline and structure remains clean.
    3. Set precast structures, bearing firmly and fully on crushed stone bedding, compacted as specified in Section 31 23 16 - Excavation and Section 31 23 23 - Fill or on other support system as indicated on Drawings.
    4. Assembly:
      - a. Assemble multi-section manholes and structures by lowering each section into excavation.
      - b. Install rubber gasket joints between precast sections according to manufacturer's recommendations.
      - c. Lower, set level, and firmly position base section before placing additional sections.
    5. Remove foreign materials from joint surfaces and verify sealing materials are placed properly.
    6. Maintain alignment between sections by using guide devices affixed to lower section.
    7. Joint sealing materials may be installed on Site or at manufacturer's plant.
    8. Verify that installed manholes and structures meet required alignment and grade.
    9. Remove knockouts or cut structure to receive piping without creating openings larger than required to receive pipe; fill annular spaces with mortar.
    10. Cut pipe flush with interior of structure.
    11. Shape inverts through manhole and structures as indicated on Drawings.
  - I. Castings:
    1. Set frames using mortar and masonry as indicated on Drawings.

### 3.4 FIELD QUALITY CONTROL

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.



- B. Test concrete manhole and structure sections according to ASTM C497.
- C. Vertical Adjustment of Existing Manholes and Structures:
  - 1. If required, adjust top elevation of existing manholes and structures to finished grades as indicated on Drawings.
  - 2. Frames, Grates, and Covers:
    - a. Carefully remove frames, grates, and covers cleaned of mortar fragments.
    - b. Reset to required elevation according to requirements specified for installation of castings.
  - 3. Reinforcing Bars:
    - a. Remove concrete without damaging existing vertical reinforcing bars if removal of existing concrete wall is required.
    - b. Clean vertical bars of concrete and bend into new concrete top slab or splice to required vertical reinforcement as indicated on Drawings.

END OF SECTION

## SECTION 33 42 13.13

### PUBLIC PIPE CULVERT

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Pipe culverts and accessories.
  - 2. Drainage structures.
  - 3. Lateral tile connections.
  - 4. Bedding and cover materials.
  - 5. Pipe supports and anchoring.
  - 6. Pile support systems.
  - 7. Concrete encasement and cradles.
  - 8. Slope protection at pipe end.
  - 9. Remove existing structure.
  
- B. Related Requirements:
  - 1. Section 31 10 00 - Site Clearing.
  - 2. Section 31 22 13 - Rough Grading.
  - 3. Section 31 23 16 – Excavation.
  - 4. Section 31 32 21 - Filter Fabric.
  - 5. Section 31 35 21 - Slope Protection and Erosion Control.
  - 6. Section 31 37 00 – Riprap.
  - 7. Section 32 91 19 - Landscape Grading.
  - 8. Section 33 05 13 - Manholes and Structures.

##### 1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Drain Crossings (Outlet Structure) and Side Ditch Outlets:
  - 1. Basis of Measurement: At the unit price bid per linear foot as stated in the proposal.
  - 2. Basis of Payment: Includes material, labor, and equipment for installation of culvert, hauling of spoils, backfill materials, filter fabric, grout, dewatering, removal and reinstallation of guardrails, if any, 12” granular subbase, and native as shown in the drawings. In summary, crossing complete as shown on drawings and in specifications.
  
- B. Remove Existing Culverts:
  - 1. Basis of Measurement: Included in the price bid for demolition as stated in the proposal.
  - 2. Basis of Payment: Includes all equipment, labor and material to remove and dispose of the existing structure and spoils complete. Includes backfilling trench for removed pipe if a new pipe is not being proposed. Unless otherwise specified, removed crossing shall become property of the Contractor to be disposed offsite.

### 1.3 REFERENCE STANDARDS

- A. American Association of State Highway and Transportation Officials:
1. AASHTO M36 - Standard Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains.
  2. AASHTO M170 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
  3. AASHTO M196 - Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains.
  4. AASHTO M207 - Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe.
  5. AASHTO M252 - Standard Specification for Corrugated Polyethylene Drainage Pipe.
  6. AASHTO M259 - Standard Specification for Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers.
  7. AASHTO M273 - Standard Specification for Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers with Less Than 2 ft of Cover Subjected to Highway Loadings.
  8. AASHTO M278 - Standard Specification for Class PS46 Poly (Vinyl Chloride) (PVC) Pipe.
  9. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
  10. AASHTO M294 - Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter.
  11. AASHTO M304 - Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Wall Drain Pipe and Fittings Based on Controlled Inside Diameter.
  12. AASHTO T180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. ASTM International:
1. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  2. ASTM A760 - Standard Specification for Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains.
  3. ASTM B745 - Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains.
  4. ASTM C14 - Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert 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.
  7. ASTM C506 - Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe.
  8. ASTM C507 - Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe.
  9. ASTM C1433 - Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers.
  10. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort 12,400 ft-lbf/ft<sup>3</sup>.
  11. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort 56,000 ft-lbf/ft<sup>3</sup>.

12. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

C. MDOT:

1. MDOT Standard Specifications for Construction, current edition.

#### 1.4 SUBMITTALS

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

B. Submit shop drawings and product data for all items to be installed within this section.

C. Provide 2 copies of permits for road and highway crossing permits to the Engineer.

#### 1.5 CLOSEOUT SUBMITTALS

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

B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Storage:

1. Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.

2. Do not place pipe flat on ground.

3. Store UV-sensitive materials out of direct sunlight.

D. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.

2. Block individual and stockpiled pipe lengths to prevent moving.

3. Cradle pipe to prevent point stress.

4. Provide additional protection according to manufacturer instructions.

#### 1.7 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.

2. Indicate field measurements on Shop Drawings.

## PART 2 - PRODUCTS

### 2.1 STORM DRAINAGE PIPING

- A. ASTM C-76, Class III or IV – Reinforced concrete pipe with premium joints and wrapped with filter fabric (See Section 31 32 21 – Filter Fabric).
- B. ASTM C-1577 – Precast concrete box culvert (HL-93) with butyl rubber rope on interior of all joints and mastic on exterior of all joints and wrapped with filter fabric (See Section 31 32 21 – Filter Fabric).
- C. PVC, SDR 26 – Pipe for field tile outlets as noted.

### 2.2 MATERIALS

- A. Furnish materials according to Michigan Department of Transportation Standard Specifications for Construction, current edition.
- B. Backfill - See Section 32 23 23 - Fill.
- C. Native Crossings:
  - 1. Bedding: Type A – Crushed angular MDOT 6A coarse aggregate.
  - 2. Backfill: Type B – MDOT Class II granular material to springline of pipe and Engineer approved Type D, native material, or MDOT Class II granular material installed to bottom of road subbase.
  - 3. Drive Surface – Match existing native surface.
- D. Backfill: See Section 31 23 23 Fill.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify that trench cut and excavation base is ready to receive Work.
- C. Verify that excavations, dimensions, and elevations are as indicated on layout drawings.

### 3.2 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.
- B. Correct over-excavation with coarse aggregate.
- C. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.

- D. Contact Engineer 48 hours prior to any Work on crossings to verify construction and installation schedule and to schedule necessary inspection time for installation.
- E. Verify that backfill and roadway requirements meet specifications of Authority having jurisdiction.
- F. Verify acceptability of backfill material with Engineer.
- G. Verify approval of all shop drawing submittals with Engineer.
- H. Verify benchmarks and required culvert placement elements and alignment.
- I. Verify that all traffic and other safety requirements have been met of the authority having jurisdiction.

### 3.3 INSTALLATION

- A. Excavation and Bedding:
  - 1. Place geotextile fabric over compacted bedding.
  - 2. Contractor shall maintain flow at all times through drain. Contractor shall submit proposed procedure to Engineer for approval prior to construction. Cost shall be included in the cost per linear foot of drain crossing.
  - 3. Excavate to required dimensions and remove existing culvert or structure where applicable.
  - 4. Cut out soft areas not capable of insitu compaction. Backfill with Type A fill and compact to a minimum of 95 percent of the materials maximum dry density as determined by modified proctor method. See Section 31 23 16 - Excavation.
  - 5. Subgrade undercutting shall be per Section 31 23 16 - Excavation.
  - 6. Place bedding according to detail shown on drawings.
  - 7. Recess inverts of crossings 6 inches or as shown on drawings.
- B. Culvert:
  - 1. Positioning:
    - a. Lift or roll culvert into position; do not drop or drag culvert over prepared bedding.
    - b. Shore culvert to required position, and retain in place until after compaction of adjacent fills.
    - c. Ensure that pipe remains in correct position and to required slope.
    - d. Cradle bottom 20 percent of pipe diameter to avoid point load.
  - 2. Repair surface damage to pipe protective coating with two coats of compatible bituminous paint coating.
  - 3. Install culvert end gratings.
  - 4. Special care shall be taken when storing handling, and placing culverts so they are not cracked, dented, scaled, or the galvanized coating is not damaged.
  - 5. Assemble crossings according to manufacturer's specifications.
  - 6. Place structure according to the planned elevations and alignment.
  - 7. Install butyl rubber rope on concrete box culvert joints to completely seal all joints. Wrap Exterior of joints with filter fabric.

### 3.4 FIELD QUALITY CONTROL

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

- B. Section 01 70 00 - Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.
- C. Request inspection from Engineer prior to placing aggregate cover over pipe.
- D. Compaction testing will be in accordance with MDOT Standard Requirements.
- E. If tests indicate work does not meet specified requirements, remove work, replace and retest at no cost to Owner.

### 3.5 PROTECTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting installed construction.
- B. Protect pipe and bedding from damage or displacement until backfilling operation is in progress.
- C. Recompact fills subject to vehicular traffic at no cost to the Owner.

### 3.6 REMOVE EXISTING STRUCTURE

- A. Remove existing structure as indicated on the drawings.
- B. Removed culverts shall become property of the Contractor unless otherwise noted by the Engineer or Owner.
- C. Grade and restore area around removed culvert to match proposed contours, elevations, and cross sections.

### 3.7 SALVAGING REPLACED CROSSINGS

- A. Care shall be taken when removing, storing, handling, and placing culverts so they are not damaged.
- B. Removed culverts shall become property of the Contractor unless otherwise noted by the Engineer or Owner.

### 3.8 UNSALVAGEABLE CROSSING

- A. Unsalvageable crossing become property of the Contractor and removed from the Site.
- B. Concrete from existing crossings will NOT be acceptable in lieu of riprap bank and grade protection.

END OF SECTION

## SECTION 33 42 14

### LATERAL TILE DRAINS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Field tile outlets.
  - 2. Surface outlet tubes.
  - 3. Rodent guards.
  - 4. Tile main.
  
- B. Related Sections:
  - 1. Section 31 23 16 - Excavation.
  - 2. Section 31 23 23 - Fill.
  - 3. Section 31 32 21 - Filter Fabric.
  - 4. Section 31 35 21 - Slope Protection and Erosion Control.

##### 1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Tile Outlet Replacement:
  - 1. Basis of Measurement: At the unit price bid per linear foot as stated in the proposal.
  - 2. Basis of Payment: Includes material, labor, and equipment for removal of existing tile and installation of SDR-26 PVC pipe within drain right-of-way. Includes connection to existing field tile.
  
- B. Header Tile Relocation:
  - 1. Basis of Measurement: At the unit price bid per linear foot as stated in the proposal.
  - 2. Basis of Payment: Includes material, labor, and equipment as needed for relocating existing head tiles outside of drain right-of-way. Includes connection of all lateral tiles with approved prefabricated fitting. Tile shall be ADS single wall heavy duty, or equal.

##### 1.3 REFERENCES

- A. ASTM International:
  - 1. ASTM F405 – Corrugated Polyethylene Tubing.

##### 1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
  
- B. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

##### 1.5 CLOSEOUT SUBMITTALS

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



- B. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

## 1.6 PROTECTION

- A. Care shall be taken to locate and excavate around all field tile outlets.
- B. Any damage to drainage tiles and outlets during construction shall be replaced. The work to be incidental to the project.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Field Tile Outlets – PVC, SDR-26
- B. Rodent Guard – Manufactured by pipe manufacturers and approved by the Engineer.
- C. Riprap Splash Pads – See Section 31 37 00 – Riprap.
- D. Fittings – Manufactured by pipe manufacturers according to ASTM Standards and approved by the Engineer.
- E. Flap Gates – Fontaine flap gate for attachment to precast headwall on tile outlets.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting Work.
- B. Verify survey bench mark and intended elevations for the Work are as indicated on Drawings.
- C. Verify that fill materials to be used are acceptable.

### 3.2 PREPARATION

- A. Field locate of all field tile outlets even if not indicated on plans.
- B. Receive direction from Engineer as to which field tile outlets are in need of repair, unless indicated on the plans.
- C. Coordinate locations of proposed surface outlet tube with Engineer prior to delivering material to site. Tubes may or may not be installed based on landowner preference.

### 3.3 INSTALLATION FIELD TILE OUTLETS

- A. Installation shall be as shown on the plans. See Section 31 23 16 – Excavation and Section 31 23 23 – Fill. Backfill material shall be Type D – native material.

- B. Field tile extensions are to be laid at a slope of 0.10 percent at minimum to provide for positive drainage.
- C. All joints between like materials shall be connected with a manufactured connector.
- D. Connection between field tile and field tile outlet or other unlike materials shall be wrapped with filter fabric. Joint shall be backfilled with concrete to provide for a joint that will not leak.
- E. Place riprap splash pad beneath tile outlet. See Section 31 32 21 – Filter Fabric and Section 31 37 00 – Riprap.
- F. Clean out any field tile outlets that do not require replacement and/or extension.

#### 3.4 RODENT GUARDS

- A. Rodent guards shall be placed on all tile outlets 3 inches or larger that have an existing rodent guard which are cutoff, replaced, or extended during construction of this project, unless a flap gate is being installed.
- B. Rodent guards do not have to be installed in existing tile outlets, which are not cutoff, replaced, or extended during construction of this project.

END OF SECTION

SECTION 40 05 71.16

FLAP GATES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Stainless steel flap gates.

1.2 DEFINITIONS

- A. Seating Head: The distance from centerline of gate to maximum water level of channel.

1.3 UNIT PRICE – MEASUREMENT AND PAYMENT

- A. Flap Gates:
  - 1. Basis of Measurement: At the unit price bid per each as stated in the proposal.
  - 2. Basis of Payment: Includes all labor, material, and equipment required to provide and install flap gates as shown on plans and listed on proposal. Includes anchors, grout, adjustments, and testing.

1.4 PREINSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Requirements for preinstallation meeting.
- B. Convene minimum one week prior to commencing Work of this Section.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit manufacturer's product information for system materials and component equipment.
- C. Shop Drawings:
  - 1. Indicate system materials and component equipment.
  - 2. Indicate installation and anchoring requirements, fasteners, and other details.
  - 3. Indicate gate location, size, design pressure.
- D. Manufacturer's Certificate:
  - 1. Certify that products meet or exceed specified requirements.
- E. Delegated Design Submittals: Submit Shop Drawings with design calculations and assumptions for seating and unseating pressure pressures.

F. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.

G. Qualifications Statements:

1. Submit qualifications for manufacturer.

#### 1.6 CLOSEOUT SUBMITTALS

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

B. Project Record Documents: Record actual locations of installed flap gates and components.

#### 1.7 QUALIFICATIONS

A. The manufacturer shall have experience in the production of substantially similar equipment and shall show evidence of satisfactory operating in at least 50 installations. The manufacturer's shop welds, welding procedures and welders shall be qualified and certified in accordance with the requirement of the latest edition of ASME, Section IX.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Store materials according to manufacturer instructions.

D. Protection:

1. Store in dry location remote from construction operations areas.

2. Provide additional protection according to manufacturer instructions.

#### 1.9 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.

2. Indicate field measurements on Shop Drawings.

#### 1.10 WARRANTY

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

B. Furnish five-year manufacturer's warranty for flap gates.

## PART 2 - PRODUCTS

### 2.1 STAINLESS STEEL FLAP GATES

#### A. Manufacturers:

1. Fontaine Aquanox

#### B. Description:

1. Configuration: As indicated on drawings.
2. Seating Head: As indicated on drawings. Calculate elevation differences between top of adjacent dike and invert of proposed flapgate pipe.
3. Opening Diameter: As indicated on Drawings.

#### C. Seat:

1. Configuration:
  - a. Flat back made for mounting to concrete wall with extra wide flange.
  - b. One piece.
2. Cover:
  - a. Configuration: One piece.
  - b. Furnish lifting eye for manual operation.
  - c. Constructed of stainless steel structural members capable of with standing specified pressure without deformation.
3. Material: Stainless Steel.

#### D. Seals:

1. Material: EPDM.
2. Seals shall be made of resilient neoprene attached to the body by means of a retainer ring for flaps up to 24" (610mm). Seals shall be made of EPDM attached to the frame with a stainless steel retainer for flaps over 24" (610 mm).

#### E. Hinges:

1. Hinges shall consist of a stainless steel pin and shall have a UHMWPE bushing.

#### F. Hinge Arms:

1. Hinge arms shall be made of structural members or formed plates. Gates 30" (762 mm) and over in diameter shall have a 2-hinge arm arrangement, with 2 pivot joints per arm, an adjustable lower pivot with limited rotation and an adjustable upper hinge lug arrangement to permit adjustment of the gate opening sensitivity to unseating head.

G. Fasteners: Stainless steel.

## 2.2 MATERIALS

<b>Part</b>	<b>Material</b>
Body, cover, hinges, hinge arm	Stainless steel ASTM A-240 Type 304L or 316L
Hinge bushing	Ultra high molecular weight polyethylene (UHMWPE) ASTM D-4020
Seal for flaps up to 24" (610 mm)	Neoprene ASTM D-2000 Grade 2 BC-510
Seal for flaps over 24" (610 mm)	EPDM ASTM D-2000
Fasteners	ASTM F593 and F594 GR1 for type 304 and GR2 for type 316

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify that items provided by other Sections of Work are ready to receive Work of this Section.

### 3.2 INSTALLATION

- A. According to manufacturer instructions and as indicated on Drawings.
- B. Flap Gates Attached to Concrete: Mount using anchor bolts and grout in place.

### 3.3 FIELD QUALITY CONTROL

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.
- B. Inspection:
  - 1. Verify alignment of gate and components.
  - 2. Verify that gate operates smoothly and does not bind.

C. Testing:

1. Leakage: Not exceeding 0.1 gpm/ft. of seating perimeter under 20 feet of seating head.

D. Manufacturer Services: Furnish services of manufacturer's representative experienced in installation of products furnished under this Section for not less than 3 days on Site for installation, inspection, field testing, and instructing Owner's personnel in maintenance of equipment.

E. Equipment Acceptance:

1. Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.
2. Make final adjustments to equipment under direction of manufacturer's representative.

F. Furnish installation certificate from equipment manufacturer's representative attesting that equipment has been properly installed and is ready for startup and testing.

3.4 ADJUSTING

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for starting and adjusting.

B. Adjust flap gates to provide smooth operation.

3.5 DEMONSTRATION

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for demonstration and training.

B. Demonstrate equipment operation, routine maintenance, and emergency repair procedures to Owner's personnel.

END OF SECTION

**APPENDIX A**  
**Geotechnical Report**





# GEOTECHNICAL EVALUATION REPORT

SAVAGE DRAIN FLOOD CONTROL IMPROVEMENTS  
ALBEE TOWNSHIP, SAGINAW COUNTY, MICHIGAN

SME Project Number: 085456.00  
December 14, 2020





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December 14, 2020

Mr. Luke O'Brien, PE  
Project Manager  
Spicer Group, Inc.  
230 South Washington Avenue  
Saginaw, Michigan 48607

Via E-Mail: [lukeo@spicergroup.com](mailto:lukeo@spicergroup.com)  
[nickc@spicergroup.com](mailto:nickc@spicergroup.com)

RE: Geotechnical Evaluation Report  
Savage Drain Flood Control Improvements  
Albee Township, Saginaw County, Michigan  
SME Project No. 085456.00

Dear Luke:

We have completed our geotechnical evaluation for the proposed flood control improvements along Savage Drain in Saginaw County, Michigan. This report presents the results of our observations and analyses, and our geotechnical engineering recommendations based on the information disclosed by the borings.

We appreciate the opportunity to be of service. If you have questions or require additional information, please contact me.

Sincerely,

**SME**

A handwritten signature in blue ink, appearing to read "Joseph Noykos", is placed over a light blue rectangular background.

Joseph L. Noykos, PE  
Senior Project Engineer

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**APPENDIX A**  
BORING LOCATION FIGURE  
BORING LOG TERMINOLOGY  
BORING LOGS (B1 AND B2)

**APPENDIX B**  
IMPORTANT INFORMATION ABOUT THIS GEOTECHNICAL ENGINEERING REPORT  
GENERAL COMMENTS  
LABORATORY TESTING PROCEDURE

# 1. INTRODUCTION

This report presents the results of our geotechnical evaluation for the flood control improvements along Savage Drain in Albee Township, Saginaw County, Michigan. We performed this evaluation in general accordance with the scope of services outlined in SME Proposal No. P03411.20, dated October 28, 2020. Mr. Luke O'Brien, PE of Spicer Group (Spicer), the project civil engineer, authorized this evaluation.

To assist with our evaluation and preparation of this report, SME was provided the following:

- A Preliminary Bueche Road Detail prepared by Spicer, dated October 2020, for the culvert replacement of the bridge at Bueche Road over Savage Drain.
- A Preliminary Concrete Flap Gate Structure Detail prepared by Spicer for the concrete flap gate structure replacement of the existing three reinforced concrete pipes (RCP) at the intersection of Savage Drain and Mistequay Creek.

## 1.1 SITE CONDITIONS

We provide the current conditions at each of the two sites below. The water surface level of Savage Drain is unknown. The approximate location of each site is depicted on the Location Map inset on the Boring Location Figure (Figure No.1), included in Appendix A.

### 1.1.1 BUECHE ROAD AT SAVAGE DRAIN

The project site currently consists of a 21 feet wide by 50 feet long, iron bridge constructed atop cast-in-place concrete abutment walls reportedly supported on driven wooden piles. Bueche Road is a gravel-surfaced road with a surface elevation of about 591 feet, based on limited topographic data provided by Spicer.

### 1.1.2 SAVAGE DRAIN AT MISTEQUAY CREEK

The site is at the intersection of Savage Drain and Mistequay Creek. Three (3), 84-inch diameter, reinforced concrete pipe culverts, with cast-in-place concrete walls at either end, are present in Savage Drain. Grass surfaced, earthen dikes are located on the north and south sides of Savage Drain. The top of dike elevation is about 598 feet based on limited topographic data provided by Spicer. The water surface level in Savage Drain is unknown.

## 1.2 PROJECT DESCRIPTION

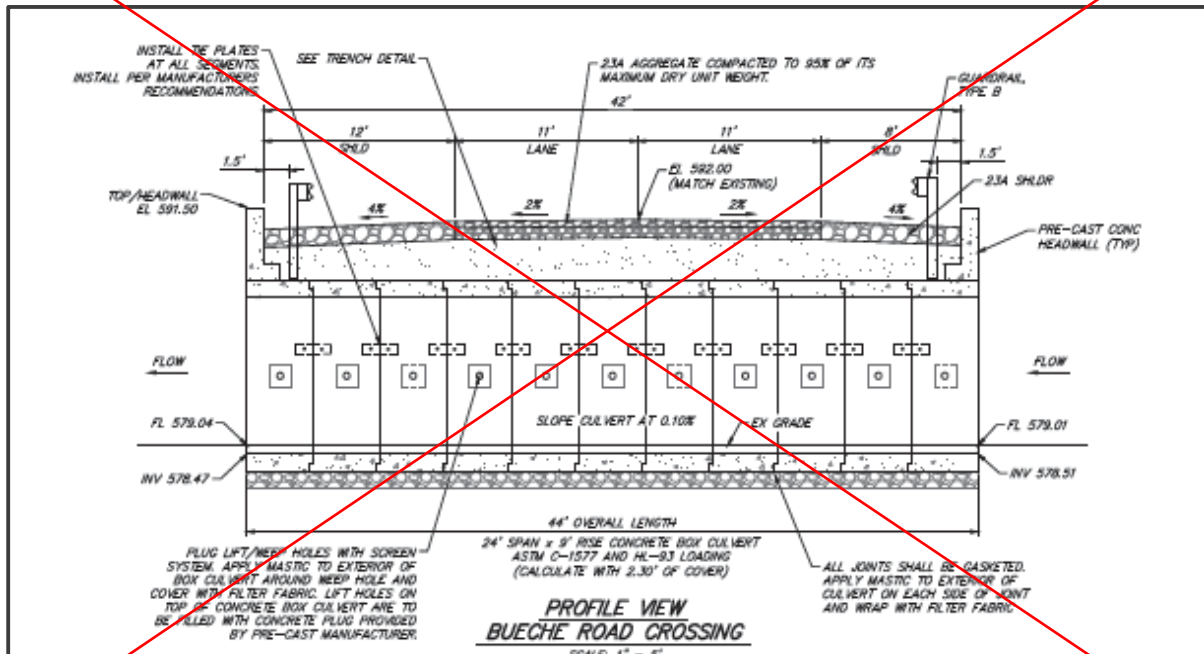
The project generally consists of flood and infrastructure improvements along Savage Drain between Bueche Road and Mistequay Creek in Albee Township, Saginaw County, Michigan.

### 1.2.1 BUECHE ROAD AT SAVAGE DRAIN

The project will consist of removing the existing iron bridge and replacing with a 24 feet long, reinforced, pre-cast, concrete sectional box culvert. The design subgrade elevation for support of the structure will be about 576 to 577 feet, or about 14 to 15 feet below existing roadway surface elevation. We understand about 12 inches of MDOT 6AA crushed limestone will be placed on the subgrade prior to placement of the box culvert sections.

**Note: Bueche Road crossing is not included with this project.**

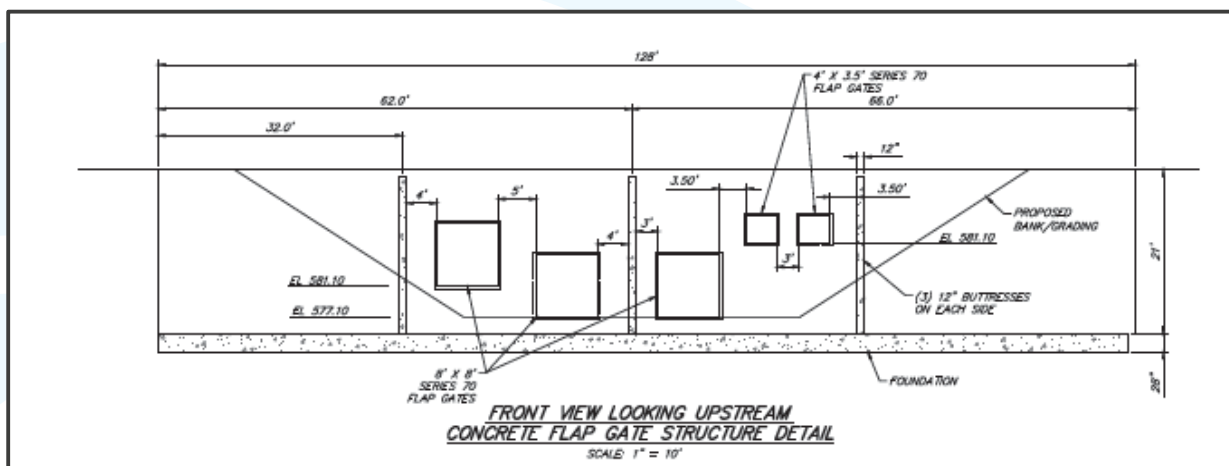
Please refer to the detail below provided by Spicer Group.



Profile View – Concrete Sectional Box Culvert Diagram

### 1.2.2 SAVAGE DRAIN AT MISTEQUAY CREEK

The project will consist of removing three (3) existing, RCP culverts located in Savage Drain at Mistequay Creek. The RCP's will be replaced with a cast-in-place, concrete, flap gate structure supported on an approximately 2-1/2 feet thick concrete mat foundation. We understand the mat foundation will bear at a depth of about 25 feet below the top of the earthen dike, or about elevation 573 feet. Please refer to the detail below provided by Spicer Group.



Concrete Flap Gate Structure Detail Diagram

## 2. EVALUATION PROCEDURES

### 2.1 FIELD EXPLORATION

SME completed two (2) borings at the project sites (B1 and B2) on November 20, 2020. We drilled boring B1 near the site of the proposed bridge replacement at Bueche Road over Savage Drain. The driller extended the boring to a depth of about 45 feet below the existing road surface, or about elevation 545.9 feet. We drilled boring B2 near the site of the RCP culvert replacement project at the intersection of Savage Drain and Mistequay Creek. The driller extended the boring to a depth of about 35 feet below the existing ground surface, or about elevation 562.8 feet. The approximate as-drilled boring locations are presented on Figure No. 1.

SME determined the planned location of the borings based on site access, proximity to the site, and site plans provided by Spicer. SME determined the planned depth of the borings and extended the borings as necessary to properly evaluate the soil conditions. Spicer provided the existing ground surface elevations at the borings to the nearest one-tenth of a foot.

The driller advanced the borings with a truck-mounted, rotary drill rig using continuous-flight augers followed by wash-rotary drilling methods where necessary. The borings included soil sampling based upon the Split-Barrel Sampling procedure. The driller sealed portions of the recovered split-barrel samples in glass for further review by the SME geotechnical engineer of record.

The driller recorded groundwater level measurements in the boreholes during auger drilling prior to utilization of wash-rotary methods. The driller tremie-grouted the borehole at boring B2 with a cement and bentonite grout at completion of drilling. The borehole at boring B1 was backfilled with auger cuttings.

Soil samples recovered from the field exploration were returned to the SME laboratory for further observation and testing.

### 2.2 LABORATORY TESTING

The laboratory testing program consisted of visual soil classification on recovered samples in general accordance with ASTM D-2488. We also performed moisture content and either hand penetrometer or Torvane tests on portions of recovered cohesive SPT samples. The Laboratory Testing Procedures in Appendix B provides descriptions of the laboratory tests performed. Based on the laboratory testing, we assigned a group symbol to the various soil strata encountered based on the Unified Soil Classification System (USCS).

Upon completion of the laboratory testing, we prepared boring logs that include the soil descriptions, penetration resistances, pertinent field observations, and the results of the laboratory testing. Each log also includes the existing ground surface elevation as estimated by Spicer. The boring logs are included in Appendix A. Explanations of symbols and terms used on the boring logs are provided on the Boring Log Terminology sheet included in Appendix A.

Soil samples are normally retained in our laboratory for 60 days and are then disposed, unless instructed otherwise.

## 3. SUBSURFACE CONDITIONS

### 3.1 SOIL CONDITIONS

The soil conditions encountered at the boring locations generally consisted of existing sand and clay fill overlying natural fine sands with varying amounts silt and clay. Standard Penetration Test (SPT) Resistances (N-values) of 1 to 3 blows per foot (bpf), indicated the sands were in a very loose condition. At boring B1, the natural sands were underlain by organic clay extending to a depth of about 33.5 feet, or about elevation 557.4 feet. Shear strengths in the organic clay ranged from about 0.6 to 0.7 kips per square foot (ksf), indicating a medium condition. Corresponding moisture contents ranged from about 72 to 127 percent.

The driller observed natural, brown/gray to gray, lean to fat clays extending from beneath the natural sands at B2 to the explored depth of the boring, or about 35 feet. Natural, lean to fat clays were encountered below the organic clay at boring B1 generally extending to a depth of about 44 feet where the driller reported a gray, sandy silt extending to the explored depth of the boring. Shear strengths in the lean to fat clays ranged from about 0.4 to 3.75 ksf, indicating a medium to very stiff condition. Associated moisture contents ranged from 11 to 48 percent.

Consider thickness measurements of the existing fill reported on the boring logs approximate since mixing of the fill with the underlying subgrade can occur while advancing the augers making it difficult to measure the thickness of surface materials in small-diameter boreholes. Therefore, if more accurate thickness measurements are required, we recommend performing additional evaluations such as shallow test pits or hand augers.

The soil profile included on the boring logs is a generalized description of the conditions encountered. The stratification depths described above and shown on the boring logs indicate a zone of transition from one soil type to another and do not show exact depths of change from one soil type to another. The soil descriptions are based on visual classification of the soils encountered. Soil conditions may vary between or away from the boring locations. Please refer to the boring logs for soil conditions at the specific boring location.

### 3.2 GROUNDWATER CONDITIONS

Groundwater was encountered at boring B1 during and immediately upon completion of drilling at a depth of about 8 to 8.5 feet below grade, or about elevation 582.4 to 582.9 feet. The driller did not observe groundwater at boring B2 either during or upon completion of drilling. However, we anticipate the long-term groundwater table to match that of the water surface level of the Savage Drain.

In cohesive soils (i.e., clays) as those predominantly encountered in the borings, a long time may be required for groundwater in small-diameter boreholes to reach equilibrium due to the relatively low permeability of the cohesive soils. Install piezometers to determine accurate site groundwater levels in the site cohesive soils.

Expect groundwater levels and the rate of infiltration into excavations to fluctuate throughout the year, based on variations in precipitation, evaporation, run-off, and other factors. The groundwater conditions indicated by the borings represent conditions at the time of the readings. The actual groundwater levels at the time of construction may vary.

## 4. ANALYSIS AND RECOMMENDATIONS

### 4.1 SITE PREPARATION AND EARTHWORK

#### 4.1.1 GENERAL SITE SUBGRADE CONDITIONS

Remove the existing structures, topsoil (if any), and other unsuitable materials to the design subgrade levels for each site. We expect subgrade soils at the Bueche Road over Savage Drain design subgrade level of about 576.5 feet to consist of natural, medium stiff, organic clay. At the proposed flap gate structure, we expect the subgrade soil at the design bottom of mat foundation elevation of about 573 feet to consist of natural, medium to soft, lean to fat clays.

The natural, lean to fat clays at the proposed flap gate structure generally appear suitable for support of the mat foundation provided the subgrade is thoroughly tested and improved as needed. We further detail mat foundation subgrade preparations in Section 4.4.1 of this report.

We do not consider the organic clays encountered at the reported culvert floor elevation suitable for support of the proposed structure. Fill placed alongside and overtop the box culvert will likely cause consolidation of the underlying organic clays resulting in possible roadway settlement/depressions, subsurface utility damage, and possible localized slope failure to the Savage Drain. Refer to Section 4.4.2 of this report for additional details.

#### 4.1.2 ENGINEERED FILL REQUIREMENTS

Any fill placed within structural areas, including utility trench backfill, should be an approved material, free of frozen soil, organics (greater than 4 percent), over-sized materials, or other deleterious materials. Fill placed in structural areas should be compacted to a minimum of 95 percent of the maximum dry density determined in accordance with the Modified Proctor test. Spread the fill in level layers with a loose thickness appropriate for the type of equipment used to obtain compaction.

Based on the information from the borings, we expect the majority of the soils to consist of existing sand/clay fill and natural sands. Do not use clay soils, or sands with elevated silt and clay contents, for below grade wall backfill. Although clays and sands can typically be considered for general site fill, due to the moderate silt and clay of the natural site sands, and the saturated condition and relatively high moisture contents and corresponding low shear strength values in the site clays, we do not recommend the reuse of the excavated soils.

In utility trenches, foundation excavations, behind walls, and in other areas where compaction is accomplished primarily by smaller plate compaction equipment or drainage is required, an approved imported granular material meeting MDOT Class II granular requirements should be used as backfill. Thinner lift sizes may be required to achieve the required density in areas where smaller compaction equipment is used.

### 4.2 EXCAVATION AND DEWATERING CONSIDERATIONS

Construction of each of the planned structures will require excavations extending below the water surface level of the Savage Drain and/or the anticipated groundwater table. Each of the excavations are expected to terminate within soft to medium natural organic or lean to fat clay strata. We consider open-cut excavations to be unfeasible due to the limited setback and groundwater/drain water. Accordingly, we anticipate groundwater control and a temporary earth retention system, likely with internal bracing, will be required for each project.



Bottom stability of both the swing gate and box culvert excavations will be a critical construction factor due to the very soft soils below the bottom of the cut.

To provide excavation support, control water infiltration into the excavations, and reduce the risk of bottom heave, we expect tremie-placed sealed cofferdams will be required. Cofferdams shall be designed by a registered professional engineer, and should comply with current Michigan Department of Transportation (MDOT) requirements (Section 704 of MDOT *Standard Specifications for Construction*).

Cofferdams could require temporary rerouting of the drain. While other methods of construction could be considered, significant dewatering would be required. Because of the layered soils, organic soils, and clays, closely spaced wellpoints would likely be required to effectively lower the groundwater level enough to maintain a reasonably dry excavation, and bottom heave of excavations would still be a concern. For shallower excavations extending less than about 1 foot below static water levels, localized control of water using submersible pumps in slotted casings should be adequate to control water.

The specific dewatering operations, if any, will depend on the rate and volume of groundwater flow determined in the field by the dewatering contractor. Dewatering, if needed, should be designed by an experienced specialty contractor.

## 4.3 FOUNDATIONS

Based on the soil conditions encountered at boring B2, the concrete flap gate structure may be supported on a concrete mat foundation as intended. Based on the soil conditions encountered at boring B1, we recommend supporting the proposed box culvert on a deep foundation system. For either option, we recommend cofferdam construction, including a seal or subfooting. Seals/subfootings, while not detailed in the following sections, are assumed to be in-place. Specific recommendations for each foundation type are provided below.

### 4.3.1 FLAP GATE STRUCTURE MAT FOUNDATION

The proposed mat foundation should bear on a prepared aggregate pad over the medium to soft, natural, lean to fat clays present at the planned bottom of excavation (about elevation 573 feet). The aggregate pad should be at least 2 feet thick, should include at least one layer of non-woven geotextile, and should span across the entire footprint of the temporary earth retention system/cofferdam. The net allowable soil bearing pressure should be limited to 1,000 pounds per square foot (psf) over the entire area of the mat to limit increase in effective stress in the underlying soft soils. A temporary increase in loading of 33% at the “toe” of the mat may be considered under flood conditions. Therefore, consider hydrostatic forces and the resulting increase in toe pressure when designing the mat foundation. A vertical modulus of subgrade reaction of 125 pounds per cubic inch (pci) may be used for mat foundations constructed over the aggregate layer.

The aggregate should consist of a crushed natural aggregate with a nominal 1-1/2-inch diameter particle size, and less than 7-percent passing the No. 200 sieve. To facilitate placement of the concrete mat, it may be desirable to cap the coarse-crushed aggregate layer with an additional 3-inch layer of MDOT 21AA dense-graded aggregate. In areas where granular fill will be placed above the coarse crushed material, a layer of MDOT 21AA dense-graded aggregate or a non-woven geotextile should be placed over the coarse aggregate to reduce the potential for migration of sand fill into the voids of the coarser material.

We expect settlement of the proposed structure to be relatively small (with the limited bearing pressures). The settlements will depend on the net contact pressures at the base of the proposed mat foundation, which we expect to be relatively low based on the weight of the overburden soils being removed. If the weight of the structure is less than the effective weight of soil overburden removed (as anticipated), we estimate the settlement will be less than about ¼ to ½ inch. However, SME can provide specific settlement estimates once design contact pressures are available to us.

Protect the bearing soils below the mat foundation from freezing during construction if work occurs during the winter months. In addition, remove any caved soils/caked slurry or mud from the foundation bearing surfaces before placing concrete.

Design and protect the mat foundation for scour. Scour analysis was beyond our scope of services, but fine-grained moderately plastic clays were encountered at the proposed bearing level and below. We expect scour countermeasures will therefore be required.

#### 4.3.2 BOX CULVERT DEEP FOUNDATION

Note: Bueche Road crossing is not included with this project.

We recommend supporting the box culvert structure on deep foundations extending through the organic clays and bearing in the natural inorganic clays and sandy silts encountered beginning at an elevation of about 555 feet. We expect timber pile foundations will develop resistance predominately from skin friction. We anticipate a net capacity of 10 tons per pile for piles extending about 15 feet into the natural clays and sandy silts below the organic clay, and we recommend a design tip elevation of 540 feet. We base the allowable pile load capacity above on a factor of safety of 2.5. We anticipate pile lengths will be about 35 to 40 feet to achieve suitable bearing depth. However, soil conditions can vary across the footprint of the culvert and the contractor should be prepared to vary the length of the piles as necessary to achieve a minimum 15-foot embedment into the natural clays and silts.

The above working capacity of 10 tons includes a reduction due to an approximate 10-ton down drag load due to consolidation of the organic clays. Therefore, the actual working load (before the reduction for down drag) on the piles is about 20 tons, and the piles should be driven accordingly. Timber piles should conform to ASTM D25 Standard Specification for Round Timber Piles and should have a minimum butt and tip diameter of 12 and 8 inches, respectively.

The capacity for the driven timber piles should be verified in the field during pile driving by observing the driving resistance, or "set" developed from a preliminary pile driving analysis. Perform dynamic testing with signal matching for initial pile installation and base "set" on the information obtained from the dynamic testing. Final pile embedment should be based on the observed final set of the pile during driving and may deviate from preliminary estimated pile lengths. Settlement of the pile foundations are expected to be less than 1/2 inch.

A qualified Registered Professional Engineer, experienced in the use of the wave equation, should perform the pile driving (wave equation) analysis, and an experienced engineer or technician should perform in-field dynamic testing. We would be pleased to perform this service once the necessary information becomes available.

A considerable amount of "soil freeze" may occur after the initial driving of the piles. Soil freeze consists of an increase in the pile capacity with time as pore water pressures generated by driving dissipate. We anticipate a certain amount of soil freeze to occur due to the presence of native silts and sands. Additionally, heave of adjacent piles can sometimes occur. Therefore, re-striking the pile a few days after driving may be necessary to verify the capacity of the pile and/or to reset heaved piles to their design tip elevations.

We recommend using a minimum design spacing of at least three pile diameters between adjacent piles (edge-to-edge) within a group. The use of closer pile spacing would require additional evaluation of the group effect, and a reduced capacity will apply.

The contractor may encounter obstructions and/or refusal to pile penetration above the target tip elevation during pile installation due to naturally occurring cobbles and boulders or due to old rip-rap, old bridge foundations/structures, or other man-made obstructions. The type, size, and frequency of these obstructions will have varying effects on the installation. When possible, the contractor needs to penetrate the obstruction, maneuver around the obstruction (provided pile plumbness/alignment requirements are not exceeded), or remove the obstruction by augering or excavation from the surface, and then backfill

~~the resulting excavation and resume pile installation. Excavations to remove obstructions must not undermine existing improvements. Further, the piles must be protected from damage during driving, and damaged butts cut off prior to casting a base mat above the pile foundations. Because a deep foundation is required, we recommend a pile-supported cast-in-place mat and a three-sided culvert in lieu of the currently proposed box culvert. Pile-supported wing-walls will also be required, and as discussed in the preceding section, we assume appropriate scour countermeasures will be provided. Wing walls should be backfilled with granular engineered fill.~~

## 4.4 CONSTRUCTION CONSIDERATIONS

The contractor must take precautions to protect nearby existing roadways and utilities during construction. Care must be exercised during the excavating and compacting operations so that excessive vibrations do not cause settlement of nearby existing site features.

The contractor must provide safely sloped excavations or an adequately constructed and braced shoring system in accordance with federal, state and local safety regulations for individuals working in an excavation that may expose them to the danger of moving ground. If material is stored or heavy equipment is operated near an excavation, use appropriate shoring to resist the extra pressure due to the superimposed loads.

Handling, transportation and disposal of excavated materials and groundwater should be performed in accordance with applicable regulatory requirements.

## 5. SIGNATURES

Report Prepared By:



Joseph L. Noykos, PE  
Senior Project Engineer

Report Reviewed By:




Laurel Johnson  
Dec 14 2020 3:29 PM

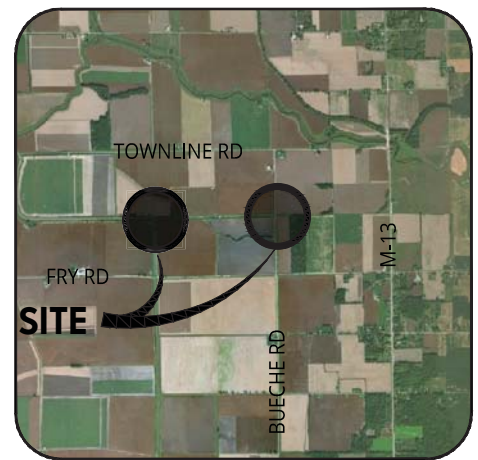
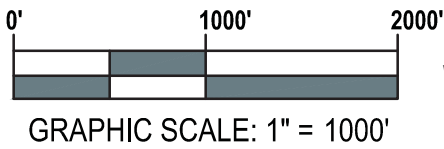
Laurel M. Johnson, PE  
Senior Consultant

**APPENDIX A**  
**BORING LOCATION DIAGRAM**  
**BORING LOG TERMINOLOGY**  
**BORING LOGS (B1 AND B2)**



**LEGEND**

 APPROXIMATE BORING LOCATION



**LOCATION MAP**

NOT TO SCALE



NOTE:  
DRAWING INFORMATION TAKEN FROM GOOGLE EARTH PRO  
WITH IMAGE DATE 5/16/2018.

No.	Revision Date	Date	12/03/2020
		Drawn By	MNR
		Designed By	JN
		Scale	AS SHOWN
		Project	085456.00

**BORING LOCATION DIAGRAM  
SAVAGE DRAIN IMPROVEMENTS  
ALBEE TWP, SAGINAW COUNTY, MI**



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**Figure No. 1**

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART		
<b>COARSE-GRAINED SOIL</b> (more than 50% of material is larger than No. 200 sieve size.)		
Clean Gravel (Less than 5% fines)		
<b>GRAVEL</b> More than 50% of coarse fraction larger than No. 4 sieve size		Well-graded gravel; gravel-sand mixtures, little or no fines
		Poorly-graded gravel; gravel-sand mixtures, little or no fines
	Gravel with fines (More than 12% fines)	
		Silty gravel; gravel-sand-silt mixtures
		Clayey gravel; gravel-sand-clay mixtures
Clean Sand (Less than 5% fines)		
<b>SAND</b> 50% or more of coarse fraction smaller than No. 4 sieve size		Well-graded sand; sand-gravel mixtures, little or no fines
		Poorly graded sand; sand-gravel mixtures, little or no fines
	Sand with fines (More than 12% fines)	
		Silty sand; sand-silt-gravel mixtures
		Clayey sand; sand-clay-gravel mixtures
<b>FINE-GRAINED SOIL</b> (50% or more of material is smaller than No. 200 sieve size)		
<b>SILT AND CLAY</b> Liquid limit less than 50%		Inorganic silt; sandy silt or gravelly silt with slight plasticity
		Inorganic clay of low plasticity; lean clay, sandy clay, gravelly clay
		Organic silt and organic clay of low plasticity
<b>SILT AND CLAY</b> Liquid limit 50% or greater		Inorganic silt of high plasticity, elastic silt
		Inorganic clay of high plasticity, fat clay
		Organic silt and organic clay of high plasticity
<b>HIGHLY ORGANIC SOIL</b>		Peat and other highly organic soil

OTHER MATERIAL SYMBOLS		

LABORATORY CLASSIFICATION CRITERIA	
GW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}^2}{D_{10} \times D_{60}}$ between 1 and 3
GP	Not meeting all gradation requirements for GW
GM	Atterberg limits below "A" line or PI less than 4
GC	Atterberg limits above "A" line with PI greater than 7
SW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{D_{30}^2}{D_{10} \times D_{60}}$ between 1 and 3
SP	Not meeting all gradation requirements for SW
SM	Atterberg limits below "A" line or PI less than 4
SC	Atterberg limits above "A" line with PI greater than 7

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

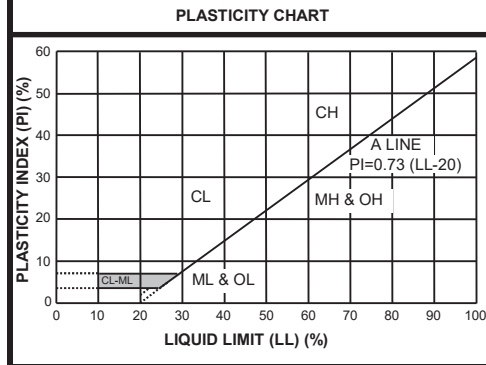
Less than 5 percent.....GW, GP, SW, SP  
 More than 12 percent.....GM, GC, SM, SC  
 5 to 12 percent.....Cases requiring dual symbols

- SP-SM or SW-SM (SAND with Silt or SAND with Silt and Gravel)
- SP-SC or SW-SC (SAND with Clay or SAND with Clay and Gravel)
- GP-GM or GW-GM (GRAVEL with Silt or GRAVEL with Silt and Sand)
- GP-GC or GW-GC (GRAVEL with Clay or GRAVEL with Clay and Sand)

If the fines are CL-ML:

- SC-SM (SILTY CLAYEY SAND or SILTY CLAYEY SAND with Gravel)
- SM-SC (CLAYEY SILTY SAND or CLAYEY SILTY SAND with Gravel)
- GC-GM (SILTY CLAYEY GRAVEL or SILTY CLAYEY GRAVEL with Sand)

PARTICLE SIZES	
Boulders	- Greater than 12 inches
Cobbles	- 3 inches to 12 inches
Gravel- Coarse	- 3/4 inches to 3 inches
Fine	- No. 4 to 3/4 inches
Sand- Coarse	- No. 10 to No. 4
Medium	- No. 40 to No. 10
Fine	- No. 200 to No. 40
Silt and Clay	- Less than (0.074 mm)



VISUAL MANUAL PROCEDURE
When laboratory tests are not performed to confirm the classification of soils exhibiting borderline classifications, the two possible classifications would be separated with a slash, as follows:
For soils where it is difficult to distinguish if it is a coarse or fine-grained soil:
<ul style="list-style-type: none"> <li>• SC/CL (CLAYEY SAND to Sandy LEAN CLAY)</li> <li>• SM/ML (SILTY SAND to SANDY SILT)</li> <li>• GC/CL (CLAYEY GRAVEL to Gravelly LEAN CLAY)</li> <li>• GM/ML (SILTY GRAVEL to Gravelly SILT)</li> </ul>
For soils where it is difficult to distinguish if it is sand or gravel, poorly or well-graded sand or gravel; silt or clay; or plastic or non-plastic silt or clay:
<ul style="list-style-type: none"> <li>• SP/GP or SW/GW (SAND with Gravel to GRAVEL with Sand)</li> <li>• SC/GC (CLAYEY SAND with Gravel to CLAYEY GRAVEL with Sand)</li> <li>• SM/GM (SILTY SAND with Gravel to SILTY GRAVEL with Sand)</li> <li>• SW/SP (SAND or SAND with Gravel)</li> <li>• GP/GW (GRAVEL or GRAVEL with Sand)</li> <li>• SC/SM (CLAYEY to SILTY SAND)</li> <li>• GM/GC (SILTY to CLAYEY GRAVEL)</li> <li>• CL/ML (SILTY CLAY)</li> <li>• ML/CL (CLAYEY SILT)</li> <li>• CH/MH (FAT CLAY to ELASTIC SILT)</li> <li>• CL/CH (LEAN to FAT CLAY)</li> <li>• MH/ML (ELASTIC SILT to SILT)</li> </ul>

DRILLING AND SAMPLING ABBREVIATIONS	
2ST	- Shelby Tube - 2" O.D.
3ST	- Shelby Tube - 3" O.D.
AS	- Auger Sample
GS	- Grab Sample
LS	- Liner Sample
NR	- No Recovery
PM	- Pressuremeter
RC	- Rock Core diamond bit. NX size, except where noted
SB	- Split Barrel Sample 1-3/8" I.D., 2" O.D., except where noted
VS	- Vane Shear
WS	- Wash Sample

OTHER ABBREVIATIONS	
WOH	- Weight of Hammer
WOR	- Weight of Rods
SP	- Soil Probe
PID	- Photo Ionization Device
FID	- Flame Ionization Device

DEPOSITIONAL FEATURES	
Parting	- as much as 1/16 inch thick
Seam	- 1/16 inch to 1/2 inch thick
Layer	- 1/2 inch to 12 inches thick
Stratum	- greater than 12 inches thick
Pocket	- deposit of limited lateral extent
Lens	- lenticular deposit
Hardpan/Till	- an unstratified, consolidated or cemented mixture of clay, silt, sand and/or gravel, the size/shape of the constituents vary widely
Lacustrine	- soil deposited by lake water
Mottled	- soil irregularly marked with spots of different colors that vary in number and size
Varved	- alternating partings or seams of silt and/or clay
Occasional	- one or less per foot of thickness
Frequent	- more than one per foot of thickness
Interbedded	- strata of soil or beds of rock lying between or alternating with other strata of a different nature

DESCRIPTION OF RELATIVE QUANTITIES	
The visual-manual procedure uses the following terms to describe the relative quantities of notable foreign materials, gravel, sand or fines:	
Trace	- particles are present but estimated to be less than 5%
Few	- 5 to 10%
Little	- 15 to 25%
Some	- 30 to 45%
Mostly	- 50 to 100%

CLASSIFICATION TERMINOLOGY AND CORRELATIONS			
<b>Cohesionless Soils</b>		<b>Cohesive Soils</b>	
<b>Relative Density</b>	<b>N<sub>60</sub> (N-Value) (Blows per foot)</b>	<b>Consistency</b>	<b>N<sub>60</sub> (N-Value) (Blows per foot)</b>
Very Loose	0 to 4	Very Soft	<2
Loose	5 to 10	Soft	2 - 4
Medium Dense	11 to 30	Medium	5 - 8
Dense	31 to 50	Stiff	9 - 15
Very Dense	51 to 80	Very Stiff	16 - 30
Extremely Dense	Over 81	Hard	> 30
		<b>Undrained Shear Strength (kips/ft<sup>2</sup>)</b>	
		> 0.25 or less	
		> 0.25 to 0.50	
		> 0.50 to 1.0	
		> 1.0 to 2.0	
		> 2.0 to 4.0	
		> 4.0 or greater	
Standard Penetration 'N-Value' = Blows per foot of a 140-pound hammer falling 30 inches on a 2-inch O.D. split barrel sampler, except where noted. N <sub>60</sub> values as reported on boring logs represent raw N-values corrected for hammer efficiency only.			

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# BORING B1

PAGE 1 OF 2

BORING DEPTH: 45 FEET

**PROJECT NAME:** Savage Drain Improvements

**PROJECT NUMBER:** 085456.00

**CLIENT:** Spicer Group

**PROJECT LOCATION:** Albee Township, Michigan

**DATE STARTED:** 11/20/20

**COMPLETED:** 11/20/20

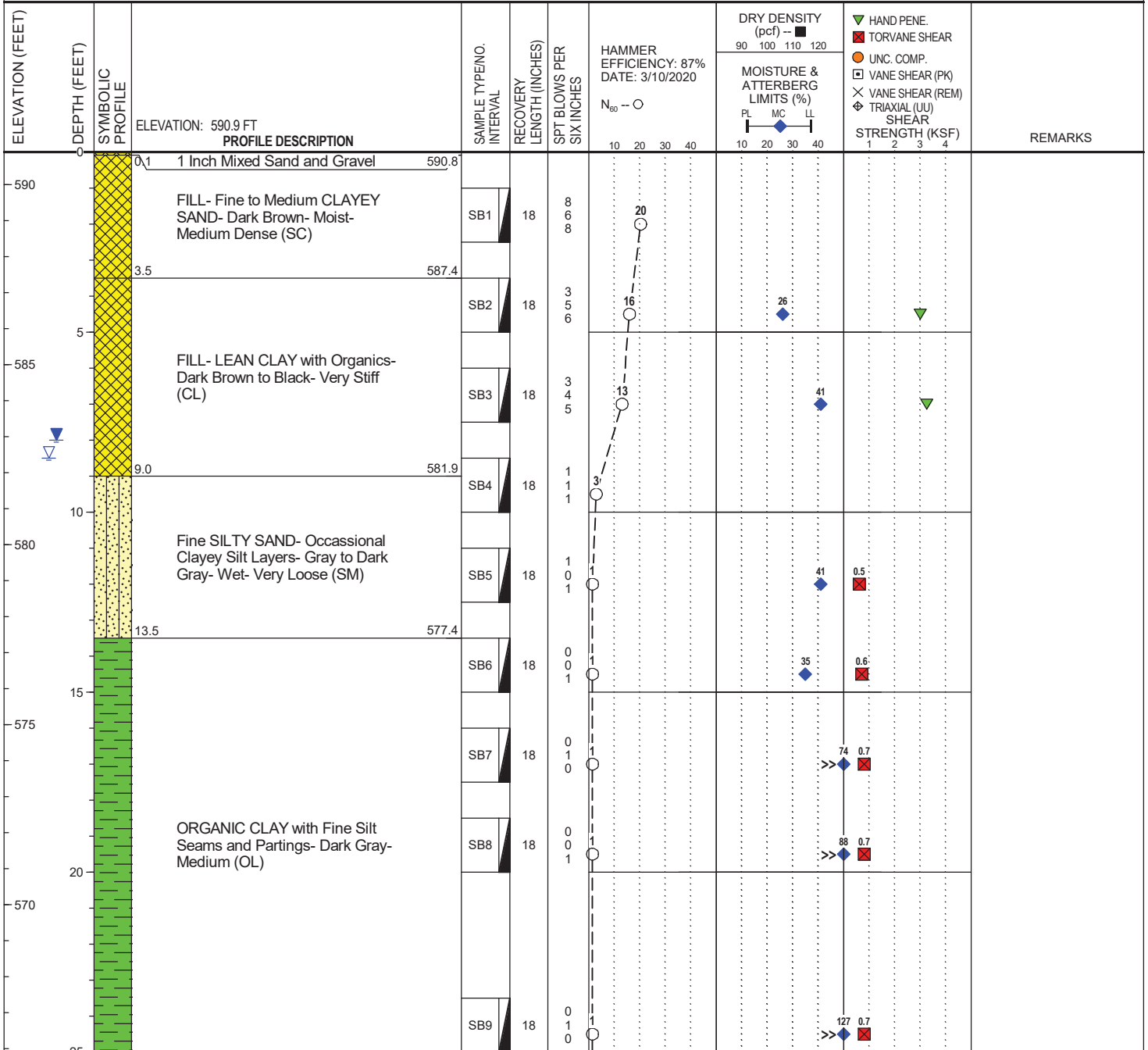
**BORING METHOD:** Hollow-stem Augers

**DRILLER:** JB/WN

**RIG NO.:** 552 (CME 55)

**LOGGED BY:** JLN

**CHECKED BY:** JLN



GROUNDWATER & BACKFILL INFORMATION		
	DEPTH (FT)	ELEV (FT)
▽ DURING BORING:	8.5	582.4
▽ AT END OF BORING:	8.0	582.9
CAVE-IN OF BOREHOLE AT:	10.0	580.9
BACKFILL METHOD:	Auger Cuttings	

NOTES: 1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.  
 2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.  
 3. Rotary wash drilling techniques were used to advance the borehole from 35 feet to 45 feet.

(Continued Next Page)





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# BORING B2

PAGE 1 OF 2

BORING DEPTH: 35 FEET

**PROJECT NAME:** Savage Drain Improvements

**PROJECT NUMBER:** 085456.00

**CLIENT:** Spicer Group

**PROJECT LOCATION:** Albee Township, Michigan

**DATE STARTED:** 11/20/20

**COMPLETED:** 11/20/20

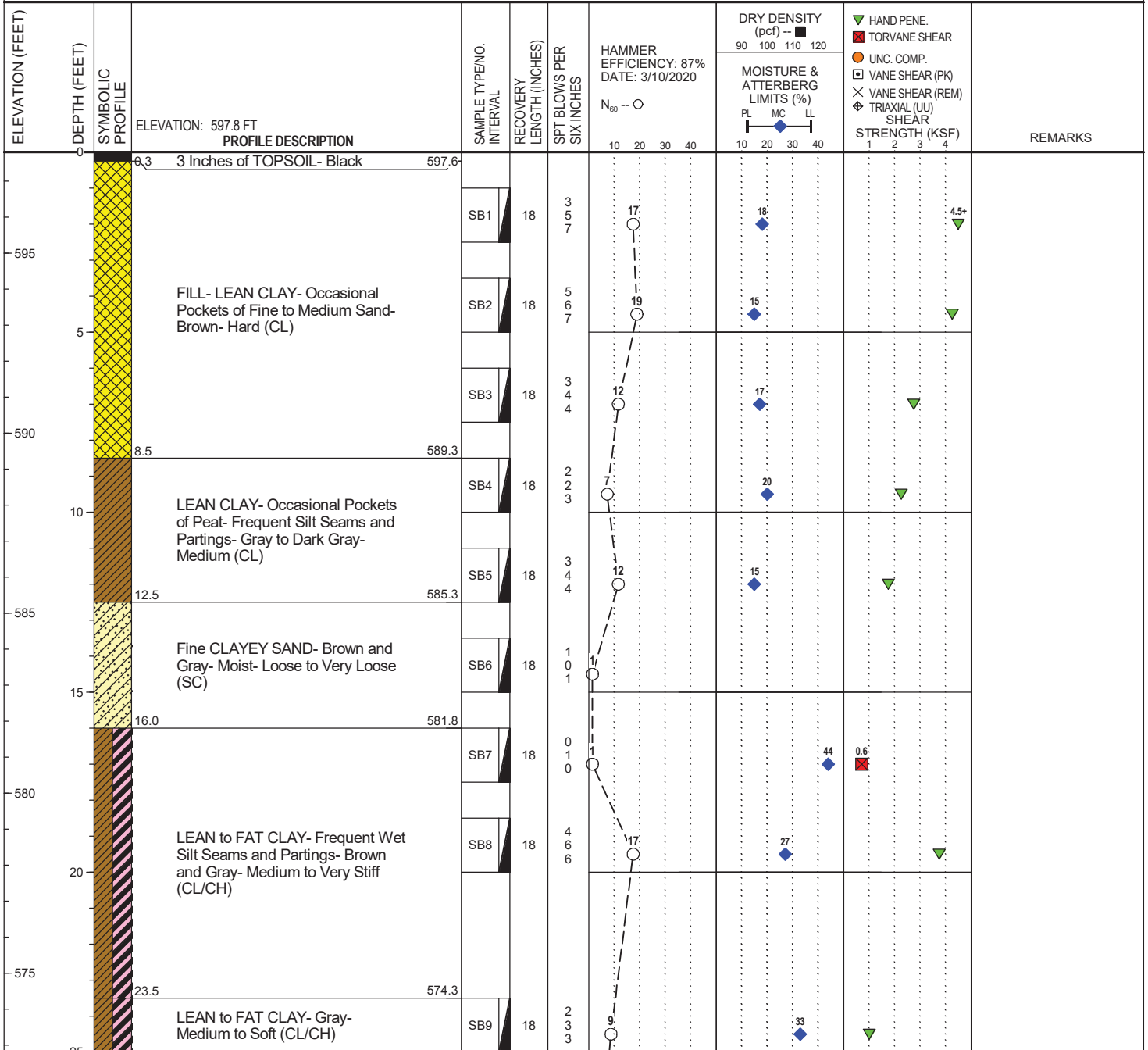
**BORING METHOD:** Hollow-stem Augers

**DRILLER:** JB/WN

**RIG NO.:** 552 (CME 55)

**LOGGED BY:** JLN

**CHECKED BY:** JLN



**GROUNDWATER & BACKFILL INFORMATION**

GROUNDWATER WAS NOT ENCOUNTERED

**BACKFILL METHOD:** Auger Cuttings, Bentonite Chips & Cement Grout

**NOTES:**

- The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
- The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
- Borehole backfilled with bentonite cement grout from 35 feet to 6 feet and from 6 feet to the surface with auger cuttings.

(Continued Next Page)

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# BORING B2

PAGE 2 OF 2

BORING DEPTH: 35 FEET

PROJECT NAME: Savage Drain Improvements

PROJECT NUMBER: 085456.00

CLIENT: Spicer Group

PROJECT LOCATION: Albee Township, Michigan

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	ELEVATION: 597.8 FT PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	HAMMER EFFICIENCY: 87% DATE: 3/10/2020 N <sub>60</sub> - O	DRY DENSITY (pcf) -- ■		MOISTURE & ATTERBERG LIMITS (%)		STRENGTH (KSF)		REMARKS
								90	100	110	120	PL	MC	
570	30		LEAN to FAT CLAY- Gray-Medium to Soft (CL/CH) (continued)	SB10	18	0 1 0					34	0.5		
565	35.0			SB11	18	0 0 0						48	0.4	
560	40	END OF BORING AT 35.0 FEET.												
555	45													
550	50													
545	55													
540														

## **APPENDIX B**

### **IMPORTANT INFORMATION ABOUT THIS GEOTECHNICAL ENGINEERING REPORT**

#### **GENERAL COMMENTS**

#### **LABORATORY TESTING PROCEDURES**

# Important Information about This

# Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

**The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.**

## Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

## Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer

will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

## Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

## You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

### Most of the “Findings” Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site’s subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

### This Report’s Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

### This Report Could Be Misinterpreted

Other design professionals’ misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals’ plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

### Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note*

*conspicuously that you’ve included the material for information purposes only.* To avoid misunderstanding, you may also want to note that “informational purposes” means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

### Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled “limitations,” many of these provisions indicate where geotechnical engineers’ responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

### Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a “phase-one” or “phase-two” environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

### Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer’s services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, *proper implementation of the geotechnical engineer’s recommendations will not of itself be sufficient to prevent moisture infiltration.* **Confront the risk of moisture infiltration** by including building-envelope or mold specialists on the design team. **Geotechnical engineers are not building-envelope or mold specialists.**



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# LABORATORY TESTING PROCEDURES

## VISUAL ENGINEERING CLASSIFICATION

Visual classification was performed on recovered samples. The appended General Notes and Unified Soil Classification System (USCS) sheets include a brief summary of the general method used visually classify the soil and assign an appropriate USCS group symbol. The estimated group symbol, according to the USCS, is shown in parentheses following the textural description of the various strata on the boring logs appended to this report. The soil descriptions developed from visual classifications are sometimes modified to reflect the results of laboratory testing.

## MOISTURE CONTENT

Moisture content tests were performed by weighing samples from the field at their in-situ moisture condition. These samples were then dried at a constant temperature (approximately 110° C) overnight in an oven. After drying, the samples were weighed to determine the dry weight of the sample and the weight of the water that was expelled during drying. The moisture content of the specimen is expressed as a percent and is the weight of the water compared to the dry weight of the specimen.

## HAND PENETROMETER TESTS

In the hand penetrometer test, the unconfined compressive strength of a cohesive soil sample is estimated by measuring the resistance of the sample to the penetration of a small calibrated, spring-loaded cylinder. The maximum capacity of the penetrometer is 4.5 tons per square-foot (tsf). Theoretically, the undrained shear strength of the cohesive sample is one-half the unconfined compressive strength. The undrained shear strength (based on the hand penetrometer test) presented on the boring logs is reported in units of kips per square-foot (ksf).

## TORVANE SHEAR TESTS

In the Torvane test, the shear strength of a low strength, cohesive soil sample is estimated by measuring the resistance of the sample to a torque applied through vanes inserted into the sample. The undrained shear strength of the samples is measured from the maximum torque required to shear the sample and is reported in units of kips per square-foot (ksf).

## LOSS-ON-IGNITION (ORGANIC CONTENT) TESTS

Loss-on-ignition (LOI) tests are conducted by first weighing the sample and then heating the sample to dry the moisture from the sample (in the same manner as determining the moisture content of the soil). The sample is then re-weighed to determine the dry weight and then heated for 4 hours in a muffle furnace at a high temperature (approximately 440° C). After cooling, the sample is re-weighed to calculate the amount of ash remaining, which in turn is used to determine the amount of organic matter burned from the original dry sample. The organic matter content of the specimen is expressed as a percent compared to the dry weight of the sample.

## ATTERBERG LIMITS TESTS

Atterberg limits tests consist of two components. The plastic limit of a cohesive sample is determined by rolling the sample into a thread and the plastic limit is the moisture content where a 1/8-inch thread begins to crumble. The liquid limit is determined by placing a 1/2-inch thick soil pat into the liquid limits cup and using a grooving tool to divide the soil pat in half. The cup is then tapped on the base of the liquid limits device using a crank handle. The number of drops of the cup to close the gap formed by the grooving tool 1/2 inch is recorded along with the corresponding moisture content of the sample. This procedure is repeated several times at different moisture contents and a graph of moisture content and the corresponding number of blows is plotted. The liquid limit is defined as the moisture content at a nominal 25 drops of the cup. From this test, the plasticity index can be determined by subtracting the plastic limit from the liquid limit.



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