BIDDING DOCUMENTS
FOR

TECUMSEH DAM

Prepared for:
JENNIFER ESCOTT
LENAWEE COUNTY DRAIN COMMISSIONER
301 N MAIN STREET
OLD COURT HOUSE 2ND FLOOR
ADRIAN, MI 49221

Prepared By:
SPICER GROUP, INC.

9/20/2024

Project I.D. Number 129021SG2020

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ADVERTISEMENT FOR BIDS

LENAWEE COUNTY DRAIN COMMISSIONER
ADRIAN, MI
TECUMSEH DAM

General Notice

Lenawee County Drain Commissioner is requesting Bids for the construction of the following Project:

Tecumseh Dam

Bids for the construction of the Project will be received by **Lenawee County Drain Commissioner** until **Friday**, **October 4, 2024** at **1:00 PM** local time. At that time the Bids received will be read. This will be a Virtual Bid Letting only and bids will only be accepted when submitted through Quest CDN. Call-in information for the Bid Opening will be provided in an addendum.

The Project includes the following Work:

> **Make improvements on the Tecumseh Dam that include: demolition and realignment of the auxiliary spillway, gate replacements, concrete repairs, operations improvements, access improvements including parking and the kayak portage, and safety improvements including fencing and lighting.**

Information and Bidding Documents for the Project can be found at the following designated website:

www.spicergroup.com

The issuing Office for the Bidding Documents is: Spicer Group, Inc., Contact: **Richard Graham**, Project Manager, **248-495-2927**, or **richg@spicergroup.com**. The contract documents for bidding purposes are available beginning **September 20, 2024,** on the Bidding section of the Spicer Group website at www.spicergroup.com. You may view the digital project bidding documents at no cost by entering Quest project number **9328347** on the website's project search page. To be considered a Planholder for bids, a contractor must register with QuestCDN.com and purchase the contract documents in digital form at a cost of $42. Registering as a Planholder is recommended for all prime contractors and subcontractors as Planholder's will receive automatic notice of addendums and other contract document updates via QuestCDN. Please contact Quest CDN Customer Support at (952) 233-1632 or info@questcdn.com for assistance in free membership registration, downloading and working with digital project information.

For this project, bids will ONLY be received and accepted via the online electronic bid service through QuestCDN.com. To access the electronic bid form, download the project documents and click on the online bid button on the bid posting page. Prospective bidders must be on the Planholder list through QuestCDN for bids to be accepted.

You must download the Contract Documents from Quest CDN to bid on the project, **to be included on the Planholders' list, and to receive Addenda**. The Contractor is responsible for ensuring all addendums have been received and acknowledged prior to submittal of the bid.

Mandatory Pre-bid Conference

A mandatory pre-bid conference for the Project will be held on **Monday, September 30, 2024,** at **1:00 PM** at the **Lenawee County Drain Office, 320 Springbrook Ave, Suite 102, Adrian, MI 49221.** Bids will not be accepted from Bidders that do not attend the mandatory pre-bid conference.

Instructions to Bidders.

For all further requirements regarding bid submittal, qualifications, procedures, and contract award, refer to the Instructions to Bidders that are included in the Bidding Documents.

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, and which registers plan holders.

ARTICLE 2—BIDDING DOCUMENTS

2.01 Bidder shall obtain a complete set of Bidding Requirements and proposed Contract Documents (together, the Bidding Documents). See the Agreement for a list of the Contract Documents. It is Bidder's responsibility to determine that it is using a complete set of documents in the preparation of a Bid. Bidder assumes sole responsibility for errors or misinterpretations resulting from the use of incomplete documents, by Bidder itself or by its prospective Subcontractors and Suppliers.

2.02 Bidding Documents are made available for the sole purpose of obtaining Bids for completion of the Project and permission to download or distribution of the Bidding Documents does not confer a license or grant permission or authorization for any other use. Authorization to download documents, or other distribution, includes the right for plan holders to print documents solely for their use, and the use of their prospective Subcontractors and Suppliers, provided the plan holder pays all costs associated with printing or reproduction. Printed documents may not be re-sold under any circumstances.

2.03 Owner has established a Bidding Documents Website as indicated in the Advertisement or invitation to bid. Owner recommends that Bidder register as a plan holder with the Issuing Office at such website and obtain a complete set of the Bidding Documents from such website. Bidders may rely that sets of Bidding Documents obtained from the Bidding Documents Website are complete, unless an omission is blatant. Registered plan holders will receive Addenda issued by Owner.

2.04 *Electronic Documents*

A. When the Bidding Requirements indicate that electronic (digital) copies of the Bidding Documents are available, such documents will be made available to the Bidders as Electronic Documents in the manner specified.

1. Bidding Documents will be provided in Adobe PDF (Portable Document Format) (.pdf). It is the intent of the Engineer and Owner that such Electronic Documents are to be exactly representative of the paper copies of the documents. However, because the Owner and Engineer cannot totally control the transmission and receipt of Electronic Documents nor the Contractor's means of reproduction of such documents, the Owner and Engineer cannot and do not guarantee that Electronic Documents and reproductions prepared from those versions are identical in every manner to the paper copies.

B. Unless otherwise stated in the Bidding Documents, the Bidder may use and rely upon complete sets of Electronic Documents of the Bidding Documents, described in Paragraph 2.03 above. However, Bidder assumes all risks associated with differences arising from transmission/receipt of Electronic Documents versions of Bidding Documents and

reproductions prepared from those versions and, further, assumes all risks, costs, and responsibility associated with use of the Electronic Documents versions to derive information that is not explicitly contained in printed paper versions of the documents, and for Bidder's reliance upon such derived information.

ARTICLE 3—QUALIFICATIONS OF BIDDERS

3.01 To demonstrate Bidder's qualifications to perform the Work, after submitting its Bid and within **three** days of Owner's request, Bidder must submit the following information:

A. Written evidence establishing its qualifications such as financial data, previous experience, and present commitments.

B. A written statement that Bidder is authorized to do business in the state where the Project is located, or a written certification that Bidder will obtain such authority prior to the Effective Date of the Contract.

C. Subcontractor and Supplier qualification information.

D. Other required information regarding qualifications.

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 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.

3.04 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.

ARTICLE 4—PRE-BID CONFERENCE

4.01 A mandatory pre-bid conference will be held at the time and location indicated in the Advertisement or invitation to bid. Representatives of Owner and Engineer will be present to discuss the Project. Proposals will not be accepted from Bidders who do not attend the conference. It is each Bidder's responsibility to sign in at the pre-bid conference to verify its participation. Bidders must sign in using the name of the organization that will be submitting a Bid. A list of qualified Bidders that attended the pre-bid conference and are eligible to submit a Bid for this Project will be issued in an Addendum.

4.02 Information presented at the pre-Bid conference does not alter the Contract Documents. Owner will issue Addenda to make any changes to the Contract Documents that result from discussions at the pre-Bid conference. Information presented, and statements made at the pre-bid conference will not be binding or legally effective unless incorporated in an Addendum.

ARTICLE 5—SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER'S SAFETY PROGRAM; OTHER WORK AT THE SITE

5.01 *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.

5.02 *Site Visit and Testing by Bidders*

A. Bidder is required to visit the Site and conduct a thorough visual examination of the Site and adjacent areas. During the visit the Bidder must not disturb any ongoing operations at the Site.

B. Bidders visiting the Site are required to arrange their own transportation to the Site.

C. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder general 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. Bidder is responsible for establishing access needed to reach specific selected test sites.

D. Bidder must 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.

E. Bidder must fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

5.03 *Owner's Safety Program*

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

5.04 *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 6—BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

6.01 *Express Representations and Certifications in Bid Form, Agreement*

A. The Bid Form that each Bidder will submit contains express representations regarding the Bidder's examination of Project documentation, Site visit, and preparation of the Bid, and certifications regarding lack of collusion or fraud in connection with the Bid. Bidder should review these representations and certifications and assure that Bidder can make the representations and certifications in good faith, before executing and submitting its Bid.

B. If Bidder is awarded the Contract, Bidder (as Contractor) will make similar express representations and certifications when it executes the Agreement.

ARTICLE 7—INTERPRETATIONS AND ADDENDA

7.01 Owner on its own initiative may issue Addenda to clarify, correct, supplement, or change the Bidding Documents.

7.02 All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing via email only to Richard Graham at richg@spicergroup.com. All email

questions must be received by **1:00 PM on Friday, September 27, 2024**. 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 by end of day on **Monday, September 30, 2024**. Questions received after **1:00 PM on Friday, September 27, 2024** may not be answered. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

7.03 Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all registered plan holders. Questions received less than seven days prior to the date for opening of Bids may not be answered.

7.04 Only responses set forth in an Addendum will be binding. Oral and other interpretations or clarifications will be without legal effect. Responses to questions are not part of the Contract Documents unless set forth in an Addendum that expressly modifies or supplements the Contract Documents.

ARTICLE 8—BID SECURITY

8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of five percent of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form of a Bid bond issued by a surety meeting the requirements of Paragraph 6.01 of the General Conditions. Such Bid bond will be issued in the form included in the Bidding Documents. **Bid security must be at least 5% of the Bidder's maximum Bid price.**

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, 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 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, in whole in the case of a penal sum bid bond, and to the extent of Owner's damages in the case of a damages-form bond. Such forfeiture will 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 7 days after the Effective Date of the Contract or 60 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 7 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 and are set forth in the Agreement.

9.02 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 10—SUBSTITUTE AND "OR EQUAL" ITEMS

10.01 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 allowing 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.

10.02 All prices that Bidder sets forth in its Bid will 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 11—SUBCONTRACTORS, SUPPLIERS, AND OTHERS

11.01 A Bidder must be prepared to retain specific Subcontractors and Suppliers for the performance of the Work if required to do so by the Bidding Documents or in the Specifications. If a prospective Bidder objects to retaining any such Subcontractor or Supplier and the concern is not relieved by an Addendum, then the prospective Bidder should refrain from submitting a Bid.

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

11.03 If requested by Owner, such list must be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor or Supplier. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor or Supplier, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder will 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.

11.04 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 and Suppliers. Declining to make requested substitutions will constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor or Supplier, 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 7.07 of the General Conditions.

ARTICLE 12—PREPARATION OF BID

12.01 T Bids will be submitted electronically via Quest CDN vBid™. See Article 14 for instructions on electronic bid submission.

12.02 A Bid by a corporation must 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 must be shown.

12.03 A Bid by a partnership must be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership must be shown.

12.04 A Bid by a limited liability company must 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 must be shown.

12.05 A Bid by an individual must show the Bidder's name and official address.

12.06 A Bid by a joint venture must be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The joint venture must have been formally established prior to submittal of a Bid, and the official address of the joint venture must be shown.

12.07 All names must be printed below the signatures.

12.08 Postal and e-mail addresses and telephone number for communications regarding the Bid must be shown.

12.09 The Bid must contain evidence of Bidder's authority to do business in the state where the Project is located, or Bidder must certify in writing that it will obtain such authority within the time for acceptance of Bids and attach such certification to the Bid.

12.10 If Bidder is required to be licensed to submit a Bid or perform the Work in the state where the Project is located, the Bid must contain evidence of Bidder's licensure, or Bidder must certify in writing that it will obtain such licensure within the time for acceptance of Bids and attach such certification to the Bid. Bidder's state contractor license number, if any, must also be shown on the Bid Form.

ARTICLE 13—BASIS OF BID

13.01 *Lump Sum*

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

13.02 *Base Bid with Alternates*

A. Bidders must 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.

13.03 *Unit Price*

A. Bidders must 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.

13.04 *Allowances*

A. For cash allowances the Bid price must 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 14—SUBMITTAL OF BID

14.01 The Bidding Documents include requested documents as shown online, and, if required, the Bid Bond Form. The Bid Form is to be completed and submitted with the Bid security and the other documents required to be submitted under the terms of Article 2 of the Bid Form.

14.02 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.

14.03 With each copy of the Bidding Documents, a Bidder is furnished one Bid Form (C410). Article 9 of the Bid Form must be completed, signed, and included with the submitted bid package.

14.04 A Bid shall be received no later than the date and time prescribed. For this project bids will ONLY be received and accepted via the online electronic bid service through QuestCDN.com. To access the electronic bid form, download the project documents and click the online bidding button at the top of the advertisement. Prospective bidders must be on the plan holders list through Quest CDN for bids to be accepted. No paper bids will be accepted.

A. Proceed to our company web site www.spicergroup.com, Bidding tab. You then will be directed to our QUESTCDN electronic bidding project list.

B. Select the project listed in this advertisement from the list of projects.

C. You will be asked to sign into your account or create a free QUESTCDN account by clicking the 'join' link. Contact QUESTCDN at 952-233-1632 or info@questcdn.com for assistance in membership registration.

D. The QUESTCDN ebid doc number for this project is **9328347**.

E. To access the bid form, click the online bidding button at the top of bid advertisement. The on-line bid button will be available when the project is published and open for bidding.

F. All addendums will be issued through our QUESTCDN electronic bidding site. You must download the bid documents to be a plan holder and receive any addenda. It is the sole responsibility of the contractor, subcontractor, vendor and/or any individual and/or corporation to review all addendums twenty-four (24) hours prior to bid.

14.05 Bids received after the date and time prescribed for the opening of bids, or not submitted in the designated manner, will not be accepted.

ARTICLE 15—MODIFICATION AND WITHDRAWAL OF BID

15.01 An unopened 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.

15.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 15.01 and submit a new Bid prior to the date and time for the opening of Bids.

15.03 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, the Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, the Bidder will be disqualified from further bidding on the Work.

ARTICLE 16—OPENING OF BIDS

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

ARTICLE 17—BIDS TO REMAIN SUBJECT TO ACCEPTANCE

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

ARTICLE 18—EVALUATION OF BIDS AND AWARD OF CONTRACT

18.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner also reserves the right to waive all minor Bid informalities not involving price, time, or changes in the Work.

18.02 Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible.

18.03 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, whether in the Bid itself or in a separate communication to Owner or Engineer, then Owner will reject the Bid as nonresponsive.

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

18.05 *Evaluation of Bids*

A. In evaluating Bids, Owner will consider whether the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.

18.06 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.

18.07 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 19—BONDS AND INSURANCE

19.01 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, other required bonds (if any), and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it must be accompanied by required bonds and insurance documentation.

19.02 Article 8, Bid Security, of these Instructions, addresses any requirements for providing bid bonds as part of the bidding process.

ARTICLE 20—SIGNING OF AGREEMENT

20.01 When Owner issues a Notice of Award to the Successful Bidder, it will 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 must 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 10 days thereafter, Owner will 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.

AFFIDAVIT OF COMPLIANCE-IRAN ECONOMIC SANCTIONS ACT
MICHIGAN PUBLIC ACT 517 OF 2012

The undersigned, as owner or authorized officer of the below named CONTRACTOR, pursuant to the compliance certification requirement by the State of Michigan, and as referenced by OWNER in the BIDDING DOCUMENTS, hereby certifies, represents and warrants that the CONTRACTOR (including its Officers, Directors and Employees) is not an "Iran linked business" as defined by the Iran Economic Sanctions Act, Michigan Public Act 517 of 2012 (THE ACT). And, that in the event CONTRACTOR is awarded a contract as a result of the aforementioned BIDDING DOCUMENTS, the Contractor will not become an "Iran linked business" at any time during the course of preforming the work or any services under the contract.

The CONTRACTOR further acknowledges that any person who is found to have submitted a false certification is responsible for a civil penalty of not more than $250,000.00 or 2 times the amount of the contract or proposed contract for which the false certification was made, whichever is greater. The cost of the OWNER'S investigation and reasonable attorney fees may also be added in addition to the fine. Moreover, any person who submitted a false certification shall be ineligible to bid on any other of the OWNER'S projects for three (3) years from the date that it is determined that the person has submitted the false certification.

CONTRACTOR:

_____
Name of Contractor
By: _____
Its: _____
Date: _____

STATE OF _____}
ss.
COUNTY OF _____}

This instrument was acknowledged before me on the _____day of _____, ____
by_____.

_____
, Notary Public
_____ County, State of _____
My Commission expires: _____
Acting in the County of: _____

BID FORM
FOR CONSTRUCTION CONTRACT

TECUMSEH DAM

ARTICLE 1—BID RECIPIENT

1.01 This Bid is submitted through Quest.com to: **Lenawee County Drain Commissioner, 301 N Main Street Old Court House 2nd Floor, Adrian, MI 49221**

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—ATTACHMENT TO THIS BID

2.01 The following documents are submitted and made a condition of this bid:

A. Required Bid security;

B. Affidavit of Compliance – Iron Economic Sanction Act;

ARTICLE 3—BASIS OF BID

3.01 Unit Price Bid

A. Bidder will perform the following Work at the unit prices submitted electronically via Quest CDN vBid™. The bid item list that follows is provided for information only.

Item No.	Estimated Quantity	Unit	Description
			DAM REPAIR
STRUCTURE REMOVALS			
1.	1	Lump Sum	Aux Retaining Wall, Rem
2.	1	Lump Sum	Aux Spillway Floor, Rem
3.	1	Lump Sum	Aux End Sill Buffers, Rem
4.	1	Lump Sum	Park Retaining Wall, Rem
5.	7	Each	Aux Slide Gates, Rem
6.	7	Each	Lift actuators, Rem
7.	1	Lump Sum	Control Equipment, Rem
8.	1	Lump Sum	Level transmitter, Rem
9.	1	Lump Sum	Electrical Pedestal, Rem
10.	1	Lump Sum	Underground Electrical, Rem
AUXILIARY SPILLWAY			
11.	1	Lump Sum	Auxiliary Spillway Reconstruction
12.	7	Each	Aux Slide Gates
13.	7	Each	Galvanized Steel Trash Racks
14.	7	Each	Electric Lift Actuators

15.	1	Lump Sum	Controls and SCADA, Complete
16.	1	Lump Sum	Level Transmitter
17.	1	Lump Sum	Utility Allowance
18.	3	Each	Catwalk Lighting Assembly
19.	1	Lump Sum	Electrical, Complete
20.	2	Each	Submersible Mixer Motors
21.	1	Lump Sum	Repair north joint seepage with epoxy injection
22.	1	Lump Sum	Repair spalled concrete
23.	32	Lin. FT	18" R.C.P.
24.	250	Lin. FT	Toe Drain/Underdrain
25.	3	Each	Rodent Guards
26.	1	Lump Sum	Regrading
27.	115	Cyd	Heavy Riprap
28.	120	Lin. FT	Riprap Bank Protection
29.	110	Lin. FT	Steel Fence and Safety Handrail Along Park Adjacent Wall
30.	2	Each	Downspout Extensions
PRIMARY SPILLWAY			
31.	1	Lump Sum	Repair south joint seepage with epoxy injection
32.	1	Lump Sum	Repair middle joint seepage with epoxy injection
33.	1	Lump Sum	Repair spalled concrete on east face and wall crest
ACCESS			
34.	1	Lump Sum	Access Drive Prep, Strip Topsoil, Excavate to grade
35.	200	Lump Sum	Grasspavers with base and grow mix
36.	160	Cyd	Sandy gravel road base
37.	0.25	Acre	Seeding
38.	1	Lump Sum	Regrading
MISCELLANEOUS			
39.	1	Lump Sum	Water Control
40.	1	Lump Sum	Miscellaneous Erosion Control
41.	1	Lump Sum	Cleanup and Restoration
42.	1	Lump Sum	Traffic Control
KAYAK PORTAGE			
STONE STEPS			
43.	39	Each	Rosetta Stone Steps
44.	1	Lump Sum	Grading
45.	60	Sq. Yd.	MDOT 6A Stone Base
46.	250	Sq. Yd.	MDOT 21AA Aggregate for Path
47.	1	Lump Sum	Geotextile Fabric for Soil Stabilization

KAYAK SLIDE			
48.	1	Lump Sum	Galvanized Steel Slide Rails
49.	10	Each	300lb Concrete Block Foundations
OTHER			
50.	100	Lin. Ft.	6' Chain Link Fence along portage
51.	1	Each	Fence Gate, 8' wide gate for 6' tall chain link fence
52.	50	Sq. Yds.	Riprap, Heavy for erosion control at banks
53.	10	Cu. Yds.	Riprap, Heavy for wave barrier
54.	1	Lump Sum	Concrete Repair, Right downstream abutment wall
55.	6	Each	Safety Signs
MISCELLANEOUS			
56.	1	Lump Sum	Water Control
57.	1	Lump Sum	Miscellaneous Erosion Control
58.	1	Lump Sum	Cleanup and Restoration

B. 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 Work will be based on actual quantities, determined as provided in the Contract Documents.

ARTICLE 4—TIME OF COMPLETION

4.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

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

ARTICLE 5—BIDDERS ACKNOWLEDGEMENTS

5.01 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 60 days after the Bid opening, or for such longer period of time that Bidder may agree to writing upon request of Owner.

5.02 Bid Acceptance Period:

A. This bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time the Bidder may agree to in writing upon request of Owner.

5.03 Instructions to Bidders

A. Bidder accepts all of the terms and conditions of the Instructions to bidders, including without limitation those dealing with the disposition of Bid Security.

5.04 Receipt of Addenda

A. Receipt of Addenda will be acknowledged online when preparing to submit a bid. A bid is not able to be submitted online without this acknowledgement.

ARTICLE 6—BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

6.01 *Bidder's Representations*

A. In submitting this Bid, Bidder represents the following:

1. Bidder has examined and carefully studied the Bidding Documents, including Addenda.
2. Bidder has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
3. Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work**.**
4. Bidder has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
5. Bidder has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.
6. 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 the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, if selected as Contractor; and (c) Bidder's (Contractor's) safety precautions and programs.
7. Based on the information and observations referred to in the preceding paragraph, Bidder 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.
8. 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.
9. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
10. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
11. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

6.02 *Bidder's Certifications*

A. The Bidder certifies the following:

1. 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.

2. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.

3. Bidder has not solicited or induced any individual or entity to refrain from bidding.

4. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 7.02.A:

   a. 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.

   b. 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.

   c. 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.

   d. 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.

BIDDER hereby submits this Bid as set forth above:

Bidder:

_____

(typed or printed name of organization)

By: _____

(individual's signature)

Name: _____

(typed or printed)

Title: _____

(typed or printed)

Date: _____

(typed or printed)

If Bidder is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.

Attest: _____

(individual's signature)

Name: _____

(typed or printed)

Title: _____

(typed or printed)

Date: _____

(typed or printed)

Address for giving notices:

_____

_____

Bidder's Contact:

Name: _____

(typed or printed)

Title: _____

(typed or printed)

Phone: _____

Email: _____

Address:

_____

_____

Bidder's Contractor License No.: (if applicable) _____

NOTICE OF AWARD

Date of Issuance:			
Owner:	Lenawee County Drain Commissioner	Owner's Project No.:	
Engineer:	Spicer Group, Inc.	Engineer's Project No.:	129021SG2020
Project:	Tecumseh Dam		
Contract Name:			
Bidder:			
Bidder's Address:			

TO BIDDER:

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

Tecumseh Dam Project

The Contract Price of the awarded Contract is $**[Contract Price]**. Contract Price is subject to adjustment based on the provisions of the Contract, including but not limited to those governing changes, Unit Price Work, and Work performed on a cost-plus-fee basis, as applicable.

[Number of copies sent] 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.

☐ 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 **[number of copies sent]** counterparts of the Agreement, signed by Bidder (as Contractor).
2. Deliver with the signed Agreement(s) the Contract security (such as required performance and payment bonds) and insurance documentation, as specified in the Instructions to Bidders and in the 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 10 days after you comply with the above conditions, Owner will return to you one fully signed counterpart of the Agreement, together with any additional copies of the Contract Documents as indicated in Paragraph 2.02 of the General Conditions.

Owner: **Lenawee County Drain Commissioner**

By *(signature)*: _____

Name *(printed)*: Jennifer Escott

Title: Lenawee County Drain Commissioner

Copy: Engineer

AGREEMENT BETWEEN OWNER AND CONTRACTOR
FOR CONSTRUCTION CONTRACT

This Agreement is by and between **Lenawee County Drain Commissioner** ("Owner") and **[name of contracting entity]** ("Contractor").

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

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: **Tecumseh Dam.**

ARTICLE 2—THE PROJECT

2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows: **Make improvements on the Tecumseh Dam that include: demolition and realignment of the auxiliary spillway, gate replacements, concrete repairs, operations improvements, access improvements including parking and the kayak portage, and safety improvements including fencing and lighting.**

ARTICLE 3—ENGINEER

3.01 The Owner has retained **Spicer Group, Inc.** ("Engineer") to act as Owner's representative, assume all duties and responsibilities of Engineer, and have the rights and authority assigned to Engineer in the Contract.

3.02 The project has been designed by Spicer Group, Inc.

ARTICLE 4—CONTRACT TIMES

4.01 *Time is 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 complete on or before **June 30, 2025**, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before **July 31, 2025**.

4.05 *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 Contract Times, as duly modified. 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 $**1500.00** for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for Substantial Completion, until the Work is substantially complete.

2. *Completion of Remaining Work:* After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner $**1500.00** for each day that expires after such time until the Work is completed and ready for final payment.

3. *Milestones:* Contractor shall pay Owner $**1500.00** for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for achievement of Milestone 1, until Milestone 1 is achieved, or until the time specified for Substantial Completion is reached, at which time the rate indicated in Paragraph 4.05.A.1 will apply, rather than the Milestone rate.

4. Liquidated damages for failing to timely attain Milestones, Substantial Completion, and final completion are not additive, and will not be imposed concurrently.

B. If Owner recovers liquidated damages for a delay in completion by Contractor, then such liquidated damages are Owner's sole and exclusive remedy for such delay, and Owner is precluded from recovering any other damages, whether actual, direct, excess, or consequential, for such delay, except for special damages (if any) specified in this Agreement.

4.06 *Special Damages*

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

Item No.	Estimated Quantity	Unit	Description	Unit Price	Extended Price
			DAM REPAIR		
STRUCTURE REMOVALS					
1	1	Lump Sum	Aux Retaining Wall, Rem	$	$
2	1	Lump Sum	Aux Spillway Floor, Rem	$	$
3	1	Lump Sum	Aux End Sill Buffers, Rem	$	$
4	1	Lump Sum	Park Retaining Wall, Rem	$	$
5	7	Each	Aux Slide Gates, Rem	$	$
6	7	Each	Lift actuators, Rem	$	$
7	1	Lump Sum	Control Equipment, Rem	$	$
8	1	Lump Sum	Level transmitter, Rem	$	$
9	1	Lump Sum	Electrical Pedestal, Rem	$	$
10	1	Lump Sum	Underground Electrical, Rem	$	$
AUXILIARY SPILLWAY					
11	1	Lump Sum	Auxiliary Spillway Reconstruction	$	$
12	7	Each	Aux Slide Gates	$	$
13	7	Each	Galvanized Steel Trash Racks	$	$
14	7	Each	Electric Lift Actuators	$	$
15	1	Lump Sum	Controls and SCADA, Complete	$	$
16	1	Lump Sum	Level Transmitter	$	$
17	1	Lump Sum	Utility Allowance	$	$
18	3	Each	Catwalk Lighting Assembly	$	$
19	1	Lump Sum	Electrical, Complete	$	$
20	2	Each	Submersible Mixer Motors	$	$
21	1	Lump Sum	Repair north joint seepage with epoxy injection	$	$
22	1	Lump Sum	Repair spalled concrete	$	$
23	32	Lin. FT	18" R.C.P	$	$

24	250	Lin. FT	Toe Drain/Underdrain	$	$
25	3	Each	Rodent Guards	$	$
26	1	Lump Sum	Regrading	$	$
27	115	Cyd	Heavy Riprap	$	$
28	120	Lin. FT	Riprap Bank Protection	$	$
29	110	Lin. FT	Steel Fence and Safety Handrail Along Park Adjacent Wall	$	$
30	2	Each	Downspout Extensions	$	$
PRIMARY SPILLWAY					
31	1	Lump Sum	Repair south joint seepage with epoxy injection	$	$
32	1	Lump Sum	Repair middle joint seepage with epoxy injection	$	$
33	1	Lump Sum	Repair spalled concrete on east face and wall crest	$	$
ACCESS					
34	1	Lump Sum	Access Drive Prep, Strip Topsoil, Excavate to grade	$	$
35	200	Lump Sum	Grasspavers with base and grow mix	$	$
36	160	Cyd	Sandy gravel road base	$	$
37	0.25	Acre	Seeding	$	$
38	1	Lump Sum	Regrading	$	$
MISCELLANEOUS					
39	1	Lump Sum	Water Control	$	$
40	1	Lump Sum	Miscellaneous Erosion Control	$	$
41	1	Lump Sum	Cleanup and Restoration	$	$
42	1	Lump Sum	Traffic Control	$	$
KAYAK PORTAGE					
STONE STEPS					
43	39	Each	Rosetta Stone Steps	$	$
44	1	Lump Sum	Grading	$	$

45	60	Sq. Yd.	MDOT 6A Stone Base	$	$
46	250	Sq. Yd.	MDOT 21AA Aggregate for Path	$	$
47	1	Lump Sum	Geotextile Fabric for Soil Stabilization	$	$
KAYAK SLIDE					
48	1	Lump Sum	Galvanized Steel Slide Rails	$	$
49	10	Each	300lb Concrete Block Foundations	$	$
OTHER					
50	100	Lin. Ft.	6' Chain Link Fence along portage	$	$
51	1	Each	Fence Gate, 8’ wide gate for 6’ tall chain link fence	$	$
52	50	Sq. Yds.	Riprap, Heavy for erosion control at banks	$	$
53	10	Cu. Yds.	Riprap, Heavy for wave barrier	$	$
54	1	Lump Sum	Concrete Repair, Right downstream abutment wall	$	$
55	6	Each	Safety Signs	$	$
MISCELLANEOUS					
56	1	Lump Sum	Water Control	$	$
57	1	Lump Sum	Miscellaneous Erosion Control	$	$
58	1	Lump Sum	Cleanup and Restoration	$	$
			Total of all Extended Prices for Unit Price Work (subject to final adjustment based on actual quantities)		$

The extended prices for Unit Price Work set forth as of the Effective Date of the Contract are based on estimated quantities. As provided in Paragraph 13.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by Engineer.

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 the basis of Contractor's Applications for Payment on or about the **5th** 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 final 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, Owner shall pay the remainder of the Contract Price in accordance with Paragraph 15.06 of the General Conditions.

6.04 *Consent of Surety*

A. Owner will not make final payment, or return or release retainage at Substantial Completion or any other time, unless Contractor submits written consent of the surety to such payment, return, or release.

ARTICLE 7—CONTRACT DOCUMENTS

7.01 *Contents*

A. The Contract Documents consist of all of the following:

1. This Agreement.
2. Bonds:
   a. Performance bond (together with power of attorney).
   b. Payment bond (together with power of attorney).
3. General Conditions.
4. Supplementary Conditions.
5. Specifications as listed in the table of contents of the project manual (copy of list attached).
6. Drawings listed on the document title page.

7. Addenda (numbers ___ to ___, inclusive).
8. Exhibits to this Agreement (enumerated as follows):
    a.
9. 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 Contract Documents listed in Paragraph 7.01.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 7.

D. The Contract Documents may only be amended, modified, or supplemented as provided in the Contract.

ARTICLE 8—REPRESENTATIONS, CERTIFICATIONS, AND STIPULATIONS

8.01 *Contractor's Representations*

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

1. Contractor has examined and carefully studied the Contract Documents, including Addenda.
2. Contractor has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
3. Contractor is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
4. Contractor has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
5. Contractor has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.
6. 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 Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (c) Contractor's safety precautions and programs.

7. 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.

8. 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.

9. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

10. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

11. 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.

8.02 *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 8.02:

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 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.

8.03 *Other Provisions*

A. Owner stipulates that if the General Conditions that are made a part of this Contract are based on EJCDC® C-700, Standard General Conditions for the Construction Contract, published by the Engineers Joint Contract Documents Committee®, and if Owner is the party that has furnished said General Conditions, then Owner has plainly shown all modifications to the standard wording of such published document to the Contractor, through a process such as highlighting or "track changes" (redline/strikeout), or in the Supplementary Conditions.

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

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

This Agreement will be effective on **[indicate date on which Contract becomes effective]** (which is the Effective Date of the Contract).

Owner:	Contractor:
Lenawee County Drain Commissioner *(typed or printed name of organization)*	_____ *(typed or printed name of organization)*
By: _____ *(individual's signature)*	By: _____ *(individual's signature)*
Date: _____ *(date signed)*	Date: _____ *(date signed)*
Name: Jennifer Escott *(typed or printed)*	Name: _____ *(typed or printed)*
Title: Lenawee County Drain Commissioner *(typed or printed)*	Title: _____ *(typed or printed)*
	*(If **[Type of Entity]** is a corporation, a partnership, or a joint venture, attach evidence*
Attest: _____ *(individual's signature)*	Attest: _____ *(individual's signature)*
Title: _____ *(typed or printed)*	Title: _____ *(typed or printed)*
Address for giving notices:	Address for giving notices:
_____	_____
_____	_____

NOTICE TO PROCEED

Owner:	Lenawee County Drain Commissioner	Owner's Project No.:	
Engineer:	Spicer Group, Inc.	Engineer's Project No.:	129021SG2020
Contractor:		Contractor's Project No.:	
Project:	Tecumseh Dam		
Contract Name:			
Effective Date of Contract:			

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on December 2, 2024 pursuant to Paragraph 4.01 of the General Conditions.

On that date, Contractor shall start performing its obligations under the Contract Documents. No Work will be done at the Site prior to such date.

In accordance with the Agreement: **[Select one of the following two alternatives, insert dates or number of days, and delete the other alternative.]**

The date by which Substantial Completion must be achieved is **June 30, 2025**, and the date by which readiness for final payment must be achieved is **July 31, 2025**.

Before starting any Work at the Site, Contractor must comply with the following:

Owner:	**Lenawee County Drain Commissioner**
By *(signature)*:	
Name *(printed)*:	Jennifer Escott
Title:	Lenawee County Drain Commissioner
Date Issued:	

Copy: Engineer

PERFORMANCE BOND

Contractor	**Surety**
Name:	Name:
Address *(principal place of business)*:	Address *(principal place of business)*:
Owner	**Contract**
Name: **Lenawee County Drain Commissioner**	Description *(name and location)*:
Mailing address *(principal place of business)*:	**Tecumseh Dam** **Tecumseh, MI**
301 N Main Street	
Old Court House 2nd Floor	Contract Price:
Adrian, MI 49221	Effective Date of Contract:

Bond

Bond Amount:

Date of Bond:

(Date of Bond cannot be earlier than Effective Date of Contract)

Modifications to this Bond form:

☐ None ☐ See Paragraph 16

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

Contractor as Principal	Surety
_____	_____
(Full formal name of Contractor)	*(Full formal name of Surety) (corporate seal)*
By: _____	By: _____
(Signature)	*(Signature)(Attach Power of Attorney)*
Name: _____	Name: _____
(Printed or typed)	*(Printed or typed)*
Title: _____	Title: _____
Attest: _____	Attest: _____
(Signature)	*(Signature)*
Name: _____	Name: _____
(Printed or typed)	*(Printed or typed)*
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 is 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 will 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 may 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 will 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 does 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 does 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 will not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety will 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 will not be reduced or set off on account of any such unrelated obligations. No right of action will 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 must be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and must 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 will be applicable.

12. Notice to the Surety, the Owner, or the Contractor must 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 will be deemed deleted therefrom and provisions conforming to such statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will 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 will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.

PAYMENT BOND

Contractor	**Surety**
Name: **[Full formal name of Contractor]** Address *(principal place of business)*: **[Address of Contractor's principal place of business]**	Name: **[Full formal name of Surety]** Address *(principal place of business)*: **[Address of Surety's principal place of business]**
Owner	**Contract**
Name: **Lenawee County Drain Commissioner** Mailing address *(principal place of business)*: **301 N Main Street** **Old Court House 2nd Floor** **Adrian, Mi 49221**	Description *(name and location)*: **Tecumseh Dam** **Tecumseh, MI** Contract Price: Effective Date of Contract:

Bond

Bond Amount:

Date of Bond:

(Date of Bond cannot be earlier than Effective Date of Contract)

Modifications to this Bond form:

☐ None ☐ See Paragraph 18

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

Contractor as Principal	Surety
_____ *(Full formal name of Contractor)*	_____ *(Full formal name of Surety) (corporate seal)*
By: _____ *(Signature)*	By: _____ *(Signature)(Attach Power of Attorney)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title: _____	Title: _____
Attest: _____ *(Signature)*	Attest: _____ *(Signature)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
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 is considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.
2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond will 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 will arise after the following:
    5.1. Claimants who do not have a direct contract with the Contractor
        5.1.1. have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
        5.1.2. have sent a Claim to the Surety (at the address described in Paragraph 13).
    5.2. Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).
6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.
7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:
    7.1. Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
    7.2. Pay or arrange for payment of any undisputed amounts.
    7.3. The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 will 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 will 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 will 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 will 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 satisfying 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 will 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 will be applicable.

13. Notice and Claims to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, will 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 will be deemed deleted here from and provisions conforming to such statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will 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:

        16.1.1. The name of the Claimant;

        16.1.2. The name of the person for whom the labor was done, or materials or equipment furnished;

        16.1.3. 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;

        16.1.4. A brief description of the labor, materials, or equipment furnished;

        16.1.5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;

16.1.6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;

16.1.7. The total amount of previous payments received by the Claimant; and

16.1.8. 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 is 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 will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.

Contractor's Application for Payment

Owner:	Lenawee County Drain Commissioner	**Owner's Project No.:**	
Engineer:	Spicer Group, Inc.	**Engineer's Project No.:**	129021SG2020
Contractor:		**Contractor's Project No.:**	
Project:	Tecumseh Dam		
Contract:			
Application No.:		**Application Date:**	
Application Period:	**From**	**to**	

1. Original Contract Price				$ -
2. Net change by Change Orders				$ -
3. Current Contract Price (Line 1 + Line 2)				$ -
4. Total Work completed and materials stored to date (Sum of Column G Lump Sum Total and Column J Unit Price Total)				$ -
5. Retainage				
a.	X	$ -	Work Completed =	$ -
b.	X	$ -	Stored Materials =	$ -
c. Total Retainage (Line 5.a + Line 5.b)				$ -
6. Amount eligible to date (Line 4 - Line 5.c)				$ -
7. Less previous payments (Line 6 from prior application)				
8. Amount due this application				$ -
9. Balance to finish, including retainage (Line 3 - Line 4 + Line 5.c)				$ -

Contractor's Certification

The undersigned Contractor certifies, to the best of its knowledge, the following:
(1) All previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with the Work covered by prior Applications for Payment;
(2) Title to all Work, materials and equipment incorporated in said Work, or otherwise listed in or covered by this Application for Payment, will pass to Owner at time of payment free and clear of all liens, security interests, and encumbrances (except such as are covered by a bond acceptable to Owner indemnifying Owner against any such liens, security interest, or encumbrances); and
(3) All the Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

Contractor:

Signature: **Date:**

Recommended by Engineer		**Approved by Owner**	
By:		**By:**	
Title:		**Title:**	
Date:		**Date:**	
Approved by Funding Agency			
By:		**By:**	
Title:		**Title:**	
Date:		**Date:**	

Progress Estimate - Unit Price Work

Contractor's Application for Payment

Owner: Lenawee County Drain Commissioner
Engineer: Spicer Group, Inc.
Contractor:
Project: Tecumseh Dam
Contract:

Owner's Project No.:
Engineer's Project No.: 129021SG2020
Contractor's Project No.:

Application No.: **Application Period:** **From** **to** **Application Date:**

A	B	C	D	E	F	G	H	I	J	K	L
		Contract Information				Work Completed					
Bid Item No.	Description	Item Quantity	Units	Unit Price ($)	Value of Bid Item (C X E) ($)	Estimated Quantity Incorporated in the Work	Value of Work Completed to Date (E X G) ($)	Materials Currently Stored (not in G) ($)	Work Completed and Materials Stored to Date (H + I) ($)	% of Value of Item (J / F) (%)	Balance to Finish (F - J) ($)
Original Contract											
					-		-		-		-
					-		-		-		-
					-		-		-		-
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					-		-		-		-
Original Contract Totals					$ -		$ -	$ -	$ -		$ -

Progress Estimate - Unit Price Work **Contractor's Application for Payment**

Owner: Lenawee County Drain Commissioner
Engineer: Spicer Group, Inc.
Contractor:
Project: Tecumseh Dam
Contract:

Owner's Project No.:
Engineer's Project No.: 129021SG2020
Contractor's Project No.:

Application No.: **Application Period:** **From** ______ **to** ______ **Application Date:**

A	B	C	D	E	F	G	H	I	J	K	L
		Contract Information				Work Completed					
Bid Item No.	Description	Item Quantity	Units	Unit Price ($)	Value of Bid Item (C X E) ($)	Estimated Quantity Incorporated in the Work	Value of Work Completed to Date (E X G) ($)	Materials Currently Stored (not in G) ($)	Work Completed and Materials Stored to Date (H + I) ($)	% of Value of Item (J / F) (%)	Balance to Finish (F - J) ($)
					Change Orders						
					-		-		-		-
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					-		-		-		-
				Change Order Totals	$ -		$ -	$ -	$ -		$ -
					Original Contract and Change Orders						
				Project Totals	$ -		$ -	$ -	$ -		$ -

Progress Estimate - Lump Sum Work

Contractor's Application for Payment

Owner:	Lenawee County Drain Commissioner	**Owner's Project No.:**	
Engineer:	Spicer Group, Inc.	**Engineer's Project No.:**	129021SG2020
Contractor:		**Contractor's Project No.:**	
Project:	Tecumseh Dam		
Contract:			

Application No.: _____ **Application Period:** **From** _____ **to** _____ **Application Date:** _____

A	B	C	D	E	F	G	H	I
			Work Completed					
Item No.	Description	Scheduled Value ($)	(D + E) From Previous Application ($)	This Period ($)	Materials Currently Stored (not in D or E) ($)	Work Completed and Materials Stored to Date (D + E + F) ($)	% of Scheduled Value (G / C) (%)	Balance to Finish (C - G) ($)
			Original Contract					
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
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						-		-
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						-		-
						-		-
						-		-
						-		-
	Original Contract Totals	$ -	$ -	$ -	$ -	$ -		$ -

Progress Estimate - Lump Sum Work

Contractor's Application for Payment

Owner:	Lenawee County Drain Commissioner	**Owner's Project No.:**	
Engineer:	Spicer Group, Inc.	**Engineer's Project No.:**	129021SG2020
Contractor:		**Contractor's Project No.:**	
Project:	Tecumseh Dam		
Contract:			

Application No.: _____ **Application Period:** **From** _____ **to** _____ **Application Date:** _____

A	B	C	D	E	F	G	H	I
			Work Completed					
Item No.	Description	Scheduled Value ($)	(D + E) From Previous Application ($)	This Period ($)	Materials Currently Stored (not in D or E) ($)	Work Completed and Materials Stored to Date (D + E + F) ($)	% of Scheduled Value (G / C) (%)	Balance to Finish (C - G) ($)
Change Orders								
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
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						-		-
	Change Order Totals	$ -	$ -	$ -	$ -	$ -		$ -
Original Contract and Change Orders								
	Project Totals	$ -	$ -	$ -	$ -	$ -		$ -

Stored Materials Summary **Contractor's Application for Payment**

Owner: Lenawee County Drain Commissioner
Engineer: Spicer Group, Inc.
Contractor:
Project: Tecumseh Dam
Contract:

Owner's Project No.:
Engineer's Project No.: 129021SG2020
Contractor's Project No.:

Application No.: **Application Period:** **From** **to** **Application Date:**

A	B	C	D	E	F	G	H	I	J	K	L	M
						Materials Stored			Incorporated in Work			
Item No. (Lump Sum Tab) or Bid Item No. (Unit Price Tab)	Supplier Invoice No.	Submittal No. (with Specification Section No.)	Description of Materials or Equipment Stored	Storage Location	Application No. When Materials Placed in Storage	Previous Amount Stored ($)	Amount Stored this Period ($)	Amount Stored to Date (G+H) ($)	Amount Previously Incorporated in the Work ($)	Amount Incorporated in the Work this Period ($)	Total Amount Incorporated in the Work (J+K) ($)	Materials Remaining in Storage (I-L) ($)
								-			-	-
								-			-	-
								-			-	-
								-			-	-
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								-			-	-
					Totals	$ -	$ -	$ -	$ -	$ -	$ -	$ -

CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner:	Lenawee County Drain Commissioner	Owner's Project No.:	
Engineer:	Spicer Group, Inc.	Engineer's Project No.:	129021SG2020
Contractor:		Contractor's Project No.:	
Project:	Tecumseh Dam		
Contract Name:			

This ☐ Preliminary ☐ Final Certificate of Substantial Completion applies to:

☐ All Work ☐ The following specified portions of the Work:

Make improvements on the Tecumseh Dam that include: demolition and realignment of the auxiliary spillway, gate replacements, concrete repairs, operations improvements, access improvements including parking and the kayak portage, and safety improvements including fencing and lighting.

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 Documents.

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.

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 must be as provided in the Contract, except as amended as follows:

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:

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 Documents.

EXECUTED BY ENGINEER:	RECEIVED:	RECEIVED:
By: _____	By: _____	By: _____
(Authorized signature)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Title: Spicer Group, Inc.	Title: Lenawee County Drain Commissioner	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 document prepared by Contractor, in a form acceptable to Engineer, to request 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; 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; 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.

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.

c. A demand or assertion by Owner or Contractor, duly submitted in compliance with the procedural requirements set forth herein, made pursuant to Paragraph 12.01.A.4, concerning disputes arising after Engineer has issued a recommendation of final payment.

d. 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), lead-based paint (as defined by the HUD/EPA standard), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to Laws and Regulations 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 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. *Electronic Document*—Any Project-related correspondence, attachments to correspondence, data, documents, drawings, information, or graphics, including but not limited to Shop Drawings and other Submittals, that are in an electronic or digital format.

21. *Electronic Means*—Electronic mail (email), upload/download from a secure Project website, or other communications methods that allow: (a) the transmission or communication of Electronic Documents; (b) the documentation of transmissions, including sending and receipt; (c) printing of the transmitted Electronic Document by the recipient; (d) the storage and archiving of the Electronic Document by sender and recipient; and (e) the use by recipient of the Electronic Document for purposes permitted by this Contract. Electronic Means does not include the use of text messaging, or of Facebook, Twitter, Instagram, or similar social media services for transmission of Electronic Documents.

22. *Engineer*—The individual or entity named as such in the Agreement.

23. *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.

24. *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.

    a. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated into the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, is not a Hazardous Environmental Condition.

    b. The presence of Constituents of Concern that are to be removed or remediated as part of the Work is not a Hazardous Environmental Condition.

    c. The presence of Constituents of Concern as part of the routine, anticipated, and obvious working conditions at the Site, is not a Hazardous Environmental Condition.

25. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and binding decrees, resolutions, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

26. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.

27. *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.

28. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.

29. *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.

30. *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.

31. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising Contractor's plan to accomplish the Work within the Contract Times.

32. *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.

33. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative (RPR) includes any assistants or field staff of Resident Project Representative.

34. *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.

35. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals.

36. *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.

37. *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.

38. *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 or areas furnished by Owner which are designated for the use of Contractor.

39. *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.

40. *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.

41. *Submittal*—A written or graphic document, prepared by or for Contractor, which the Contract Documents require Contractor to submit to Engineer, or that is indicated as a Submittal in the Schedule of Submittals accepted by Engineer. Submittals may include Shop Drawings and Samples; schedules; product data; Owner-delegated designs; sustainable design information; information on special procedures; testing plans; results of tests and evaluations, source quality-control testing and inspections, and field or Site quality-control testing and inspections; warranties and certifications; Suppliers' instructions and reports; records of delivery of spare parts and tools; operations and maintenance data; Project photographic documentation; record documents; and other such documents required by the Contract Documents. Submittals, whether or not approved or accepted by Engineer, are not Contract Documents. Change Proposals, Change Orders, Claims, notices, Applications for Payment, and requests for interpretation or clarification are not Submittals.

42. *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 of such Work.

43. *Successful Bidder*—The Bidder to which the Owner makes an award of contract.

44. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.

45. *Supplier*—A manufacturer, fabricator, supplier, distributor, 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.

46. *Technical Data*

    a. Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (1) existing subsurface conditions at or adjacent to the Site, or existing physical conditions at or adjacent to the Site including existing surface or subsurface structures (except Underground Facilities) or (2) Hazardous Environmental Conditions at the Site.

    b. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then Technical Data is defined, with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06, as the data contained in boring logs,

recorded measurements of subsurface water levels, assessments of the condition of subsurface facilities, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical, environmental, or other Site or facilities conditions report prepared for the Project and made available to Contractor.

c. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data, and instead Underground Facilities are shown or indicated on the Drawings.

47. *Underground Facilities*—All active or not-in-service underground lines, pipelines, conduits, ducts, encasements, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or systems at the Site, including but not limited to those facilities or systems that produce, transmit, distribute, or convey telephone or other communications, cable television, fiber optic transmissions, power, electricity, light, heat, gases, oil, crude oil products, liquid petroleum products, water, steam, waste, wastewater, storm water, other liquids or chemicals, or traffic or other control systems. An abandoned facility or system is not an Underground Facility.

48. *Unit Price Work*—Work to be paid for on the basis of unit prices.

49. *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.

50. *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 Paragraphs 1.02.B, C, D, and E are not defined terms that require initial capital letters, but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives*: 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*: The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective*: The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

1. does not conform to the Contract Documents;
2. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
3. 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 Paragraph 15.04).

E. *Furnish, Install, Perform, Provide*

1. The word "furnish," when used in connection with services, materials, or equipment, means 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, means 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, means 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. *Contract Price or Contract Times*: References to a change in "Contract Price or Contract Times" or "Contract Times or Contract Price" or similar, indicate that such change applies to (1) Contract Price, (2) Contract Times, or (3) both Contract Price and Contract Times, as warranted, even if the term "or both" is not expressed.

G. 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 Performance and Payment Bonds; Evidence of Insurance*

A. *Performance and Payment Bonds*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner the performance bond and payment bond (if the Contract requires Contractor to furnish such bonds).

B. *Evidence of Contractor's Insurance*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each additional insured (as identified in the Contract), the certificates, endorsements, and other evidence of insurance required to be provided by Contractor in accordance with Article 6, except to the extent the Supplementary Conditions expressly establish other dates for delivery of specific insurance policies.

C. *Evidence of Owner's Insurance*: After receipt of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor,

with copies to each additional insured (as identified in the Contract), 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 signed 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 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 *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 the schedules submitted in accordance with Paragraph 2.03.A. No progress payment will 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.

4. If a schedule is not acceptable, Contractor will have an additional 10 days to revise and resubmit the schedule.

2.06 *Electronic Transmittals*

A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may send, and shall accept, Electronic Documents transmitted by Electronic Means.

B. If the Contract does not establish protocols for Electronic Means, then Owner, Engineer, and Contractor shall jointly develop such protocols.

C. Subject to any governing protocols for Electronic Means, when transmitting Electronic Documents by Electronic Means, the transmitting party makes no representations as to long-term compatibility, usability, or readability of the Electronic Documents 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 Electronic Documents.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is required by one Contract Document 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 versions of the Contract Documents (including any printed copies derived from such electronic versions) and the printed record version, the printed record version will 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.

F. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation will be deemed stricken, and all remaining provisions will continue to be valid and binding upon Owner and Contractor, which agree that the Contract Documents will 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.

G. Nothing in the Contract Documents creates:

1. any contractual relationship between Owner or Engineer and any Subcontractor, Supplier, or other individual or entity performing or furnishing any of the Work, for the benefit of such Subcontractor, Supplier, or other individual or entity; or

2. 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.

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, means 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, and no instruction of a Supplier, will be effective to change the duties or responsibilities of Owner, Contractor, or Engineer 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 or Engineer 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 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 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 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 in writing 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.

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 notify Owner and Contractor in writing 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 versions, 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 precludes 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 30th 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 60th day after the day of Bid opening or the 30th 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 may 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 must 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 will 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 Contract Price or 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. Such an adjustment will 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 third-party utility owners or other third-party entities (other than those third-party utility owners or other third-party entities performing other work at or adjacent to the Site as arranged by or under contract with Owner, as contemplated in Article 8); and

4. Acts of war or terrorism.

D. Contractor's entitlement to an adjustment of Contract Times or Contract Price is limited as follows:

1. Contractor's entitlement to an adjustment of the Contract Times is conditioned on the delay, disruption, or interference adversely affecting an activity on the critical path to completion of the Work, as of the time of the delay, disruption, or interference.

2. Contractor shall not be entitled to an adjustment in Contract Price 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. Such a concurrent delay by Contractor shall not preclude an adjustment of Contract Times to which Contractor is otherwise entitled.

3. Adjustments of Contract Times or Contract Price are subject to the provisions of Article 11.

E. Each Contractor request or Change Proposal seeking an increase in Contract Times or Contract Price must be supplemented by supporting data that sets forth in detail the following:

1. The circumstances that form the basis for the requested adjustment;

2. The date upon which each cause of delay, disruption, or interference began to affect the progress of the Work;

3. The date upon which each cause of delay, disruption, or interference ceased to affect the progress of the Work;

4. The number of days' increase in Contract Times claimed as a consequence of each such cause of delay, disruption, or interference; and

5. The impact on Contract Price, in accordance with the provisions of Paragraph 11.07.

Contractor shall also furnish such additional supporting documentation as Owner or Engineer may require including, where appropriate, a revised progress schedule indicating all the activities affected by the delay, disruption, or interference, and an explanation of the effect of the delay, disruption, or interference on the critical path to completion of the Work.

F. 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, together with the provisions of Paragraphs 4.05.D and 4.05.E.

G. Paragraph 8.03 addresses 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.

ARTICLE 5—SITE; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor in writing 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, or to improvements, structures, utilities, or similar facilities located at such adjacent lands 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 7.13, 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 in a court of competent jurisdiction; 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 will 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 of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data;

2. Those drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data; and

3. Technical Data contained in such reports and drawings.

B. *Underground Facilities*: Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05, and not in the drawings referred to in Paragraph 5.03.A. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

C. *Reliance by Contractor on Technical Data*: 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 Paragraph 1.01.A.46.b.

D. *Limitations of Other Data and Documents*: 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;

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings;

3. the contents of other Site-related documents made available to Contractor, such as record drawings from other projects at or adjacent to the Site, or Owner's archival documents concerning the Site; or

4. 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:

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;

2. is of such a nature as to require a change in the Drawings or Specifications;

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 whether it is necessary for Owner to obtain 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; 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. *Early Resumption of Work*: If at any time Engineer determines that Work in connection with the subsurface or physical condition in question may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the condition in question has been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.

E. *Possible Price and Times Adjustments*

1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, 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 subject to the provisions of Paragraphs 4.05.D and 4.05.E.

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;

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 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, then any such adjustment will 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, 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.

F. *Underground Facilities; Hazardous Environmental Conditions*: Paragraph 5.05 governs rights and responsibilities regarding the presence or location of Underground Facilities. Paragraph 5.06 governs rights and responsibilities regarding Hazardous Environmental Conditions. The provisions of Paragraphs 5.03 and 5.04 are not applicable to the presence or location of Underground Facilities, or to Hazardous Environmental Conditions.

5.05 *Underground Facilities*

A. *Contractor's Responsibilities*: Unless it is otherwise expressly provided in the Supplementary Conditions, the cost of all of the following are included in the Contract Price, and Contractor shall have full responsibility for:

1. reviewing and checking all information and data regarding existing Underground Facilities at the Site;

2. complying with applicable state and local utility damage prevention Laws and Regulations;

3. verifying the actual location of those Underground Facilities shown or indicated in the Contract Documents as being within the area affected by the Work, by exposing such Underground Facilities during the course of construction;

4. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and

5. 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 on the Drawings, or was not shown or indicated on the Drawings 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), notify Owner and Engineer in writing regarding such Underground Facility.

C. *Engineer's Review*: Engineer will:

1. promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy;

2. identify and communicate with the owner of the Underground Facility; prepare recommendations to Owner (and if necessary issue any preliminary instructions to

Contractor) regarding the Contractor's resumption of Work in connection with the Underground Facility in question;

3. obtain any pertinent cost or schedule information from Contractor; 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

4. 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. *Early Resumption of Work*: If at any time Engineer determines that Work in connection with the Underground Facility may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the Underground Facility in question and conditions affected by its presence have been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.

F. *Possible Price and Times Adjustments*

1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, to the extent that any existing Underground Facility at the Site that was not shown or indicated on the Drawings, 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. 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;

   b. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E; and

   c. 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, then any such adjustment will 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, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

4. The information and data shown or indicated on the Drawings with respect to existing Underground Facilities at the Site is based on information and data (a) furnished by the owners of such Underground Facilities, or by others, (b) obtained from available records, or (c) gathered in an investigation conducted in accordance with the current edition of ASCE 38, Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, by the American Society of Civil Engineers. If such information or data is

incorrect or incomplete, Contractor's remedies are limited to those set forth in this Paragraph 5.05.F.

5.06 *Hazardous Environmental Conditions at Site*

A. *Reports and Drawings*: The Supplementary Conditions identify:

1. those reports known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site;

2. drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; 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 on the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b. 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;

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, as a result of such Work stoppage, such special conditions under which Work is agreed to be resumed by Contractor, or any costs or expenses incurred in response to the Hazardous Environmental Condition, 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. Entitlement to any such adjustment is subject to the provisions of Paragraphs 4.05.D, 4.05.E, 11.07, and 11.08.

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, arbitration, or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I obligates 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 obligates 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 Contractor's obligations under the Contract. These bonds must 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 terms of a prescribed bond form, the Supplementary Conditions, or other provisions of the Contract.

B. Contractor shall also furnish such other bonds (if any) as are required by the Supplementary Conditions or other provisions of the Contract.

C. All bonds must be in the form included in the Bidding Documents or otherwise specified by Owner prior to execution of the Contract, except as provided otherwise by Laws or Regulations, and must be issued and signed by a surety named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Department Circular 570 (as amended and supplemented) by the Bureau of the Fiscal Service, 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 must show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

D. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue bonds in the required amounts.

E. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer in writing and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which must comply with the bond and surety requirements above.

F. 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.

G. Upon request to Owner from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Owner shall provide a copy of the payment bond to such person or entity.

H. Upon request to Contractor from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Contractor shall provide a copy of the payment bond to such person or entity.

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. Alternative forms of insurance coverage, including but not limited to self-insurance and "Occupational Accident and Excess Employer's Indemnity Policies," are not sufficient to meet the insurance requirements of this Contract, unless expressly allowed in the Supplementary Conditions.

D. Contractor shall deliver to Owner, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Contractor has obtained and is maintaining the policies and coverages 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, documentation of applicable self-insured retentions (if allowed) and deductibles, full disclosure of all relevant exclusions, and evidence of insurance required to be purchased and maintained by Subcontractors or Suppliers. In any documentation furnished under this provision, Contractor, Subcontractors, and Suppliers may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those applicable to this Contract.

E. Owner shall deliver to Contractor, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Owner has obtained and is maintaining the policies and coverages 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, documentation of applicable self-insured retentions (if allowed) and deductibles, and full disclosure of all relevant exclusions. In any documentation furnished under this provision, Owner may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those relevant to this Contract.

F. 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, will not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.

G. In addition to the liability insurance required to be provided by Contractor, the Owner, at Owner's option, may purchase and maintain Owner's own liability insurance. 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.

H. Contractor shall require:

1. Subcontractors to purchase and maintain worker's compensation, commercial general liability, and other insurance that is appropriate for their participation in the Project, and to name as additional insureds Owner and Engineer (and any other individuals or entities identified in the Supplementary Conditions as additional insureds on Contractor's liability policies) on each Subcontractor's commercial general liability insurance policy; and

2. Suppliers to purchase and maintain insurance that is appropriate for their participation in the Project.

I. If either party does not purchase or maintain 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.

J. If Contractor has failed to obtain and maintain required insurance, Contractor's entitlement to enter or remain at the Site will end immediately, and Owner may impose an appropriate set-off

against payment for any associated costs (including but not limited to the cost of purchasing necessary insurance coverage), and exercise Owner's termination rights under Article 16.

K. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect (but is in no way obligated) 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 will be adjusted accordingly.

L. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests. Contractor is responsible for determining whether such coverage and limits are adequate to protect its interests, and for obtaining and maintaining any additional insurance that Contractor deems necessary.

M. The insurance and insurance limits required herein will not be deemed as a limitation on Contractor's liability, or that of its Subcontractors or Suppliers, under the indemnities granted to Owner and other individuals and entities in the Contract or otherwise.

N. All the policies of insurance required to be purchased and maintained under this Contract will contain a provision or endorsement that the coverage afforded will not be canceled, 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 and Engineer.

6.03 *Contractor's Insurance*

A. *Required Insurance*: Contractor shall purchase and maintain Worker's Compensation, Commercial General Liability, and other insurance pursuant to the specific requirements of the Supplementary Conditions.

B. *General Provisions*: The policies of insurance required by this Paragraph 6.03 as supplemented must:

1. include at least the specific coverages required;

2. be written for not less than the limits provided, or those required by Laws or Regulations, whichever is greater;

3. remain in effect at least until the Work is complete (as set forth in Paragraph 15.06.D), and longer if expressly required elsewhere in this Contract, 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;

4. apply with respect to the performance of the Work, whether such performance is 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; and

5. include all necessary endorsements to support the stated requirements.

C. *Additional Insureds*: The Contractor's commercial general liability, automobile liability, employer's liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies, if required by this Contract, must:

1. include and list as additional insureds Owner and Engineer, and any individuals or entities identified as additional insureds in the Supplementary Conditions;

2. include coverage for the respective officers, directors, members, partners, employees, and consultants of all such additional insureds;

3. afford primary coverage to these additional insureds for all claims covered thereby (including as applicable those arising from both ongoing and completed operations);

4. not seek contribution from insurance maintained by the additional insured; and

5. as to commercial general liability insurance, apply to additional insureds with respect to liability caused in whole or in part by Contractor's acts or omissions, or the acts and omissions of those working on Contractor's behalf, in the performance of Contractor's operations.

6.05 *Property Losses; Subrogation*

A. The builder's risk insurance policy purchased and maintained in accordance with Paragraph 6.04 (or an installation floater policy if authorized by the Supplementary Conditions), will contain provisions to the effect that in the event of payment of any loss or damage the insurer 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.

1. 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, risks, 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 individuals or entities identified in the Supplementary Conditions as builder's risk or installation floater 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.

2. None of the above waivers extends 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. Any property insurance policy maintained by Owner covering any loss, damage, or consequential loss to Owner's existing structures, buildings, or facilities in which any part of the Work will occur, or to which any part of the Work will attach or adjoin; to adjacent structures, buildings, or facilities of Owner; or to part or all of the completed or substantially completed Work, 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, will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them, and that the insured is allowed to waive the insurer's rights of subrogation in a written contract executed prior to the loss, damage, or consequential loss.

1. 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 all losses and damages caused by, arising out of, or resulting from fire or any of the perils, risks, or causes of loss covered by such policies.

C. The waivers in this Paragraph 6.05 include the waiver of rights 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 insured peril, risk, or cause of loss.

D. Contractor shall be responsible for assuring that each Subcontract 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 fire or other peril, risk, or cause of loss covered by builder's risk insurance, installation floater, and any other property insurance applicable to the Work.

6.06 *Receipt and Application of Property Insurance Proceeds*

A. Any insured loss under the builder's risk and other policies of property insurance required by Paragraph 6.04 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 6.04 shall maintain such proceeds in a segregated account, and 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, Contractor shall repair or replace the damaged Work, using allocated insurance proceeds.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.01 *Contractor's Means and Methods of Construction*

A. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.

B. If the Contract Documents note, or Contractor determines, that professional engineering or other design services are needed to carry out Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures, or for Site safety, then Contractor shall cause such services to be provided by a properly licensed design professional, at Contractor's expense. Such services are not Owner-delegated professional design services under this Contract, and neither Owner nor Engineer has any responsibility with respect to (1) Contractor's determination of the need for such services, (2) the qualifications or licensing of the design professionals retained or employed by Contractor, (3) the performance of such services, or (4) any errors, omissions, or defects in such services.

7.02 *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.

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who will not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.03 *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 maintain good discipline and order at the Site.

B. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of Contractor's employees; of Suppliers and Subcontractors, and their employees; and of any other individuals or entities performing or furnishing any of the Work, just as Contractor is responsible for Contractor's own acts and omissions.

C. 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 will 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.

7.04 *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 must be new and of good quality, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications will 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 must 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.

7.05 *"Or Equals"*

A. *Contractor's Request; Governing Criteria*: Whenever an item of equipment or material is specified or described in the Contract Documents by using the names of one or more proprietary items or specific Suppliers, 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 equipment or material, or items from other proposed Suppliers, under the circumstances described below.

1. If Engineer in its sole discretion determines that an item of equipment or material proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer will deem it an "or equal" item. For the purposes

of this paragraph, a proposed item of equipment or material will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment Engineer determines that the proposed item:

1) is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

2) 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) has a proven record of performance and availability of responsive service; and

4) is not objectionable to Owner.

b. Contractor certifies that, if the proposed item is approved and incorporated into the Work:

1) there will be no increase in cost to the Owner or increase in Contract Times; and

2) the item 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 will result in any change in Contract Price. The Engineer's denial of an "or-equal" request will be final and binding, and may not be reversed through an appeal under any provision of the Contract.

E. *Treatment as a Substitution Request*: If Engineer determines that an item of equipment or material proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the item a proposed substitute pursuant to Paragraph 7.06.

7.06 *Substitutes*

A. *Contractor's Request; Governing Criteria*: Unless the specification or description of an item of equipment or material 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 equipment or material under the circumstances described below. To the extent possible such requests must 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 equipment or material from anyone other than Contractor.

2. The requirements for review by Engineer will be as set forth in Paragraph 7.06.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 equipment or material that Contractor seeks to furnish or use. The application:
    a. will 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 the item specified; and
        3) be suited to the same use as the item 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 the item specified; and
        2) available engineering, sales, maintenance, repair, and replacement services.
    d. will 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 will be final and binding, and may not be reversed through an appeal under any provision of the Contract. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.06.D, by timely submittal of a Change Proposal.

7.07 *Concerning Subcontractors and Suppliers*

A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner. The Contractor's retention of a Subcontractor or Supplier for the performance of parts of the Work will not relieve Contractor's obligation to Owner to perform and complete the Work in accordance with the Contract Documents.

B. Contractor shall retain specific Subcontractors and Suppliers 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 or Supplier 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 5 days.

E. Owner may require the replacement of any Subcontractor or Supplier. 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 or Suppliers 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 or Supplier so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor or Supplier.

F. If Owner requires the replacement of any Subcontractor or Supplier retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, 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 or Supplier, whether initially or as a replacement, will 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 solely responsible for scheduling and coordinating the work of Subcontractors and Suppliers.

J. The divisions and sections of the Specifications and the identifications of any Drawings do not control Contractor in dividing the Work among Subcontractors or Suppliers, or in delineating the Work to be performed by any specific trade.

K. All Work performed for Contractor by a Subcontractor or Supplier must be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract for the benefit of Owner and Engineer.

L. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor for Work performed for Contractor by the Subcontractor or Supplier.

M. Contractor shall restrict all Subcontractors and Suppliers from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed in this Contract.

7.08 *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 an 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 will be disclosed 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.

7.09 *Permits*

A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits, licenses, and certificates of occupancy. 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.

7.10 *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.

7.11 *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. 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 is not Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this does not relieve Contractor of its obligations under Paragraph 3.03.

C. Owner or Contractor may give written 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 written notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.12 *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.

7.13 *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.

B. Contractor shall designate a qualified and experienced safety representative whose duties and responsibilities are the prevention of Work-related accidents and the maintenance and supervision of safety precautions and programs.

C. 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.

D. All damage, injury, or loss to any property referred to in Paragraph 7.13.C.2 or 7.13.C.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).

E. 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.

F. Contractor shall notify Owner; the owners of adjacent property; the owners of Underground Facilities and other utilities (if the identity of such owners is known to Contractor); and other contractors and utility owners performing work at or adjacent to the Site, in writing, when Contractor knows that 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.

G. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. Any Owner's safety programs that are applicable to the Work are identified or included in the Supplementary Conditions or Specifications.

H. 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.

I. Contractor's duties and responsibilities for safety and protection will continue until all the Work is completed, Engineer has issued a written notice to Owner and Contractor in accordance with Paragraph 15.06.C that the Work is acceptable, and Contractor has left the Site (except as otherwise expressly provided in connection with Substantial Completion).

J. Contractor's duties and responsibilities for safety and protection will 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.

7.14 *Hazard Communication Programs*

A. Contractor shall be responsible for coordinating any exchange of safety data sheets (formerly known as 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 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 by an emergency, or are required as a result of Contractor's response to an emergency. If Engineer determines that a change in the Contract Documents is required because of an emergency or Contractor's response, a Work Change Directive or Change Order will be issued.

7.16 *Submittals*

A. *Shop Drawing and Sample Requirements*

1. Before submitting a Shop Drawing or Sample, Contractor shall:

a. review and coordinate the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;

b. determine and verify:

1) all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal;

2) 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

3) all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto;

c. confirm that the Submittal is complete with respect to all related data included in the Submittal.

2. Each Shop Drawing or Sample must 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 Shop Drawing or Sample, Contractor shall give Engineer specific written notice of any variations that the Submittal may have from the requirements of the Contract Documents. This notice must be set forth in a written communication separate from the Submittal; and, in addition, in the case of a Shop Drawing by a specific notation made on the Shop Drawing itself.

B. *Submittal Procedures for Shop Drawings and Samples*: Contractor shall label and submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals.

1. *Shop Drawings*

a. Contractor shall submit the number of copies required in the Specifications.

b. Data shown on the Shop Drawings must 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.C.

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.C.

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. *Engineer's Review of Shop Drawings and Samples*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the accepted Schedule of Submittals. 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, comply with the requirements of 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 will 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 or other appropriate Contract modification.

5. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for complying with the requirements of Paragraphs 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, will 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 or Sample will 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.C.4.

D. *Resubmittal Procedures for Shop Drawings and Samples*

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 Shop Drawing and Sample submittals with sufficient information and accuracy to obtain required approval of an item with no more than two resubmittals. Engineer will record Engineer's time for reviewing a third or subsequent resubmittal of a Shop Drawing or Sample, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges.

3. If Contractor requests a change of a previously approved Shop Drawing or Sample, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

E. *Submittals Other than Shop Drawings, Samples, and Owner-Delegated Designs*

1. The following provisions apply to all Submittals other than Shop Drawings, Samples, and Owner-delegated designs:

a. Contractor shall submit all such Submittals to the Engineer in accordance with the Schedule of Submittals and pursuant to the applicable terms of the Contract Documents.

b. Engineer will provide timely review of all such Submittals in accordance with the Schedule of Submittals and return such Submittals with a notation of either Accepted or Not Accepted. Any such Submittal that is not returned within the time established in the Schedule of Submittals will be deemed accepted.

c. Engineer's review will be only to determine if the Submittal is acceptable under the requirements of the Contract Documents as to general form and content of the Submittal.

d. If any such Submittal is not accepted, Contractor shall confer with Engineer regarding the reason for the non-acceptance, and resubmit an acceptable document.

2. Procedures for the submittal and acceptance of the Progress Schedule, the Schedule of Submittals, and the Schedule of Values are set forth in Paragraphs 2.03. 2.04, and 2.05.

F. Owner-delegated Designs: Submittals pursuant to Owner-delegated designs are governed by the provisions of Paragraph 7.19.

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 is entitled to rely on Contractor's warranty and guarantee.

B. Owner's rights under this warranty and guarantee are in addition to, and are not limited by, Owner's rights under the correction period provisions of Paragraph 15.08. The time in which Owner may enforce its warranty and guarantee rights under this Paragraph 7.17 is limited only by applicable Laws and Regulations restricting actions to enforce such rights; provided, however, that after the end of the correction period under Paragraph 15.08:

1. Owner shall give Contractor written notice of any defective Work within 60 days of the discovery that such Work is defective; and

2. Such notice will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the notice.

C. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, or improper modification, 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.

D. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents, a release of Contractor's obligation to perform the Work in accordance with the Contract Documents, or a release of Owner's warranty and guarantee rights under this Paragraph 7.17:

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. The end of the correction period established in Paragraph 15.08;

8. Any inspection, test, or approval by others; or

9. Any correction of defective Work by Owner.

E. 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 will 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 losses, damages, costs, and judgments (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 from third-party claims or actions relating to or resulting from the performance or furnishing of the Work, provided that any such claim, action, loss, cost, judgment or damage is attributable to bodily injury, sickness, disease, or death, or to damage 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 will 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.

7.19 *Delegation of Professional Design Services*

A. Owner may require Contractor to provide professional design services for a portion of the Work by express delegation in the Contract Documents. Such delegation will specify the performance and design criteria that such services must satisfy, and the Submittals that Contractor must furnish to Engineer with respect to the Owner-delegated design.

B. Contractor shall cause such Owner-delegated professional design services to be provided pursuant to the professional standard of care by a properly licensed design professional, whose signature and seal must appear on all drawings, calculations, specifications, certifications, and Submittals prepared by such design professional. Such design professional must issue all certifications of design required by Laws and Regulations.

C. If a Shop Drawing or other Submittal related to the Owner-delegated design is prepared by Contractor, a Subcontractor, or others for submittal to Engineer, then such Shop Drawing or other Submittal must bear the written approval of Contractor's design professional when submitted by Contractor to Engineer.

D. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, and approvals performed or provided by the design professionals retained or employed by Contractor under an Owner-delegated design, subject to the professional standard of care and the performance and design criteria stated in the Contract Documents.

E. Pursuant to this Paragraph 7.19, Engineer's review, approval, and other determinations regarding design drawings, calculations, specifications, certifications, and other Submittals furnished by Contractor pursuant to an Owner-delegated design will be only for the following limited purposes:

1. Checking for conformance with the requirements of this Paragraph 7.19;
2. Confirming that Contractor (through its design professionals) has used the performance and design criteria specified in the Contract Documents; and
3. Establishing that the design furnished by Contractor is consistent with the design concept expressed in the Contract Documents.

F. Contractor shall not be responsible for the adequacy of performance or design criteria specified by Owner or Engineer.

G. Contractor is not required to provide professional services in violation of applicable Laws and Regulations.

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 third-party utility work that Owner has arranged to take place at or adjacent to the Site, Owner shall provide such information to Contractor.

C. Contractor shall afford proper and safe access to the Site to each contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work.

D. 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.

E. If the proper execution or results of any part of Contractor's Work depends upon work performed by others, 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.

F. The provisions of this article are not applicable to work that is performed by third-party utilities or other third-party entities without a contract with Owner, or that is performed without having been arranged by Owner. If such work occurs, then any related delay, disruption, or interference incurred by Contractor is governed by the provisions of Paragraph 4.05.C.3.

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 for Owner at or adjacent to the Site, the Owner's employees, any other contractor working for Owner, or any utility owner that Owner has arranged to perform work, 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. 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 will 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, and any remedies available to Contractor under Laws or Regulations concerning utility action or inaction. When applicable, any such equitable adjustment in Contract Price will 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 or Contract Price is subject to the provisions of Paragraphs 4.05.D and 4.05.E.

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.

1. 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 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 8.03.B.

2. 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 Contractor.

C. 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 will 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 (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 10.07. 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 *Resident 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 the Supplementary Conditions and in Paragraph 10.07.

B. If Owner designates an individual or entity who is not Engineer's consultant, agent, or employee to represent Owner at the Site, then the responsibilities and authority of such individual or entity will be as provided in the Supplementary Conditions.

10.04 *Engineer's Authority*

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

B. Engineer's authority as to Submittals is set forth in Paragraph 7.16.

C. Engineer's authority as to design drawings, calculations, specifications, certifications and other Submittals from Contractor in response to Owner's delegation (if any) to Contractor of professional design services, is set forth in Paragraph 7.19.

D. Engineer's authority as to changes in the Work is set forth in Article 11.

E. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.05 *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.

10.06 *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.

10.07 *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, will 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 Contractor under 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 10.07 also apply to the Resident Project Representative, if any.

10.08 *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 of which Engineer has been informed.

ARTICLE 11—CHANGES TO THE CONTRACT

11.01 *Amending and Supplementing the Contract*

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

B. If an amendment or supplement to the Contract includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order.

C. All changes to the Contract that 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, must be supported by Engineer's recommendation. Owner and Contractor may amend other terms and conditions of the Contract without the recommendation of the Engineer.

11.02 *Change Orders*

A. Owner and Contractor shall execute appropriate Change Orders covering:

1. Changes in 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 11.05, (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 that embody the substance of any final and binding results under: Paragraph 11.03.B, resolving the impact of a Work Change Directive; Paragraph 11.09, concerning Change Proposals; Article 12, Claims; Paragraph 13.02.D, final adjustments resulting from allowances; Paragraph 13.03.D, final adjustments relating to determination of quantities for Unit Price Work; and similar provisions.

B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of Paragraph 11.02.A, it will be deemed to be of full force and effect, as if fully executed.

11.03 *Work Change Directives*

A. 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 11.07 regarding change of Contract Price.

B. If Owner has issued a Work Change Directive and:

1. Contractor believes that an adjustment in Contract Times or Contract Price is necessary, then Contractor shall submit any Change Proposal seeking such an adjustment no later than 30 days after the completion of the Work set out in the Work Change Directive.

2. Owner believes that an adjustment in Contract Times or Contract Price is necessary, then Owner shall submit any Claim seeking such an adjustment no later than 60 days after issuance of the Work Change Directive.

11.04 *Field Orders*

A. 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.

B. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.05 *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. Changes involving the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters will be supported by Engineer's recommendation.

B. Such changes in the Work 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 must be performed under the applicable conditions of the Contract Documents.

C. Nothing in this Paragraph 11.05 obligates 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.

11.06 *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.C.2.

11.07 *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 must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment of Contract Price must 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);

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 11.07.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 11.07.C).

C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit will 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 will be 15 percent;

   b. For costs incurred under Paragraph 13.01.B.3, the Contractor's fee will be 5 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 11.07.C.2.a and 11.07.C.2.b is that the Contractor's fee will be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.B.1 and 13.01.B.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 5 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 will be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the Work;

   d. No fee will 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 of the Work will be the amount of the actual net decrease in Cost of the Work and a deduction of an additional amount equal to 5 percent of such actual net decrease in Cost of the Work; and

   f. When both additions and credits are involved in any one change or Change Proposal, the adjustment in Contractor's fee will be computed by determining the sum of the costs in each of the cost categories in Paragraph 13.01.B (specifically, payroll costs, Paragraph 13.01.B.1; incorporated materials and equipment costs, Paragraph 13.01.B.2; Subcontract costs, Paragraph 13.01.B.3; special consultants costs, Paragraph 13.01.B.4; and other costs, Paragraph 13.01.B.5) and applying to each such cost category sum the appropriate fee from Paragraphs 11.07.C.2.a through 11.07.C.2.e, inclusive.

11.08 *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 must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment in the Contract Times must comply with the provisions of Article 12.

B. Delay, disruption, and interference in the Work, and any related changes in Contract Times, are addressed in and governed by Paragraph 4.05.

11.09 *Change Proposals*

A. *Purpose and Content*: Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; contest an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; challenge a set-off against payment due; or seek other relief under the Contract. The Change Proposal will specify any proposed change in Contract Times or Contract Price, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents. Each Change Proposal will address only one issue, or a set of closely related issues.

B. *Change Proposal Procedures*

1. *Submittal*: Contractor shall submit each Change Proposal to Engineer within 30 days after the start of the event giving rise thereto, or after such initial decision.

2. *Supporting Data*: 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.

   a. Change Proposals based on or related to delay, interruption, or interference must comply with the provisions of Paragraphs 4.05.D and 4.05.E.

   b. Change proposals related to a change of Contract Price must include full and detailed accounts of materials incorporated into the Work and labor and equipment used for the subject Work.

   The supporting data must 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.

3. *Engineer's Initial Review*: Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal. If in its discretion Engineer concludes that additional supporting data is needed before conducting a full review and making a decision regarding the Change Proposal, then Engineer may request that Contractor submit such additional supporting data by a date specified by Engineer, prior to Engineer beginning its full review of the Change Proposal.

4. *Engineer's Full Review and Action on the Change Proposal*: Upon receipt of Contractor's supporting data (including any additional data requested by Engineer), Engineer will conduct a full review of each Change Proposal and, within 30 days after such receipt of the Contractor's supporting data, either approve the Change Proposal in whole, deny it in whole, or approve it in part and deny it in part. Such actions must 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.

5. *Binding Decision*: Engineer's decision is final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.

C. *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 in writing that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice will be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

D. *Post-Completion*: Contractor shall not submit any Change Proposals after Engineer issues a written recommendation of final payment pursuant to Paragraph 15.06.B.

11.10 *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 are subject 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;

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; and

4. Subject to the waiver provisions of Paragraph 15.07, any dispute arising after Engineer has issued a written recommendation of final payment pursuant to Paragraph 15.06.B.

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 rests with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, 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 will 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 will 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 will 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 will 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 will 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 will 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 will be incorporated in a Change Order or other written document 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. When needed 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 will be in amounts no higher than those commonly incurred in the locality of the Project, will not include any of the costs itemized in Paragraph 13.01.C, and will 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 in advance of the subject Work. Such employees include, without limitation, superintendents, foremen, safety managers, safety representatives, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work will be apportioned on the basis of their time spent on the Work. Payroll costs include, but are not limited to, salaries and wages plus the cost of fringe benefits, which include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, 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, will 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 accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts will accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment will 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, which 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 will 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 or retained for services specifically related to the Work.

5. Other costs consisting of 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, 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.

        1) In establishing included costs for materials such as scaffolding, plating, or sheeting, consideration will be given to the actual or the estimated life of the material for use on other projects; or rental rates may be established on the basis of purchase or salvage value of such items, whichever is less. Contractor will not be eligible for compensation for such items in an amount that exceeds the purchase cost of such item.

    c. *Construction Equipment Rental*

        1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner as to price (including any surcharge or special rates applicable to overtime use of the construction equipment or machinery), and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the Work.

        2) Costs for equipment and machinery owned by Contractor or a Contractor-related entity will be paid at a rate shown for such equipment in the equipment rental rate book specified in the Supplementary Conditions. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs.

        3) With respect to Work that is the result of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, must cease to accrue when the use thereof is no longer necessary for the changed 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 builder's risk or other property insurance established in accordance with Paragraph 6.04), 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 include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will 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 does not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, 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. The cost of purchasing, renting, or furnishing small tools and hand tools.

3. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

4. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

5. 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.

6. Expenses incurred in preparing and advancing Claims.

7. 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*

1. When the Work as a whole is performed on the basis of cost-plus-a-fee, then:

a. Contractor's fee for the Work set forth in the Contract Documents as of the Effective Date of the Contract will be determined as set forth in the Agreement.

b. for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work, Contractor's fee will be determined as follows:

1) When the fee for the Work as a whole is a percentage of the Cost of the Work, the fee will automatically adjust as the Cost of the Work changes.

2) When the fee for the Work as a whole is a fixed fee, the fee for any additions or deletions will be determined in accordance with Paragraph 11.07.C.2.

2. When the Work as a whole is performed on the basis of a stipulated sum, or any other basis other than cost-plus-a-fee, then Contractor's fee for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work will be determined in accordance with Paragraph 11.07.C.2.

E. *Documentation and Audit*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor and pertinent Subcontractors will establish and maintain records of the costs in accordance with generally accepted accounting practices. Subject to prior written notice, Owner will be afforded reasonable access, during normal business hours, to all Contractor's accounts, records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, and similar data relating to the Cost of the Work and Contractor's fee. Contractor shall preserve all such documents for a period of three years after the final payment by Owner. Pertinent Subcontractors will afford such access to Owner, and preserve such documents, to the same extent required of Contractor.

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 for any of the foregoing will be valid.

C. *Owner's Contingency Allowance*: Contractor agrees that an Owner's 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 for Work covered by allowances, and the Contract Price will 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, and the final adjustment of Contract Price will be set forth in a Change Order, subject to the provisions of the following paragraph.

E. *Adjustments in Unit Price*

1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:

a. the quantity of the item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

b. Contractor's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.

2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to perform such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.

3. Adjusted unit prices will apply to all units of that item.

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 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 with such procedures and programs 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 will 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 will 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 will 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 written 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 will be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.

B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.

C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.

1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.

2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, 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 will 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 defective Work as required by Engineer, then Owner may, after 7 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 for 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.

2. 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 must also be accompanied by: (a) a bill of sale, invoice, copies of subcontract or purchase order payments, or other documentation establishing full payment by Contractor for the materials and equipment; (b) at Owner's request, documentation warranting that Owner has received the materials and equipment free and clear of all Liens; and (c) 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.

3. Beginning with the second Application for Payment, each Application must include an affidavit of Contractor stating that all previous progress payments received by Contractor have been applied to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

4. 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;

   b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto;

c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work;

d. to make any examination to ascertain how or for what purposes Contractor has used the money paid by Owner; 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 based on Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages resulting from 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 has occurred that would constitute a default by Contractor and therefore justify a termination for cause;

j. Liquidated or other 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; or

l. Other items entitle 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 will 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 will be treated as an amount due as determined by Paragraph 15.01.D.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 7 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 will 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 7 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 15.03.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 6.04 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 7.12), and other documents, Contractor may make application for final payment.

2. The final Application for Payment must 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 duly pending Change Proposals and Claims; 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 Final Application and Recommendation of Payment*: 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 10 days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the final Application for Payment to Owner for payment. Such recommendation will 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. 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. *Notice of Acceptability*: In support of its recommendation of payment of the final Application for Payment, Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to stated limitations in the notice and to the provisions of Paragraph 15.07.

D. *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 and issuance of notice of the acceptability of the Work.

E. *Final Payment Becomes Due*: Upon receipt from Engineer of the final Application for Payment and accompanying documentation, Owner shall set off against the amount recommended by Engineer for final payment any further sum to which Owner is entitled, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions of this Contract with respect to progress payments. Owner shall pay the resulting balance due to Contractor within 30 days of Owner's receipt of the final Application for Payment from Engineer.

15.07 *Waiver of Claims*

A. By making final payment, Owner waives its claim or right to liquidated damages or other damages for late completion by Contractor, except as set forth in an outstanding Claim, appeal under the provisions of Article 17, set-off, or express reservation of rights by Owner. Owner reserves all other claims or rights after final payment.

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 as a Claim, 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 Supplementary Conditions or the terms of any applicable special guarantee required by the Contract Documents), Owner gives Contractor written notice that any Work has been found to be defective, or that Contractor's repair of any damages to the Site or adjacent areas has been found to be defective, then after receipt of such notice of defect 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 adjacent areas;

2. correct such defective Work;

3. remove the defective Work from the Project and replace it with Work that is not defective, if the defective Work has been rejected by Owner, 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 from the corrective measures.

B. Owner shall give any such notice of defect within 60 days of the discovery that such Work or repairs is defective. If such notice is given within such 60 days but after the end of the correction period, the notice will be deemed a notice of defective Work under Paragraph 7.17.B.

C. If, after receipt of a notice of defect within 60 days and within the correction period, 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 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). Contractor's failure to pay such costs, losses, and damages within 10 days of invoice from Owner will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the failure to pay.

D. 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.

E. 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.

F. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph are not to 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 directly attributable to any such suspension. Any Change Proposal seeking such adjustments must 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) 10 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) written 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 7 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 will govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate for Convenience*

A. Upon 7 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 for any loss of anticipated profits or revenue, post-termination overhead costs, 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 7 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, 7 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, pursuant to Article 12; and

2. Disputes between Owner and Contractor concerning the Work, or obligations under the Contract Documents, that arise 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;

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 requires the giving of written notice to Owner, Engineer, or Contractor, it will be deemed to have been validly given only if delivered:

1. in person, by a commercial courier service or otherwise, to the recipient's place of business;

2. by registered or certified mail, postage prepaid, to the recipient's place of business; or

3. by e-mail to the recipient, with the words "Formal Notice" or similar in the e-mail's subject line.

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 will not constitute a waiver of that provision, nor will 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 of the Contract or 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 *Assignment of Contract*

A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party to this Contract of any rights under or interests in the Contract will be binding on the other party 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.

18.09 *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.

18.10 *Headings*

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

SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

These Supplementary Conditions amend or supplement EJCDC® C-700, Standard General Conditions of the Construction Contract (2018). The General Conditions remain in full force and effect except as amended.

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—for example, “Paragraph SC-4.05.”

ARTICLE 5 - SITE, SUBSURFACE AND PHYSICAL CONDITIONS, HAZARDOUS ENVIRONMENTAL CONDITIONS

5.03 *Subsurface and Physical Conditions*

SC-5.03 See the attached geotechnical report for subsurface investigation information.

5.06 *Hazardous Environmental Conditions*

SC 5.06 No reports or drawings related to Hazardous Environmental Conditions at the Site are known to Owner.

ARTICLE 6 – BONDS AND INSURANCE

6.03 *Contractor’s Insurance*

SC-6.03 Supplement Paragraph 6.03 with the following provisions after Paragraph 6.03.C:

D. *Other Additional Insureds:* As a supplement to the provisions of Paragraph 6.03.C of the General Conditions, the commercial general liability, automobile liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies must include as additional insureds (in addition to Owner and Engineer) the following: Lenawee County, Lenawee Drain Commissioner, Red Mill Pond Special Assessment District, Spicer Group, Inc.

E. *Workers’ Compensation and Employer’s Liability:* Contractor shall purchase and maintain workers’ compensation and employer’s liability insurance, including, as applicable, United States Longshoreman and Harbor Workers’ Compensation Act, Jones Act, stop-gap employer’s liability coverage for monopolistic states, and foreign voluntary workers’ compensation (from available sources, notwithstanding the jurisdictional requirement of Paragraph 6.02.B of the General Conditions).

Workers’ Compensation and Related Policies	Policy limits of not less than:
Workers’ Compensation	
State	Statutory
Applicable Federal (e.g., Longshoreman’s)	Statutory
Foreign voluntary workers’ compensation (employer’s responsibility coverage), if applicable	Statutory
Employer’s Liability	
Each accident	$100,000

Workers' Compensation and Related Policies	Policy limits of not less than:
Disease	$100,000
Aggregate Disease	$500,000

F. *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 claims for:

1. damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees,
2. damages insured by reasonably available personal injury liability coverage, and
3. damages because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.

G. *Commercial General Liability—Minimum Policy Limits*

Commercial General Liability	Policy limits of not less than:
General Aggregate	$1,000,000
Products—Completed Operations Aggregate	$1,000,000
Personal and Adverse Injury	$1,000,000
Bodily Injury and Property Damage—Each Occurrence	$1,000,000

H. *Automobile Liability:* Contractor shall purchase and maintain automobile liability insurance 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 must be written on an occurrence basis.

Automobile Liability	Policy limits of not less than:
Bodily Injury-Each Occurrence Limit	$500,000
Property Damage-Each Occurrence Limit	$250,000
[or]	
Combined Single Limit	
Combined Single Limit (Bodily Injury and Property Damage)	$1,000,000

I. *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. The coverage afforded must be at least as broad as that of each and every one of the underlying policies.

Excess or Umbrella Liability	Policy limits of not less than:
Each Occurrence	$1,000,000

ARTICLE 7 - CONTRACTOR'S RESPONSIBILITIES

7.03 *Labor; Working Hours*

SC-7.03 Add the following new subparagraphs immediately after Paragraph 7.03.C:

1. Regular working hours will be 7:00am-7:00pm.
2. Owner's legal holidays are New Year's Day, MLK Day, President's Day, Good Friday, Memorial Day, Juneteenth, Independence Day, Labor Day, Veteran's Day, Thanksgiving, Christmas Day, New Year's Eve.

SC-7.03 Amend the first and second sentences of Paragraph 7.03.C to state "…all Work at the Site must be performed during regular working hours, Monday through Saturday. Contractor will not perform Work on Sunday, or any legal holiday."

7.09 *Permits*

SC-7.09 Add the following new subparagraphs immediately after Paragraph 7.09.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. Traffic Control Permit

ARTICLE 10 - ENGINEER'S STATUS DURING CONSTRUCTION

10.03 *Resident Project Representative*

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

C. The Resident Project Representative (RPR) will be Engineer's representative at the Site. RPR's dealings in matters pertaining to the Work in general will be with Engineer and Contractor. RPR's dealings with Subcontractors will only be through or with the full knowledge or approval of Contractor. The RPR will:

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 Contractor's 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; Defective Work

   a. Conduct On-Site observations of the Work to assist Engineer in determining, to the extent set forth in Paragraph 10.02, 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 and Tests*

   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 Conditions.

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.

D. The RPR will 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 construction.

5 Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.

6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.

7. Accept Shop Drawing or Sample submittals from anyone other than Contractor

8. Authorize Owner to occupy the Project in whole or in part.

WORK CHANGE DIRECTIVE NO.:

Owner:	Lenawee County Drain Commissioner	Owner's Project No.:	
Engineer:	Spicer Group, Inc.	Engineer's Project No.:	129021SG2020
Contractor:		Contractor's Project No.:	
Project:	Tecumseh Dam		
Contract Name:			
Date Issued:		Effective Date of Work Change Directive:	

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

Description:

Attachments:

Purpose for the Work Change Directive:

Directive to proceed promptly with the Work described herein, prior to agreeing to change in Contract Price and Contract Time, is issued due to:

Notes to User—Check one or both of the following

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

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

Contract Price: $ _____ **[increase] [decrease] [not yet estimated]**.

Contract Time: _____ days **[increase] [decrease] [not yet estimated]**.

Basis of estimated change in Contract Price:

☐ Lump Sum ☐ Unit Price ☐ Cost of the Work ☐ Other

RECOMMENDED:	AUTHORIZED BY:	RECEIVED:
By: _____	By: _____	By: _____
Engineer (Authorized Signature)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Title: Spicer Group, Inc.	Title: Lenawee County Drain Commissioner	Title:
Date:	Date:	Date:

Approved by Funding Agency (if applicable)

By: Date:

Title:

CHANGE ORDER NO.:

Owner:	Lenawee County Drain Commissioner	Owner's Project No.:	
Engineer:	Spicer Group, Inc	Engineer's Project No.:	129021SG2020
Contractor:		Contractor's Project No.:	
Project:	Tecumseh Dam		
Contract Name:			
Date Issued:		Effective Date of Change Order:	

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

Description:

Attachments:

Change in Contract Price	**Change in Contract Times [State Contract Times as either a specific date or a number of days]**
Original Contract Price: $ _____	Original Contract Times: Substantial Completion: _____ Ready for final payment: _____
[Increase] [Decrease] from previously approved Change Orders No. 1 to No. **[Number of previous Change Order]**: $ _____	**[Increase] [Decrease]** from previously approved Change Orders No.1 to No. **[Number of previous Change Order]**: Substantial Completion: _____ Ready for final payment: _____
Contract Price prior to this Change Order: $ _____	Contract Times prior to this Change Order: Substantial Completion: _____ Ready for final payment: _____
[Increase] [Decrease] this Change Order: $ _____	**[Increase] [Decrease]** this Change Order: Substantial Completion: _____ Ready for final payment: _____
Contract Price incorporating this Change Order: $ _____	Contract Times with all approved Change Orders: Substantial Completion: _____ Ready for final payment: _____

RECOMMENDED:	ACCEPTED:	ACCEPTED:
By: _____	By: _____	By: _____
Engineer (if required)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Title: Spicer Group, Inc.	Title: Lenawee County Drain Commissioner	Title: _____
Date: _____	Date: _____	Date: _____

Approved by Funding Agency (if applicable)

By: _____ Date:

Title: _____

FIELD ORDER NO.:

Owner:	Lenawee County Drain Commissioner	Owner's Project No.:	
Engineer:	Spicer Group, Inc.	Engineer's Project No.:	129021SG2020
Contractor:		Contractor's Project No.:	
Project:	Tecumseh Dam		
Contract Name:			
Date Issued:		Effective Date of Field Order:	

Contractor is hereby directed to promptly perform the Work described in this Field Order, issued in accordance with Paragraph 11.04 of the General Conditions, 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 Section(s):

Drawing(s) / Details (s):

Description:

Attachments:

ISSUED:	RECEIVED:
By: _____	By: _____
Engineer (Authorized Signature)	Contractor (Authorized Signature)
Title: Spicer Group. Inc.	Title: _____
Date: _____	Date: _____

Copy to: Owner

SECTION 01 10 00

SUMMARY OF WORK

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Summary of Work

B. Location of Site

C. Contractor Use of Site.

D. Work Sequence.

E. Landowner Occupancy.

F. Utilities Constructed Within Public Streets.

1.2 SUMMARY OF WORK

A. Primary Spillway Work
   1. Seepage spot repair on the upstream side in two (2) locations.
   2. Concrete cracking and spalling repair on abutment walls.
   3. Erosion repair to downstream embankment.
   4. Install proposed kayak portage on the southwest side of primary spillway off of N Evans Street.

B. Auxiliary Spillway Work
   1. Seepage spot repair on the upstream side in (1) location.
   2. Replace and realign spillway floor and walls as detailed in the drawings.
   3. Replace (7) gates and electric actuators.
   4. Install remote automated system to control operations and monitor gates.
   5. Extend existing storm sewer and install toe drain as detailed in the drawings.
   6. Add safety fencing and signage.
   7. Install proposed access drive on northwest side of auxiliary spillway off of N Evans Street.

1.3 LOCATION OF SITE

A. The Tecumseh Dam is located on the River Rasin in the City of Tecumseh, Section 27, T.5.S.-R.4. E., Lenawee County, Michigan.

1.4 CONTRACTOR USE OF SITE

A. Utility Outages and Shutdown: Schedule temporary shutdowns of active utilities at times that will cause the least interference with service use and as approved by the Owner and Engineer.

B. Construction Operations: Limited to right-of-way limits and Owner furnished easements, as noted on Drawings.

C. Emergency Building Exits During Construction: Maintain ingress and egress for businesses in the area.

1.5 WORK SEQUENCE

A. Construct Work in accordance with the Engineer approved construction and sequencing schedule.

1.6 LANDOWNER OCCUPANCY

A. Cooperate with Landowners to minimize conflict. If disputes arise, contact the Engineer immediately.

B. Contractor will provide Landowners a minimum four (4) day notice to relocate obstructions within the right-of-way. A seven (7) day notice is required for fence relocations.

1.7 UTILITIES CONSTRUCTED WITHIN PUBLIC STREETS

A. Conform to the requirements of the City, County, Township, Village, MDOT, or authority having jurisdiction over the road.

B. Obtain and pay for construction permits from the authority having jurisdiction in order to work in the public road right-of-way.

C. Notify the authority two (2) working days in advance of the intention to cross a roadway.

D. Install and maintain traffic control devices in accordance with Section 01570 Traffic Regulation.

E. Contractor shall be liable for all accidents and damage occasioned in any way by his acts or neglect or by the acts or neglect of his sub-contractors, agents, employees, or workmen.

END OF SECTION

SECTION 01 20 00

PRICE AND PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Units of Measurement and Payment

B. Cash Allowances

C. Schedule of Pay Items

D. Scope of Payment

E. Application for Payment

F. Change procedures.

G. Defect assessment.

H. Unit Prices

I. Alternatives

J. Final Payment

1.2 UNITS OF MEASUREMENT AND PAYMENT

A. All units of measurement shall be standard United States convention as applied to the specific items of work by tradition and as interpreted by ENGINEER and OWNER.

B. Unit Price Items.
   1. Payment items for the work of this contract on which the contract progress payment will be based are listed in the Bid Documents. The unit price and payment made for each item listed shall constitute full compensation for furnishing all labor, materials, and equipment, and performing any associated Contractor quality control, environmental protection, safety requirements, sampling, tests, and reports, and for performing all work required for each of the unit price items. Payment is contingent upon approval of all applicable submittals.

C. Lump Sum Items.
   1. Payment items for the work of this contract for which Contract lump sum payments will be made are listed in Bid Documents. Contract progress payments for lump sum items will be paid for based on the approved schedule of values. All costs for items of work, which are not specifically mentioned to be included in a particular lump sum or unit price payment item, shall be included in the listed lump sum item most closely associated with

the work involved. The lump sum price and payment made for each item listed shall constitute full compensation for furnishing all labor, materials, and equipment, and performing any associated Contractor quality control, environmental protection, safety requirements, sampling, tests and reports, and for performing all work required for which separated payment is not otherwise provided. Payment is contingent upon approval of all applicable submittals.

1.3 SCHEDULE OF PAY ITEMS

A. Mobilization
   1. Basis of Measurement: At the unit price per lump sum as stated in the agreement.
   2. Basis of Payment: Includes all associated labor, material, and equipment for hauling and relocating all equipment.

B. Structure and Concrete Removals
   1. Basis of Measurement: At the unit price per lump sum as stated in the agreement.
   2. Basis of Payment: Includes all associated labor, material, and equipment for saw cussing, excavation, full depth removal and disposal of existing concrete on the auxiliary spillway. The limits of Concrete Removal, as shown on the plans, will be established at the discretion of the Engineer.

C. Gates and Actuators Removals
   1. Basis of Measurement: At the unit price per lump sum as stated in the agreement.
   2. Basis of Payment: Includes all associated labor, material, and equipment for extraction, removal and disposal of existing gates, lifts, actuator systems, and trashracks.

D. Electrical Removals
   1. Basis of Measurement: At the unit price per lump sum as stated in the agreement.
   2. Basis of Payment: Includes all associated labor, material, and equipment for coordination, extraction, removal, and disposal of existing electrical and materials.

E. Auxiliary Spillway Reconstruction
   1. Basis of Measurement: At the unit price per lump sum as stated in the agreement.
   2. Basis of Payment: Includes all associated labor, material, equipment, excavation, bedding, backfill, pipe connections, framing, mortar, and finishing to install the new auxiliary spillway as per the plans.

F. Gates, Actuators, Lifts, and Trashrack Installations
   1. Basis of Measurement: At the unit price per lump sum as stated in the agreement.
   2. Basis of Payment: Includes all associated labor, material, and equipment for the manufacturing and installation of the new gates, actuators, lifts, and trashracks.

G. Electrical, Controls, and SCADA
   1. Basis of Measurement: At the unit price per lump sum as stated in the agreement.
   2. Basis of Payment: Includes all associated labor, materials, mixing motors, wiring, conduit, fixtures, SCADA components, and equipment for the complete installation of the SCADA systems.

H. Concrete Repair and Seepage Sealing

1. Basis of Measurement: At the unit price per lump sum as stated in the agreement.
2. Basis of Payment: Includes all associated labor, material, saw cutting, hand chipping, excavation, disposal and equipment for the concrete repair. The limits of concrete repair, as shown on the plans, will be established at the discretion of the Engineer.

I. Storm Sewer and Underdrain
   1. Basis of Measurement: At the unit price per lineal foot as stated in the agreement.
   2. Basis of Payment: Includes all associated labor, material, excavation, bedding, backfill, disposal, and equipment to furnish and install the new toe drain and underdrain and extend the storm sewer connection to the auxiliary spillway.

J. Riprap and Bank Protection
   1. Basis of Measurement: At the unit price per lineal foot or cubic yard as stated in the agreement.
   2. Basis of Payment: Includes all associated labor, material excavation, bedding, geotextile, backfill, disposal, and equipment to install riprap. The limits of riprap, as shown on the plans, will be established at the discretion of the Engineer.

K. Grass Pavers and Site Access
   1. Basis of Measurement: At the unit price per lump sum as stated in the agreement.
   2. Basis of Payment: Includes all associated labor, material, excavation, bedding, geotextile, backfill, seed mix, disposal, and equipment to furnish and install the grass paver drive access. The limits of the grass paver, as shown on the plans will be established at the discretion of the Engineer.

L. Soil Erosion and Sedimentation Control
   1. Basis of Measurement: At the unit price per lump sum as stated in the agreement
   2. Basis of Payment: Includes all associated labor, material, equipment, etc. to furnish and install soil erosion and sedimentation control measures. Additional control measures shall be emplyed as required by the site conditions and applicable enforcing agency having jurisdiction at no additional cost.

M. Site Restoration
   1. Basis of Measurement: At the unit price per lump sum as stated in the agreement
   2. Basis of Payment: Includes all associated labor, material, and equipment for restoration and clean up o required to return the site to it’s original condition are included in the pay item.

N. Kayak Portage
   1. Basis of Measurement: At the unit price per lump sum as stated in the agreement
      Basis of Payment: Includes all associated labor, material, bedding, backfill, and equipment for the furnishing and installation of the kayak portage stone steps and pathway.

O. Water Control
   1. Basis of Measurement: At the unit price per lump sum as stated in the agreement
      Basis of Payment: Includes all associated labor, material and equipment for the control of water in order to construct the auxiliary spillway and kayak portage. All pumping equipment and coffer dam design and installation are included in the pay item.

P. Traffic Control

1. Basis of Measurement: At the unit price per lump sum as stated in the agreement
   Basis of Payment: Includes all required traffic control and regulation to meet the requirements of the authority having jurisdiction, and all labor, material, and equipment necessary to furnish and operate all traffic devices, barricades, plastic drums, signs, ext. and traffic regulations for this project to maintain traffic control.

1.4 SCOPE OF PAYMENT

A. The pay items in the Bid Form and in the specifications herein describe the measurement of and payment for the work to be done for the respective items listed in the Bid. Each unit price stated in the Bid shall constitute full compensation, as herein specified, for each item of the work completed.

B. The Contractor shall accept compensation as herein provided, as full payment to furnish all materials, labor, tools, equipment, permitting, and incidentals necessary to the completed work; for performing all work contemplated and embraced by the Contract; for all loss or damage arising from the nature of the work, or from the action of the elements, or from any unforeseen difficulties which may be encountered during the execution of the work; and for all expenses incurred in consequence of the suspension of the work as herein authorized.

C. No extra payment will be made to the Contractor for any expense or delays caused by revision of inadequate submittals, lack of progress, defective workmanship, or rescheduling of work by other contractors, subcontractors, or equipment and material suppliers.

D. No additional payment will be allowed because of differences between field dimensions and those shown specified herein should work be conducted before notifying the ENGINEER of these differences.

E. Additional costs caused by ill-timed or defective work, or work not conforming to Project Specifications, including costs for additional services of an ENGINEER, shall be incurred solely by the Contractor.

F. Work done on written instructions of the ENGINEER and/or the OWNER, other than defective or non-conforming work, will be paid for by the OWNER.

1.5 APPLICATION FOR PAYMENT

A. Submit electronic file of each Application for Payment to Engineer via Procore

B. Format shall follow C-620 Contractors Application For Payment.

C. Submit updated construction schedule with each Application for Payment.

D. Submit submittals with transmittal letter as specified in Section 01 33 00 - Submittal Procedures.

E. Submit waivers requested by Owner for Contractor, all subcontractors, and suppliers.

F. Substantiating Data: When Engineer requires substantiating information, submit data justifying dollar amounts in question.

1.6 CHANGE PROCEDURES

A. Submittals: Submit name of individual who is authorized to receive change documents and is responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.

B. Carefully study and compare Contract Documents before proceeding with fabrication and installation of Work. Promptly advise Engineer of any error, inconsistency, omission, or apparent discrepancy.

C. Requests for Interpretation (RFI) and Clarifications: Allot time in construction scheduling for liaison with Engineer; establish procedures for handling queries and clarifications.
   1. Use Contractor form for requesting interpretations.
   2. Engineer may respond with a direct answer on the Request for Interpretation form, 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.

1.7 DEFECT ASSESSMENT

A. Replace the Work, or portions of the Work, not conforming to specified requirements.

B. If, in the opinion of Engineer, it is not practical to remove and replace the Work, Engineer will direct appropriate remedy or adjust payment.

C. The defective Work may remain, but unit sum/price will be adjusted to new sum/price at discretion of Owner.

D. Defective Work will be partially repaired according to instructions of Engineer, and unit sum/price will be adjusted to new sum/price at discretion of Owner.

E. Individual Specification Sections may modify these options or may identify specific formula or percentage sum/price reduction.

F. Authority of Engineer to assess defects and identify payment adjustments is final.

G. Nonpayment for Rejected Products: Payment will not be made for rejected products for any of the following reasons:
   1. Products wasted or disposed of in a manner that is not acceptable.
   2. Products determined as unacceptable before or after placement.
   3. Products not completely unloaded from transporting vehicle.
   4. Products placed beyond lines and levels of the required Work.
   5. Products remaining on hand after completion of the Work.
   6. Loading, hauling, and disposing of rejected products.

1.8 UNIT PRICES

A. Authority: Measurement methods are delineated in individual Specification Sections and Section 01 21 00.

B. Measurement methods delineated in individual Specification Sections complement criteria of this Section 01 21 00. 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 in order to comply with plans and specifications 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.
   9. Contractor will be responsible for verifying all quantities. Contractor will not be paid for wasted materials or overbuild quantities.
   10.

1.9 ALTERNATES

A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in Owner-Contractor Agreement. The Owner-Contractor

Agreement may identify certain Alternates to remain an Owner option for a stipulated period of time.

B. Coordinate related Work and modify surrounding Work. Description for each Alternate is recognized to be abbreviated but requires that each change shall be complete for scope of Work affected.
   1. Coordinate related requirements among Specification Sections as required.
   2. Include as part of each Alternate: Miscellaneous devices, appurtenances, and similar items incidental to or necessary for complete installation.
   3. Coordinate Alternate with adjacent Work and modify or adjust as necessary to ensure integration.

C. Schedule of Alternates:
   1. None

1.10 FINAL PAYMENT

A. The ENGINEER will make, as soon as practicable after the entire completion of the project, a final quantity invoice of the amount of the Work performed and the value of such work and the OWNER will then pay the entire sum found to be due, after deducting therefrom all previous payments. All amounts to be paid under the provisions of the Contract may be held by the OWNER for a period of sixty (60) days after the completion of the final quantity invoice, or until such time as the Contractor submits satisfactory evidence that all bills for labor and materials used under this Contract have been paid and all required documents have been submitted to ENGINEER or OWNER as required by the General Conditions.

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. Contractor must 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.

1.5 INSTALLER SUBSTITUTION PROCEDURES

A. Document each request with:
1. Installer's qualifications.
2. Installer's experience in work similar to that specified.
3. Other information as necessary to assist Engineer's evaluation.

B. Substitution Submittal Procedure:
1. Include the following subparagraphs only when substitution is permitted after Contract award.
2. Submit electronic submittals via email as PDF electronic files for consideration. Limit each request to one proposed substitution.
3. Engineer will notify Contractor in writing of decision to accept or reject request.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Coordination and Project conditions.

B. Field Engineering

C. Cutting and Patching

D. Preconstruction 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.
   1. Coordination Drawings: Prepare as required to coordinate all portions of Work. Show relationship and integration of different construction elements that require coordination during fabrication or installation to fit in space provided or to function as intended. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are important.

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. The Contractor is responsible for all construction staking necessary to complete the Work. The Engineer will perform verification checks as necessary.

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 CUTTING AND PATCHING

A. Employ skilled and experienced installer to perform cutting and patching.

B. Submit written request in advance of cutting or altering elements which affects:
   1. Structural integrity of element.
   2. Integrity of weather-exposed or moisture-resistant elements.
   3. Efficiency, maintenance, or safety of element.
   4. Visual quantities of sight-exposed elements.
   5. Work of Owner or separate contractor.

C. Execute cutting, fitting, and patching including excavation and fill, to complete Work, and to:
   1. Fit the several parts together, to integrate with other Work.
   2. Uncover Work to install or correct ill-timed Work.
   3. Remove and replace defective and non-conforming Work.
   4. Remove samples of installed Work for testing.

D. Execute work by methods which will avoid damage to other Work and provide proper surfaces to receive patching and finishing.

E. Cut rigid materials using masonry saw or core drill.

F. Restore Work with new products in accordance with requirements of Contract Documents.

G. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

H. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.

I. Identify any hazardous substance or condition exposed during the Work to the Engineer for decision or remedy.

1.5 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. Owner's requirements and occupancy.
12. Construction facilities and controls.
13. Temporary utilities.
14. Survey and building layout.
15. Security and housekeeping procedures.
16. Procedures for testing.
17. Procedures for maintaining record documents.
18. Requirements for startup of equipment.
19. Utility Representatives comments and requirements.

D. Engineer will record minutes and distribute copies to participants after meeting.

1.6 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. Engineer: Record minutes and distribute copies to participants within two days after meeting, with two copies each to Contractor, Owner, and those affected by decisions made.

1.7 PREPARATORY MEETINGS

A. When required in individual Specification Sections, convene preparatory 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. Notification and meeting requirements are outlined in Section 01 40 00 Quality Requirements

1.8 PREINSTALLATION MEETINGS

A. When required in individual Specification Sections, convene preinstallation meetings at Project Site one week before starting Work of specific Section.

B. Require attendance of parties directly affecting, or affected by, Work of specific Section.

C. Notify Engineer one week 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 one week after meeting, with electronic copies each to Engineer, Owner, and those affected by decisions made.

1.9 CLOSEOUT MEETING

A. Schedule Project closeout meeting with sufficient time to prepare for requesting Substantial Completion. Preside over meeting and be responsible for minutes.

B. Attendance Required: Contractor, Subcontractors, Engineer, Owner, and others appropriate to agenda.

C. Notify Engineer four days in advance of meeting date.

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

E. Record minutes and distribute copies to participants within one week after meeting, with copies to all participants and those affected by decisions made.

1.10 PROGRESS SCHEDULE REQUIREMENTS

A. Progress Schedule shall be based on and incorporate the milestone and completion dates as specified in the Contract

B. A schedule showing the Work completed in less than the Contract Time, which has been accepted by Engineer, shall be considered to have Project Float. The Project Float is the time between the scheduled completion of the Work and Contract Substantial Completion. Project Float is a resource available to both Engineer and Contractor.

C. Float Ownership: Neither Engineer nor Contractor owns float. The Project owns the float. As such, liability for delay of any Substantial Completion or Final Completion date rests with the

party whose actions, last in time, actually cause delay to a Substantial Completion or Final Completion date.

D. Progress Schedule shall be the basis for evaluating job progress, payment requests, and time extension requests. Responsibility for developing the Contract schedule and monitoring actual progress as compared to Progress Schedule rests with Contractor.

E. Failure of Progress Schedule to include any element of the Work or any inaccuracy in Progress Schedule will not relieve Contractor from responsibility for accomplishing the Work in accordance with the Contract. Engineer's acceptance of the Schedule shall be for its use in monitoring and evaluating job progress, payment requests, and time extension requests, and shall not, in any manner, impose a duty of care upon Engineer, or act to relieve Contractor of its responsibility for the means and methods of construction.

F. Contractor shall submit its Progress Schedule for review no later than first progress payment

G. All Schedules shall be time-scaled.

H. Each Schedule shall indicate all separate fabrication, procurement and field construction activities required for completion of the Work, including but not limited to the following:
   1. All Contractor, Subcontractor, and assigned Contractor work shall be shown in a logical work sequence that demonstrates a coordinated plan of work for all contractors. The intent is to provide a common basis of acceptance, understanding, and communication, as well as interface with other contractors.
   2. Activities related to the delivery of Contractor and Engineer-furnished equipment to be Contractor-installed per Contract shall be shown.
   3. All activities shall be identified through codes or other identification to indicate the area (i.e. Primary Spillway, Auxiliary Spillway, Site work).
   4. Break up the Work schedule into activities of durations of approximately 21 Days or less each, except for non-field construction activities or as otherwise deemed acceptable by Engineer.
   5. Show the critical path in red. For each activity, show early start, late start, early finish, late finish, durations measured in Days, float, resources, predecessor and successor activities, planned workday/week for the activity.

I. Updating the Schedule to reflect actual progress shall not be considered revisions to the Schedule. Since scheduling is a dynamic process, however, revisions to activity durations and sequences are expected on a monthly basis.

J. To reflect revisions to the Schedule, Contractor shall provide Engineer with a written narrative with a full description and reasons for each Work activity revised. For revisions affecting the sequence of Work, Contractor shall provide a schedule diagram that compares the original sequence to the revised sequence of Work. Contractor shall clearly show and discuss any changes in the critical path, and provide the written narrative and schedule diagram for revisions three Days in advance of the monthly schedule update meeting.

K. Schedule revisions shall not be incorporated into any schedule update until Engineer has reviewed the revisions. Engineer may request further information and justification for schedule

revisions and, within three Days, provide Engineer with a complete written narrative response to Engineer's request.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION

3.1 ALTERATION PROCEDURES

A. Entire facility will be occupied for normal operations during progress of construction. Cooperate with Owner in scheduling operations to minimize conflict and to permit continuous usage.
   1. Perform Work not to interfere with operations of occupied areas.
   2. Keep utility and service outages to a minimum and perform only after written approval of Owner.
   3. Clean Owner-occupied areas daily. Clean spillage, overspray, and heavy collection of dust in Owner-occupied areas immediately.

B. Materials: As specified in product Sections; match existing products with new and salvaged products for patching and extending Work.

C. Employ skilled and experienced installer to perform alteration and renovation Work.

D. Cut, move, or remove items as necessary for access to alterations and renovation Work. Replace and restore at completion. Comply with Section 01 70 00 - Execution and Closeout Requirements

E. Remove unsuitable material not marked for salvage, including rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished Work.

F. Remove debris and abandoned items from area and from concealed spaces.

G. Prepare surface and remove surface finishes to permit installation of new Work and finishes.

H. Close openings in exterior surfaces to protect existing Work from weather and extremes of temperature and humidity.

I. Remove, cut, and patch Work to minimize damage and to permit restoring products and finishes to original or specified condition.

J. Refinish existing visible surfaces to remain in renovated rooms and spaces, to specified or new condition for each material, with neat transition to adjacent finishes.

K. Where new Work abuts or aligns with existing Work, provide smooth and even transition. Patch Work to match existing adjacent Work in texture and appearance.

L. When finished surfaces are cut so that smooth transition with new Work is not possible, terminate existing surface along straight line at natural line of division and submit recommendation to Engineer for review.

M. Where change of plane of 1/4 inch or more occurs, submit recommendation for providing smooth transition to Engineer for review.

N. Trim existing doors to clear new floor finish. Refinish trim to original or specified condition.

O. Patch or replace portions of existing surfaces that are damaged, lifted, discolored, or showing other imperfections.

P. Finish surfaces as specified in individual product Sections.

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. Utilize a 9-character submittal identification numbering system in the following manner:

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 SCHEDULE OF SUBMITTALS

A. Submit a Schedule of Submittals within 15 days after Notice to Proceed. Include the following information:
   1. List of submittals (group by Specification number). At a minimum this list shall include all of the submittals.
   2. Estimated submission date
   3. Estimated start date for corresponding items of Work

1.5 CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial schedule within 15 days after Notice to Proceed.

B. Schedule Updates shall be provided at progress meetings:
   1. Overall percent complete, projected and actual.
   2. Completion progress by listed activity and sub activity, to within five working 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.

C. Updating Schedules
   1. Maintain schedules to record actual start and finish dates of completed activities.
   2. Indicate progress of each activity to date of revision, with projected completion date of each activity. Update schedules to depict current status of Work
   3. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes
   4. Upon approval of a Change Order, including the change in the next schedule submittal
   5. Indicate changes required to maintain required completion dates.

1.6 SITE TRAFFIC CONTROL AND HAULING PLAN

A. The CONTRACTOR is responsible for submitting all necessary shop drawings and plans in accordance with Specification Section 01 50 00.

1.7 HEALTH AND SAFETY PLAN (HASP):

A. The CONTRACTOR is responsible for developing and implementing a Site-Specific HASP, directing the training of personnel, and providing safety equipment and incidentals as required. The HASP shall incorporate the Standard Operating Safety Guidelines published by the U.S. EPA (November 1984), where applicable and meet requirements specified in OSHA Standard 29 CFR Part 1910. At a minimum, the HASP shall address the following:
   1. Physical hazard evaluation (i.e., spills, cold, excavation, slip, trip, fall, structural instability, etc.).
   2. Site control.
   3. Spill Control Plan.
   4. Fire control - fire hazards.
   5. Emergency response and communications.
   6. In addition, the HASP shall comply with applicable Local, State, and Federal requirements.

1.8 TEMPORARY CONSTRUCTION EMERGENCY ACTION PLAN (TCEAP):

A. The CONTRACTOR is responsible for developing and implementing a TCEAP to define procedures and training to protect construction workers or the public from a failure of the temporary construction work.

B. The TCEAP should include:
   1. A notification list of emergency response authorities.
   2. A plan drawing showing the proposed arrangement of the structure.
   3. The location of safety devices and escape routes.
   4. A brief description of testing procedures for the plan.

1.9 PRE-CONSTRUCTION INSPECTION AND PHOTOGRAPHS:

A. Perform a pre-construction inspection (field report with photographs and detailed observations) of the site including the powerhouse, site access routes and adjacent roadways.

B. Submit pre-construction survey field report within one week of performing the work.

1.10 PROPOSED PRODUCT LIST

A. Within 15 days after date of the Notice to Proceed, 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.

1.11 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.

1.12 ELECTRONIC CAD FILES OF PROJECT DRAWINGS

A. Electronic CAD Files of Project Drawings: May only be used to expedite production of Shop Drawings for the Project. Use for other Projects or purposes is not allowed.

B. Electronic CAD Files of Project Drawings: Distributed only under the following conditions:

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

1.13 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. Do not perform Work related to submittals prior to obtaining the required approval from the Engineer.

E. Submit number of opaque reproductions Contractor requires, plus two copies Engineer will retain.

F. 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.

1.14 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.

1.15 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.

1.16 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.

1.17 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.

1.18 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.

1.19 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.

1.20 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.

1.21 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.

1.22 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.

E. Owner may withhold monies due to Contractor to cover additional costs beyond the second submittal review.

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 assurance and control of installation.

B. References.

C. Field samples.

D. Inspection and testing laboratory services.

E. Manufacturers' field services and reports.

F. Benchmarks and control elevations.

1.2 RELATED SECTIONS

A. Section 01300 – Submittals: Submission of Manufacturers' Instructions and Certificates.

B. Section 01600 – Material and Equipment: Requirements for material and product quality.

1.3 QUALITY ASSURANCE/ 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 a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

C. Perform work by persons qualified to produce workmanship of 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.

1.4 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.

1.5 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.

1.6 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.

1.7 FIELD SAMPLES

A. Install field samples at the site as required by individual specifications Sections for review.

B. Acceptable samples represent a quality level for the Work.

C. Where field sample is specified in individual Sections to be removed, clear area after field sample has been accepted by Engineer.

1.8 INSPECTION AND TESTING LABORATORY SERVICES

A. Testing, inspections, and source quality control may occur on or off Project Site. Perform off-Site testing as required by Engineer, Owner, or specific specification section.

B. Reports shall be submitted by independent firm to Engineer, Contractor, and authorities having jurisdiction, as digital files in pdf format, indicating observations and results of tests and compliance or noncompliance with Contract Documents.

C. Submit final report indicating correction of Work previously reported as noncompliant.

D. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.

E. Notify Engineer and independent firm 72 hours before expected time for operations requiring services.

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 same independent firm on instructions from Architect/Engineer. Payment for retesting or re-inspection will be charged to Contractor by deducting testing charges from Contract Sum/Price.

H. Agency Responsibilities:
   1. Test Samples of mixes submitted by Contractor.
   2. Provide qualified personnel at Site. Cooperate with Architect/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 Architect/Engineer and Contractor of observed irregularities or nonconformance of Work or products.
   6. Perform additional tests required by Architect/Engineer.
   7. Attend preconstruction meetings and progress meetings.

I. Agency Reports: After each test, promptly submit electronic 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.

1.9 MANUFACTURERS' FIELD SERVICES AND REPORTS

A. When specified in individual specification Sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, and to initiate instructions when necessary.

B. Individuals to report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

C. Submit report within thirty (30) days of observation to the Engineer for review.

D. Refer to Section 01 33 00 - Submittal Procedures, "Manufacturer's Field Reports" Article.

1.10 BENCHMARKS AND CONTROL ELEVATIONS

A. Elevations for proposed work shall be set from bench marks established for this project.

B. Verify elevations of existing features against project benchmarks.

C. Notify Engineer of conflicts in elevations, which affect the proposed work.

END OF SECTION

SECTION 01 41 00

REGULATORY REQUIREMENTS

PART 1 GENERAL

1.1 APPLICABLE CODES

A. The Contractor shall comply with all Local, State and Federal laws, rules, ordinances and regulations relating to buildings, employment, the preservation of public health and safety, and so forth. All necessary permits or certificates of inspection shall be paid for and obtained by the Contractor.

1.2 APPLICABLE REGULATIONS

All applicable Local, State, and Federal laws, ordinances, rules and regulations are deemed to be included herein the same as though written in full. The Contractor shall comply with all authorities having jurisdiction over the work. The following list of regulations does not necessarily include all regulations, which may be applicable to site activities and off-site transportation, recycling, or disposal. All regulations listed shall be as amended.

A. Federal Regulations:
   1. Transport wastes in accordance with:
      a. All applicable U.S. Dept. of Transportation (DOT) rules and regulations (49 CFR).
      b. U.S. EPA rules and regulations, including 40 CFR Part 761 Toxic Substances Control Act (TSCA).
      c. United States Department of Labor (U.S. DOL) Occupational Safety and Health Standards (29 CFR 1910).
      d. U.S. DOT Container Specifications (49 CFR 178-179).
   2. Conduct all site work in accordance with the site-specific Health and Safety Plan (HASP) and applicable federal regulations, including U.S. DOL Occupational Safety and Health Standards (29 CFR 1910, 1926).
   3. Dispose of waste in accordance with all applicable federal regulations including, U.S. EPA 40 CFR Part 763 – Asbestos.

B. State Regulations:
   1. Public Act No. 154 of 1954, Occupational Safety and Health Act, as amended.
   2. Public Act No. 230 of 1972, Stille-Derossett-Hale Single State Construction Code Act.
   3. Public Act No. 299 of 1980, Occupational Code, as amended.
   4. Public Act No. 451 of 1994, Natural Resources and Environmental Protection Act (NREPA), as amended to include but not be limited to:
      a. Part 17 of Public Act No. 451 of 1994, Michigan Environmental Protection Act.
      b. Part 31 of Public Act No. 451 of 1994, Water Resources Protection.
      c. Part 55 of Public Act No. 451 of 1994, Air Pollution Control.

d. Part 91 of Public Act No. 451 of 1994, Soil Erosion and Sedimentation Control.
e. Part 115 of Public Act No. 451 of 1994, Solid Waste Management.
f. Part 201 of Public Act No. 451 of 1994, Environmental Response.
g. Part 301 of Public Act No.451, Inland Lakes and Streams.
h. Part 303 of Public ACT No. 451, Wetlands
i. Part 315 of Public Act No. 451, Dam Safety.

5. Disposal of dewatered sediment and treated water shall be in compliance with applicable State regulations. Contractor is responsible for acquiring any and all permits associated under Public Act No. 451.
6. Transportation, traffic control, etc. shall be in compliance with Standard Specifications for Construction, Michigan Department of Transportation, current edition.
7. Public Act No. 407 of 216, Skilled Trades Regulation Act
8. 2015 Michigan Building Code
9. 2015 Michigan Mechanical Code
10. 2018 Michigan Plumbing Code

C. Local Requirements:
1. Ascertain and comply with all applicable city, county, and municipal ordinances, codes, rules, and regulations, and obtain all required permits, including seasonal load limits that may be imposed to cover transportation on certain roads, and locally administered soil and erosion control.

D. Other Codes, Standards, and Guidance Documents:
1. In addition to regulatory requirements, the Contractor shall follow the codes, standards, and guidance documents cited in other sections of these Specifications such as, but not limited to, API Recommended Practices, EPA Guidance Documents, Michigan State Memos and Administrative Circulars, and ASTM Standards.
2. Other national codes, which the Contractor shall comply with for all site work that are not specifically cited in other Specification sections include:
a. Building Officials and Code Administrators (BOCA) - "Basic Building Code."
b. International Code Council (ICC) – International Building Code
c. Associated General Contractors of America (AGC) - "Manual of Accident Prevention in Construction."
d. National Electrical Code (NEC).

1.3 SPECIAL CONSIDERATIONS

A. Contractor shall be responsible for negotiations of any waivers or alternate arrangements required to enable transportation of materials to and from the site.

B. Maintain conditions of access road to site such that access is not hindered as the result of construction related deterioration.

C. Part of the Work is planned to be performed within the 100-year-floodplain. No soil or fill materials, with the exception of riprap or rockfill, may be stockpiled within the 100-year-floodplain for more than two weeks.

D. Coordinate all stockpile locations with the Owner and Engineer.

E. Contractor shall monitor weather forecasts, River Rasin stream flow gauges and water levels to protect site visitors, field personnel, equipment, supplies and Work area from high water and flooding conditions.

1.4 SUBMITTALS

A. Submit the following to the Engineer for review and approval no less than 21 calendar days prior to mobilization to the site:
   1. Environmental Management Plan (EMP). At a minimum, the EMP should address the following topics:
      a. Goal of Project Environmental Program
      b. Authority and Responsibilities
      c. Environmental Administration
      d. Agency Permits and Registrations
      e. Spill Prevention and Emergency Response
      f. Hazardous Material Management
      g. General Waste Management
      h. Hazardous Waste Management
      i. Equipment and Vehicles Maintenance
      j. Concrete Washout
      k. Storm Water Management, Dust Control, Litter and Construction Debris Control
      l. Air Quality Employee Awareness and Training
      m. Recordkeeping
   2. Spill Prevention Plan (SPP), which describes:
      a. Means to provide containment and storage facilities to prevent discharge of drill water, drill fluids, fuels, or oils onto the ground surface or into the reservoir.
      b. Means to clean up spills.
      c. Description of material handling and storage procedures.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

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. Temporary Utilities:

1. Temporary electricity.
2. Temporary lighting for construction purposes.
3. Temporary water service.
4. Temporary sanitary facilities.

C. Construction Facilities:

1. Field offices and sheds.
2. Parking.
3. Progress cleaning and waste removal.
4. Project identification.
5. Traffic regulation.
6. Fire-prevention facilities.

D. Temporary Controls:

1. Barriers and fencing.
2. Security.
3. Water control.
4. Dust control.
5. Noise control.
6. Erosion and sediment control.
7. Pollution control.

E. Removal of utilities, facilities, and controls.

1.2 TEMPORARY FACILITIES UNDER CONSTRUCTION MANAGEMENT AGREEMENT

A. Temporary Provisions Provided by Construction Manager:

1. Temporary barriers, barricades, covered walkways, fencing, exterior closures, and interior closures.
2. Temporary field offices.
3. Cleaning during construction.

4. Access roads and approaches.
5. Temporary sanitary facilities.
6. Temporary electrical service and distribution system for power and lighting.

B. Each Contractor: Coordinate provisions with Construction Manager and provide the following items as necessary for execution of the Work including associated costs:

1. Construction aids.
2. Temporary fire protection, dust control, erosion and sediment control, water control, noise control, and other necessary temporary controls.
3. Temporary barriers, barricades, and similar devices as necessary for safety and protection of construction personnel and public.
4. On Construction Manager's approval, may provide temporary field office including electrical service and temporary telephone.
5. Temporary tree and plant protection.
6. Electrical service required in addition to temporary service and distribution provided by Construction Manager.
7. Temporary provisions for protection of installed Work.

1.3 TEMPORARY ELECTRICITY

A. Provide and pay for power service required from DTE as needed for construction operation.

1.4 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

A. Provide and maintain lighting for construction operations.

1.5 TEMPORARY WATER SERVICE

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

1.6 TEMPORARY SANITARY FACILITIES

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

1.7 FIELD OFFICES AND SHEDS

A. Do not use permanent facilities for field offices or for storage.

B. Provide temporary facilities as needed for construction.

C. Removal: At completion of Work remove buildings, foundations, utility services, and debris. Restore areas to same or better condition as original condition.

1.8 PARKING

A. Maintenance:

1. Maintain traffic and parking areas in sound condition.

B. If Site space is not adequate, provide additional off-Site parking.

1.9 PROGRESS CLEANING AND WASTE REMOVAL

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

B. Collect and remove waste materials, debris, and rubbish from Site periodically and dispose of off-Site.

1.10 PROJECT IDENTIFICATION

A. Project Identification Sign:

1. One sign must be posted with the following content:
   a. Project title and name of Owner.
   b. Names and titles of authorities.
   c. Names and titles of Engineer and Consultants.
   d. Name of Prime Contractor and major Subcontractors.
   e. Other information as required by law.

B. Design sign and structure to withstand weathering, fading, and/or chipping for duration of construction.

C. Installation:

1. Install Project identification sign within 15 days after date established by Notice to Proceed.
2. Erect at location of high public visibility adjacent to main entrance to Site.

D. Maintenance: Maintain clean signs and supports; repair deterioration and damage.

E. Removal: Remove signs, framing, supports, and foundations at completion of Project and restore area.

1.11 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 Cones, Drums, Flares, and Lights: As approved by authorities having jurisdiction.
3. 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.

1.12 FIRE-PREVENTION FACILITIES

A. Designate area on Site where smoking is permitted. Provide approved ashtrays in designated smoking areas.

B. Establish fire watch for cutting, welding, and other hazardous operations capable of starting fires. Maintain fire watch before, during, and after hazardous operations until threat of fire does not exist.

C. Portable Fire Extinguishers: NFPA 10; 10-pound capacity, 4A-60B: C UL rating.
1. Provide minimum of one fire extinguisher in every construction trailer and storage shed.

1.13 BARRIERS AND FENCING

A. Furnish, install, and maintain as long as necessary and remove when no longer required adequate barriers, enclosures, warning signs, or lights at all dangerous locations throughout the Work for protection of property, workers, and the public. The Contractor shall remove such material when deemed no longer required. The Contractor shall hold the Owner harmless from damage or claims arising out of any injury or damage that may be sustained by any person or persons as a result of the Work under the Contract.

B. Temporary Fence: The Contractor may utilize temporary fencing to provide site security.
   1. Fencing shall be in compliance with all governing laws, regulations, codes and ordinances.
   2. Gates shall have minimum width of 20 feet to allow access for emergency vehicles. Gates must be capable of manual operation by one person.
   3. Installation of temporary fencing shall not deter or hinder access to existing fire hydrants.
   4. The fence shall be removed and grounds restored to original condition upon completion of the Work.
   5. Repair damage caused by installation of temporary fencing.

C. Tree and Plant Protection: Preserve and protect existing trees and plants designated to remain.

   1. Protect areas within drip lines from traffic, parking, storage, dumping, chemically injurious materials and liquids, ponding, and continuous running water.
   2. Provide high barriers around drip line, with access for maintenance.
   3. Replace trees and plants damaged by construction operations.

1.14 SECURITY

A. Security Program:

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

1.15 WATER CONTROL

A. Section 02 24 13 River Flow and Reservoir Water Level Management.

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

C. Protect Site from puddles or running water.

1.16 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.

1.17 NOISE CONTROL

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

1.18 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 owner and authorities having jurisdiction.

1.19 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, and materials before Final Application for Payment inspection.

B. Clean and repair damage caused by installation or use of temporary Work.

C. 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 55 26

TRAFFIC CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

B. Traffic Control.

C. Signs, Signals, and Devices.

D. Traffic Signs and Signals.

E. Construction Parking Control.

F. Regulators.

G. Lighting Devices.

H. Haul Routes.

I. Removal.

1.2 Related Sections:

A. Section 01 10 00 – Summary.

B. Section 01 30 00 – Administrative Requirements.

C. Section 01 50 00 – Temporary Facilities and Controls.

1.3 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Refer to Section 01 20 00- Price and Payment Procedures

1.4 TRAFFIC CONTROL

A. Comply with the rules and regulations of the County, City, Township, Village, or MDOT having jurisdiction over the road.

B. Provide, install, and maintain traffic control devices.

C. Control devices shall conform to the Michigan Manual of Uniform Traffic Control Devices Part 6 Construction and Maintenance, Quality Standards for Work Zone Traffic Control Devices published by the American Traffic Safety Services Association (ATSSA) and the current MDOT Standard Specifications for Highway Construction.

D. Maintain through traffic unless written permission to do otherwise is obtained from the authority having jurisdiction over the road.

E. Provide and maintain detour signs if allowed to close road.

F. Contractor shall submit the Traffic Control Plan no later than the pre-construction meeting.

1.5 SIGNS, SIGNALS, AND DEVICES

A. Traffic Control Signals: As approved by local jurisdictions.

B. Traffic Cones and Drums, and Lights: As approved by local jurisdictions.

C. Traffic Regulators (Flagman) Equipment: As approved by local jurisdictions.

D. Post Mounted and Wall Mounted Traffic Control and Informational Signs: Specified in paragraph 1.4 Traffic Control.

E. Automatic Traffic Control Signals: As approved by local jurisdictions.

1.6 TRAFFIC SIGNS AND SIGNALS

A. Install traffic control devices at approaches to Site and on Site, at crossroads, for detours, in parking areas, and elsewhere, as needed to direct construction and affected public traffic.

B. Install and operate traffic signals to direct and maintain orderly flow of traffic in areas under Contractor's control, and areas affected by Contractor's operations.

C. Relocate traffic control devices as Work progresses, to maintain effective traffic control.

1.7 CONSTRUCTION PARKING CONTROL

A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and Landowner's operations.

B. Monitor parking of construction personnel’s vehicles in existing facilities. Maintain vehicular access to and through parking areas.

C. Prevent parking on or adjacent to access roads or in non-designated areas.

D. Staging of equipment and storage of materials will not be allowed on business or residential parking areas without written permission form the landowner. See plans for a designated parking area.

1.8 REGULATORS (FLAGMEN)

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

1.9 LIGHTING DEVICES

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

1.10 HAUL ROUTES

A. Consult with authority having jurisdiction in establishing public thoroughfares to be used for haul routes and Site access.

B. Confine construction traffic to designated haul routes.

C. Provide traffic control devices and/or regulators at critical areas of haul routes to minimize interference with public traffic.

1.11 REMOVAL

A. Remove equipment and traffic control devices when no longer required.

B. Repair damage caused by installation.

C. Remove post settings to a depth of 1 foot.

END OF SECTION

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Products.

B. Product delivery requirements.

C. Product storage and handling requirements.

D. Product options

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 bonded 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. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit Request for Substitution for any manufacturer not named, according to Section 01 25 00 - Substitution Procedures.

D. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.

E. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

F. 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.

G. 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.

H. 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

2.1 EQUIPMENT ELECTRICAL CHARACTERISTICS AND COMPONENTS

A. Wiring Terminations: Furnish terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Include lugs for terminal box.

B. Cord and Plug: Furnish minimum 6-foot long cord and plug including grounding connector for connection to electric wiring system. Cord of longer length may be specified in individual Specification Sections.

PART 3 - EXECUTION - Not Used

END OF SECTION

SECTION 01 70 00

EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Examination.

B. Preparation.

C. Coordination of Owner's portion of the Work.

D. Field engineering.

E. Execution.

F. Cutting and patching.

G. Protecting installed construction.

H. Starting of systems.

I. Demonstration and instruction.

J. Testing, adjusting, and balancing.

K. Closeout procedures.

L. Project record documents.

M. Operation and maintenance data.

N. Manual for materials and finishes.

O. Manual for equipment and systems.

P. Spare parts and maintenance products.

Q. Product warranties and product bonds.

R. Maintenance service.

S. Final cleaning.

1.2 EXAMINATION

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

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

C. Examine and verify specific conditions described in individual Specification Sections.

D. Verify that utility services are available with correct characteristics and in correct locations.

1.3 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance according to manufacturer's instructions.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer-required or -recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

1.4 COORDINATION WITH OWNER

A. Site Access: Provide access to Project site for Owner's personnel.

1. Coordinate with owner for gate access.

2. Refer to Section 02 24 13 – River Flow and Reservoir Water Level Management for water management.
   a. The Contractor is responsible for maintaining the legal lake level during construction. If for any reason, the owner is found to be in violation due to the Contractor being found in non-compliance, the Contractor will be fully responsible for any fines and costs incurred by Owner, including legal defense.
   b. The Contractor acknowledges the Owner’s right to enter on to the project and operate the dam after notice to the Contractor allowing time for adjustments to be made by Contractor.

3. Refer to Section 01 10 00 - Summary for other requirements for Owner-furnished, Contractor-installed and Owner-furnished, and Owner-installed products.

1.5 FIELD ENGINEERING

A. Employ land surveyor registered at Project location in State of Michigan and acceptable to Engineer.

B. Owner will locate and Contractor shall Locate and protect survey controls and reference points. Promptly notify Architect/Engineer of discrepancies discovered.

C. Control datum for survey is established by Owner-provided survey indicated on Drawings.

D. Verify setbacks and easements; confirm Drawing dimensions and elevations.

E. Provide field engineering services. Establish elevations, lines, and levels using recognized engineering survey practices.

F. Submit copy of Site drawing and certificate signed by land surveyor certifying elevations and locations of the Work are in conformance with Contract Documents.

G. Maintain complete and accurate log of control and survey Work as Work progresses.

H. On completion of foundation walls and major Site improvements, prepare certified survey illustrating dimensions, locations, angles, and elevations of construction and Site Work.

I. Protect survey control points prior to starting Site Work; preserve permanent reference points during construction.

J. Promptly report to Engineer loss or destruction of reference point or relocation required because of changes in grades or other reasons.

K. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Engineer.

L. Final Property Survey: Prior to Substantial Completion, prepare final property survey illustrating locations, dimensions, angles, and elevations Site Work that have resulted from construction indicating their relationship to permanent benchmarks and property lines.

1. Show significant features (real property) for Project.
2. Include certification on survey, signed by surveyor, that principal metes, bounds, lines, levels, and elevations of Project are accurately shown.

1.6 EXECUTION

A. Comply with manufacturer's installation instructions, performing each step in sequence. Maintain one set of manufacturer's installation instructions at Project Site during installation and until completion of construction.

B. When manufacturer's installation instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

C. Verify that field measurements are as indicated on approved Shop Drawings or as instructed by manufacturer.

D. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1. Secure Work true to line and level and within specified tolerances, or if not specified, industry-recognized tolerances.

2. Physically separate products in place and provide electrical insulation or protective coatings to prevent galvanic action or corrosion between dissimilar metals.
3. Exposed Joints: Provide uniform joint width and arrange to obtain best visual effect. Refer questionable visual effect choices to Engineer for final decision.

E. Allow for expansion of materials and building movement.

F. Climatic Conditions and Project Status: Install each unit of Work under conditions to ensure best possible results in coordination with entire Project.

1. Isolate each unit of Work from incompatible Work as necessary to prevent deterioration.
2. Coordinate enclosure of Work with required inspections and tests to minimize necessity of uncovering Work for those purposes.

G. Mounting Heights: Where not indicated, mount individual units of Work at industry-recognized standard mounting heights for particular application indicated.

1. Refer questionable mounting height choices to Architect/Engineer for final decision.
2. Elements Identified as Handicap Accessible: Comply with applicable codes and regulations.

H. Adjust operating products and equipment to ensure smooth and unhindered operation.

I. Clean and perform maintenance on installed Work as frequently as necessary through remainder of construction period. Lubricate operable components as recommended by manufacturer.

1.7 CUTTING AND PATCHING

A. Employ skilled and experienced Installers to perform cutting and patching.

B. Submit written request in advance of cutting or altering elements affecting the following:

1. Structural integrity of element.
2. Integrity of weather-exposed or moisture-resistant elements.
3. Efficiency, maintenance, or safety of element.
4. Visual qualities of sight-exposed elements.
5. Work of Owner or separate Contractor.

C. Execute cutting, fitting, and patching, including excavation and fill. to complete Work and to accomplish the following:

1. Fit the several parts together, to integrate with other Work.
2. Uncover Work to install or correct ill-timed Work.
3. Remove and replace defective and nonconforming Work.
4. Remove samples of installed Work for testing.
5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.

D. Execute Work by methods to avoid damage to other Work and to provide proper surfaces to receive patching and finishing.

E. Cut masonry and concrete materials using masonry saw or core drill.

F. Restore Work with new products according to requirements of Contract Documents.

G. Fit Work tight to pipes, sleeves, ducts, conduits, and other penetrations through surfaces.

H. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.

I. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for assembly, refinish entire unit.

J. Identify the hazardous substances or conditions exposed during the Work to Engineer for decision or remedy.

1.8 PROTECTING INSTALLED CONSTRUCTION

A. Protect installed Work and provide special protection where specified in individual Specification Sections.

B. Provide temporary and removable protection for installed products. Control activity in immediate Work area to prevent damage.

C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

D. Use durable sheet materials to protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects.

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

F. Prohibit traffic from landscaped areas.

1.9 STARTING OF SYSTEMS

A. Coordinate schedule for startup of various equipment and systems.

B. Notify Engineer and Owner seven (7) days prior to startup of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

D. Verify that tests, meter readings, and electrical characteristics agree with those required by equipment or system manufacturer.

E. Verify that wiring and support components for equipment are complete and tested.

F. Execute startup under supervision of manufacturer's representative or Contractors' personnel according to manufacturer's instructions.

G. When specified in individual Specification Sections, require manufacturer to provide authorized representative who will be present at Site to inspect, check, and approve equipment or system installation prior to startup and will supervise placing equipment or system in operation.

H. Submit a written report in accordance with Section 01 33 00 - Submittal Procedures stating that equipment or system has been properly installed and is functioning correctly.

1.10 DEMONSTRATION AND INSTRUCTION

A. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of Substantial Completion final inspection.

B. Demonstrate Project equipment and instructed by qualified authorized manufacturer's representative who is knowledgeable about the Project.

C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

D. Use operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

E. Demonstrate startup, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.

F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

G. Allot the required instruction time for each item of equipment and system as specified in individual Specification Sections.

1.11 CLOSEOUT PROCEDURES

A. Prerequisites to Substantial Completion: Complete following items before requesting Certification of Substantial Completion, either for entire Work or for portions of Work:

1. Submit maintenance manuals, Project record documents, and other similar final record data in compliance with this Section.
2. Complete facility startup, testing, adjusting, balancing of systems and equipment, demonstrations, and instructions to Owner's operating and maintenance personnel as specified in compliance with this Section.
3. Conduct inspection to establish basis for request that Work is substantially complete. Create comprehensive list (initial punch list) indicating items to be completed or corrected, value of incomplete or nonconforming Work, reason for being incomplete, and date of anticipated completion for each item. Include copy of list with request for Certificate of Substantial Completion.
4. Obtain and submit releases enabling Owner's full, unrestricted use of Project and access to services and utilities. Include certificate of occupancy, operating certificates, and similar releases from authorities having jurisdiction and utility companies.
5. Deliver tools, spare parts, extra stocks of material, and similar physical items to Owner.

6. Make final change-over of locks eliminating construction master-key system and transmit keys directly to Owner. Advise Owner's personnel of change-over in security provisions.
7. Discontinue or change over and remove temporary facilities and services from Project Site, along with construction tools, mockups, and similar elements.
8. Perform final cleaning according to this Section.

B. Substantial Completion Inspection:

1. When Contractor considers Work to be substantially complete, submit to Engineer:

    a. Written certificate that Work, or designated portion, is substantially complete.
    b. List of items to be completed or corrected (initial punch list).

2. Within seven (7) days after receipt of request for Substantial Completion, Engineer will make inspection to determine whether Work or designated portion is substantially complete.
3. Should Engineer determine that Work is not substantially complete:

    a. Engineer will promptly notify Contractor in writing, stating reasons for its opinion.
    b. Contractor shall remedy deficiencies in Work and send second written request for Substantial Completion to Engineer.
    c. Engineer will reinspect Work.
    d. Redo and Inspection of Deficient Work: Repeated until Work passes Engineer's inspection.

4. When Engineer and Owner finds that Work is substantially complete, Engineer and Owner will:

    a. Prepare Certificate of Substantial Completion on AIA G704 - Certificate of Substantial Completion EJCDC C-625 - Certificate of Substantial Completion ConsensusDocs 280 - Certificate of Substantial Completion _____, accompanied by Contractor's list of items to be completed or corrected as verified and amended by Engineer and Owner (final punch list).
    b. Submit Certificate to Owner and Contractor for their written acceptance of responsibilities assigned to them in Certificate.

5. After Work is substantially complete, Contractor shall:

    a. Allow Owner occupancy of Project under provisions stated in Certificate of Substantial Completion.
    b. Complete Work listed for completion or correction within time period stipulated.

6. Owner will occupy all of the site as specified in Section 01 10 00 - Summary.

C. Prerequisites for Final Completion: Complete following items before requesting final acceptance and final payment.

1. When Contractor considers Work to be complete, submit written certification that:

    a. Contract Documents have been reviewed.

b. Work has been examined for compliance with Contract Documents.
c. Work has been completed according to Contract Documents.
d. Work is completed and ready for final inspection.

2. Submittals: Submit following:

a. Final punch list indicating all items have been completed or corrected.
b. Final payment request with final releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
c. Specified warranties, workmanship/maintenance bonds, maintenance agreements, and other similar documents.
d. Accounting statement for final changes to Contract Sum.

3. Perform final cleaning for Contractor-soiled areas according to this Section.

D. Final Completion Inspection:

1. Within seven (7) days after receipt of request for final inspection, Engineer will make inspection to determine whether Work or designated portion is complete.
2. Should Engineer consider Work to be incomplete or defective:

a. Engineer will promptly notify Contractor in writing, listing incomplete or defective Work.
b. Contractor shall remedy stated deficiencies and send second written request to Engineer that Work is complete.
c. Engineer will reinspect Work.
d. Redo and Inspection of Deficient Work: Repeated until Work passes Engineer's inspection.

1.12 PROJECT RECORD DOCUMENTS

A. Maintain on Site one set of the following record documents; record actual revisions to the Work:

1. Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other modifications to the Contract.
5. Reviewed Shop Drawings, product data, and Samples.
6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress, not less than weekly.

E. Specifications: Legibly mark and record, at each product Section, description of actual products installed, including the following:

1. Manufacturer's name and product model and number.
2. Product substitutions or alternates used.
3. Changes made by Addenda, bulletin, Change Order, and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction as follows:

1. Include Contract modifications such as Addenda, supplementary instructions, change directives, field orders, minor changes in the Work, and change orders.
2. Include locations of concealed elements of the Work.
3. Identify depth of buried utility lines and provide dimensions showing distances from permanent facility components that are parallel to utilities.
4. Dimension ends, corners, and junctions of buried utilities to permanent facility components using triangulation.
5. Identify and locate existing buried or concealed items encountered during Project.
6. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
7. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
8. Field changes of dimension and detail.
9. Details not on original Drawings.

G. Submit marked-up paper copy documents to Engineer before Substantial Completion with claim for final Application for Payment.

H. Submit PDF electronic files of marked-up documents to Engineer before Substantial Completion with claim for final Application for Payment.

1.13 OPERATION AND MAINTENANCE DATA

A. Submit in PDF composite electronic indexed file.

B. Contents: Prepare table of contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:

1. Part 1: Directory, listing names, addresses, and telephone numbers of Engineer, Contractor, Subcontractors, and major equipment suppliers.
2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by Specification Section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Include the following:

a. Significant design criteria.
b. List of equipment.
c. Parts list for each component.
d. Operating instructions.
e. Maintenance instructions for equipment and systems.
f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.

g. Safety precautions to be taken when operating and maintaining or working near equipment.

3. Part 3: Project documents and certificates, including the following:

a. Shop Drawings and product data.
b. Certificates.
c. Photocopies of warranties and bonds.

1.14 MANUAL FOR MATERIALS AND FINISHES

A. Submit digital copy of preliminary draft or proposed formats and outlines of contents before start of Work. Engineer will review draft and return copy with comments.

B. For equipment or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.

C. Submit one PDF copy of completed volumes before Substantial Completion 15 days prior to final inspection. Completed volumes, with Engineer comments, will be returned after Substantial Completion final inspection. Revise content of document sets as required prior to final submission.

D. Submit in PDF form composite electronic indexed file of final volumes within 10 days after final inspection.

E. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Include information for re-ordering custom-manufactured products.

F. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

G. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Include recommendations for inspections, maintenance, and repair.

H. Additional Requirements: As specified in individual product Specification Sections.

I. Include listing in table of contents for design data, with tabbed fly sheet and space for insertion of data.

1.15 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Submit digital copies of preliminary draft or proposed formats and outlines of contents before start of Work. Engineer will review draft and return one copy with comments.

B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.

C. Submit one copy of completed volumes before Substantial Completion 15 days prior to final inspection. Completed volumes, with Engineer comments, will be returned after Substantial Completion final inspection. Revise content of document sets as required prior to final submission.

D. Submit two sets of revised final volumes within ten days after final inspection.

E. Submit in PDF composite electronic indexed file of final volumes within ten days after final inspection.

F. Equipment and Systems: Include description of unit or system and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and model number of replaceable parts.

G. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed by label machine.

H. Include color-coded wiring diagrams as installed.

I. Operating Procedures: Include startup, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shutdown, and emergency instructions. Include summer, winter, and special operating instructions.

J. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

K. Include servicing and lubrication schedule and list of lubricants required.

L. Include manufacturer's printed operation and maintenance instructions.

M. Include sequence of operation by controls manufacturer.

N. Include original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

O. Include control diagrams by controls manufacturer as installed.

P. Include Contractor's coordination drawings indicating installed color-coded piping diagrams.

Q. Include charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

R. Include list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

S. Include test and balancing reports as specified in Section 01 40 00 - Quality Requirements.

T. Additional Requirements: As specified in individual product Specification Sections.

U. Include listing in table of contents for design data with tabbed dividers and space for insertion of data.

1.16 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Furnish spare parts, maintenance, and extra products in quantities specified in individual Specification Sections.

B. Deliver to Project Site and place in location as directed by Owner; obtain receipt prior to final payment.

1.17 PRODUCT WARRANTIES AND PRODUCT BONDS

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

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

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

D. Co-execute submittals when required.

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

F. Submit prior to final Application for Payment.

G. Time of Submittals:

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

1.18 MAINTENANCE SERVICE

A. Furnish service and maintenance of components indicated in Specification Sections for one year from date of Substantial Completion during warranty period.

B. Examine system components at frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

C. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by manufacturer of original component.

D. Do not assign or transfer maintenance service to agent or Subcontractor without prior written consent of Owner.

1.19 FINAL CLEANING

A. Clean Site; sweep paved areas, rake clean landscaped surfaces.

B. Remove waste and surplus materials, rubbish, and construction facilities from Site.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

SECTION 02 24 13

RIVER FLOW AND RESERVOIR WATER LEVEL MANAGEMENT

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Provide all layout, products, materials, equipment, tools, services, transportation, supervision, and labor to maintain river flow and legal lake level for the Work as shown on the design drawings.

1.2 INTENT OF THE WORK

A. The proposed work will occur in the auxiliary spillway which maintains river flows and is influenced by reservoir elevations and inflows. Temporary cofferdams will be required on the upstream and downstream sides of the auxiliary spillway to facilitate the proposed construction in dry conditions.

B. Temporary cofferdams will need to be carefully sequenced to maintain river flow in each river channel.

C. The temporary cofferdams shall be removed from the spillway at the end of the Work.

1.3 RELATED WORK

A. Section 31 41 16 - Steel Sheet Pile

1.4 UNIT PRICES

A. Refer to Section 01 20 00- Price and Payment Procedures

1.5 PERFORMANCES

A. The Contractor shall use appropriate means and methods for the flow management of the Rasin River to allow for the installation of erosion and sediment control BMPs, upstream and downstream cofferdams, and temporary water controls.

B. The flow management system and temporary cofferdams shall be capable of conveying the daily flow of the River Rasin plus sufficient volume to protect the Work areas. The minimum design flood elevations and minimum flow requirements are shown on the drawings.

C. Dewater the work side of the cofferdams and maintain this condition for the extent of the Work. Unwatering due to rainfall or groundwater intrusion shall be considered incidental to the Work.

D. Provide and implement the appropriate measures to protect flow management system(s) from freezing temperatures.

E. Provide and implement the appropriate measures to protect flow management system(s) from clogging or damage by debris and sediment.

F. Operation, monitoring, and maintenance of the flow management system(s) shall be performed by the Contractor to prevent delays.

1.6 SUBMITTALS

A. Not less than three (3) weeks prior to the scheduled installation of the temporary cofferdams, the Contractor shall submit its proposed method of installing and maintaining the temporary cofferdams, and emergency procedures, to the Engineer for review. The submittal shall include as a minimum the following items:

1. River Flow and Reservoir Water Level Management Plan. The plan shall include specifics relative to the Contractor's proposed sequence of installation, sealing, maintenance, and supervision of the temporary cofferdams. Maintenance and supervision requirements during non-working hours (i.e., nights, holidays, and weekends) should be addressed. The work plan should also provide a detailed description of the sequence of the installation of the upstream, downstream, and cofferdams.
2. Temporary Cofferdam Design: Provide a cofferdam design including:
    a. Proposed construction sequence.
    b. Drawings showing plan, elevations, sections, details with callout to specific materials, products and anchorages.
    c. Description of stages of construction within each design section. These shall include excavations, lateral support installation, backfilling inside or outside of the SSP wall.
    d. Derivation of strength parameters used in the evaluation. Include loading diagrams for each design section at each evaluation stage.
    e. Calculations demonstrating the SSP performance at each construction stage considering both structural and geotechnical failure modes.
    f. Where lateral support is required, submit design drawings and calculations demonstrating the design and support components (rakers, walers, struts, bearing plates, etc.) will meet the design requirements of these specifications.
    g. Plan to monitor wall deflections through beginning and end of construction to demonstrate the maximum allowable movement is not exceeded during construction.
    h. Design drawings and calculations must be prepared and stamped by a Professional Engineer licensed in the State of Michigan.
3. All materials to be used for the work of this section.
4. Installer and Supervisor qualifications. These individuals shall each have documented experience on at least five installations of similar temporary cofferdams under similar conditions in ponds, lakes, or reservoirs. Shop drawings showing the layout in plan of the temporary cofferdam installations shall be provided.
5. Proposed method of initial lowering of water inside temporary cofferdams along with siltation control measures for any water that is discharged into the river.
6. Flood Contingency Plan for prevention or control of potential flooding of the work area during storm events. The Flood Contingency Plan should address, but not be limited to:

a. Maximum River level under which the temporary cofferdams may be used, Emergency signaling procedures, including 24-hour emergency contact information for Contractor's staff responsible to implement emergency measures,
b. Health and safety plan,
c. Emergency breaching and controlled flooding procedures,
d. Leakage/seepage/sand boil control measures, and
e. Placement of temporary "Super Sack" and sandbag barrier for emergency situations,
f. Quantity and stockpile location of materials to be used to construct emergency measures.

1.7 TEMPORARY COFFERDAMS

A. The Contractor shall develop temporary cofferdam designs using the following performance criteria:
1. Upstream and Downstream cofferdam for use in the river upstream of the spillway to the minimum elevation.
2. Size system components based on anticipated water depth (hydraulic loading).
3. Size system components to accommodate river levels coincident with the top of the system (flood level with two feet of wave runup).
4. Cofferdam is subject to dynamic hydraulic loads due to the staged construction, which includes operation of the existing dam. Dynamic loads to be included in the design of the cofferdam.
5. Stoppage of flows during the construction work will not be permitted. The Legal Lake Level is required to be maintained at all times.
6. The Contractor is responsible for the stability and water tightness of the cofferdams under all loading conditions.

B. The contract drawings provide a schematic of the proposed construction sequence and staging and shall not be used by the Contractor in any manner for the design of the cofferdams. Cofferdams must be within the work area and limits of construction.

PART 2 - MATERIALS

2.1 STEEL SHEET PILE

A. Refer to Section 31 41 16 - Steel Sheet Pile

2.2 "SUPER SACKS" AND SANDBAG BARRIERS

A. "Super Sacks" and sandbags shall be woven high strength 10mm polypropylene, with a minimum unit weight of four ounces per square yard, a Mullen burst strength exceeding 300 psi in conformance with ASTM D3786, and a minimum ultraviolet stability of 70% at 1000 hours in conformance with the requirements of ASTM designation D4355. Burlap sandbags shall not be allowed.

B. Individual "Super Sacks" which (when filled) measure approximately 3-feet-square by 40- inches high with top closure (30 cft "Super Sacks").

C. Individual sandbags (filled) shall have a minimum length of 18 inches, minimum width of 12 inches and minimum thickness of 3 inches.

D. “Super Sacks” and sandbags shall be free of rips or tears which would lead to a loss of sand into the River and bag openings shall be tied to prevent the same.

E. “Super Sacks” shall be filled with sand (MDOT Class II granular material Section 902, Table 902-3) with a placed moist unit weight of at least 125 lb/cft (minimum weigh of filled Super Sack is 3.75 kips)

F. All materials used in the construction of the Super Sack or sandbag barrier shall be clean and free of substances or materials which might lead to contamination of the River, wetlands, or other water courses. Fill material shall meet the material properties MDOT Class II Granular Material (Section 902, Table 902-3).

G. Loose soil material will NOT be an acceptable material for the construction of cofferdams or diversion barriers or to fill voids between “Super Sacks”.

2.3 PUMPS, HOSES, SIPHONS

A. Pumps, hoses, or siphons used at the site shall be sized appropriately and shall be maintained in good working order by the Contractor.

B. Pumps shall be sized appropriately by the Contractor and shall operate in a manner which does not create a nuisance to abutters (i.e. quietly and without significant exhaust).

C. Secondary containment shall be provided as stipulated in permits for gasoline or diesel-powered pumping equipment. Fueling procedures shall be as per permit conditions.

D. All piping, conveyance, equipment and materials necessary for the operation and maintenance of flow management system(s) shall be selected and provided by the Contractor to complete the Work. All proposed equipment and materials shall be provided in the Water Management Plan as described above.

PART 3 - EXECUTION

3.2 GENERAL

A. The Contractor shall be responsible for maintaining a safe, clean and accessible work site at all times. The Contractor shall have full responsibility for the complete and proper diversion of water from the work site at all stages of the project. The Contractor shall, at no additional cost to the Owner, repair any damage to any equipment, material or work caused by seepage, flood, overtopping, or other failure of the temporary cofferdam system.

B. The Contractor shall take all reasonable and prudent precautions during construction to provide and maintain the temporary cofferdams and other related equipment. The temporary cofferdams shall be maintained and supervised by the Contractor's personnel qualified to do such work.

C. All OSHA requirements, and all applicable local environmental requirements shall be satisfied.

D. In the case of overtopping of the cofferdam by waves, settlement or high waters, provide for controlled flooding of the work area.

E. Temporary cofferdam components which settle, tilt or move laterally shall be righted, reset or enlarged as necessary at no additional expense to the Owner.

F. The Contractor shall take all such precautions necessary to protect the site and the Works of this Contract, either completed or incomplete, from flood waters and flows which would either damage the Work or the site or cause delay of the Work.

G. The Contractor shall remove any debris from the river that is lodged against the sides of the cofferdam.

3.3 INSTALLATION REQUIREMENTS

A. The Contractor shall make their own evaluation of condition of the cofferdam, and the cofferdam placement site conditions, particularly the reservoir bottom and contours along the length of the cofferdam. Other temporary cofferdam structures (working platform) may be presented by the Contractor for review and approval of the Owner and Engineer.

B. In the event of anticipated flooding, the Contractor shall remove all equipment, erosion-susceptible material items or materials subject to damage from water, and items or materials that could adversely impact water quality from areas liable to be inundated or otherwise impacted by flooding. The Contractor shall secure the site and make all efforts to protect completed and incomplete work.

C. This design does not consider ice loading on the cofferdam. The Contractor shall prevent debris and ice from impacting the sides of the cofferdam.

1. In the event the cofferdams are expected to be in place when ice will be present, the Contractor shall provide and operate an active system (with appropriate backup) to prevent ice formation against the cofferdams (e.g. bubblers, etc.).

3.4 EQUIPMENT INSTALLATION, INITIAL TESTING, AND OPERATION

A. The Contractor shall install and construct flow management system(s) according to the approved River Flow and Reservoir Water Level Water Management Plan.

B. Any defective parts or equipment shall be replaced, and system leaks inspected and documented by the Contractor prior to operation of the system(s).

C. The Contractor shall perform system startup, monitoring and operation, as appropriate, to ensure the effectiveness of the system(s).

3.5 EMERGENCY CONDITIONS

A. The Contractor shall be responsible for protection of work in the event of an actual or potential emergency situation, including but not limited to an actual or potential failure of the temporary cofferdam and shall submit an emergency plan for approval as a part of the Contractor's Flood Contingency Plan described above. The contingency plan may include the Contractor placing "Super Sacks" within the temporary cofferdam to help protect the work during an emergency or potential failure of the temporary cofferdam. The Contractor must maintain the required Materials onsite to construct the approved emergency measures throughout the entire time the upstream temporary cofferdam is in place. This work shall be considered incidental to the temporary water control work item and will not be paid for as part of the temporary cofferdam.

END OF SECTION

SECTION 03 31 00

STRUCTURAL CONCRETE

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Providing all labor, materials, equipment, tools, and services necessary to furnish and install all structural concrete as shown on the Drawings or specified herein; including, but not limited to, the following items:
   1. Auxiliary Spillway Slabs
   2. Auxiliary Spillway Walls
   3. Concrete Repair
   4. Existing retaining wall tie-back concrete

1.2 REFERENCES

A. The following is a list of standards that may be referenced in this Section:
   1. Michigan DOT:
      a. Standard Specification for Construction (latest edition).
   2. American Concrete Institute:
      a. ACI 201 - Mass Concrete
      b. ACI 301- Specifications for Concrete Construction
      c. ACI 304.2R - Placing Concrete by Pumping Methods
      d. ACI 305R - Guide to Hot Weather Concreting
      e. ACI 306.1 - Cold Weather Concreting
      f. ACI 308 - Standard Practice for Curing Concrete
      g. ACI 315 - Details and Detailing of Concrete Reinforcement
      h. ACI 318 - Building Code Requirements for Reinforced Concrete
      i. ACI 347 - Guide to Formwork for Concrete
      j. ACI 117 - Standard Tolerance for Concrete Construction and Materials
      k. ACI 350 – Code Requirements for Environmental Engineering Concrete Structures
   3. ASTM International:
      a. ASTM A82 - Steel Wire, Plain, for Concrete Reinforcement
      b. ASTM A185 - Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
      c. ASTM A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
      d. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field
      e. ASTM C33 - Concrete Aggregates
      f. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
      g. ASTM C94 - Ready-Mixed Concrete

h. ASTM C114 - Standard Test Methods for Chemical Analysis of Hydraulic Cement
i. ASTM C143 - Standard Test Method for Slump of Hydraulic Cement Concrete
j. ASTM C150 - Portland Cement (PC)
k. ASTM C156 – Standard Test Method for Water Retention by Concrete Curing Materials
l. ASTM C260 – Air Entraining Admixtures for Concrete
m. ASTM C309 – Liquid Membrane-Forming Compounds for Curing Concrete
n. ASTM C494 – Chemical Admixtures for Concrete
o. ASTM C595 – Standard Specifications for Blended Hydraulic Cements (PLC– Portland Limestone Cement)
p. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
q. ASTM C989 - Standard Specification for Slag Cement for Use in Concrete and Mortars
r. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
s. ASTM C1602 - Standard Specification for Mixing Water Used in Production of Hydraulic Cement Concrete
t. ASTM C1611 – Standard Test Method for Slump Flow of Self-Consolidating Concrete
u. ASTM D 2103: Polyethylene Film and Sheeting

4. American Welding Society:
   a. AWS D1.4 - Structural Welding Code - Reinforcing Steel
5. U.S. Army Corps of Engineers Specifications (USACE):
   a. CRD C572 PVC Waterstop
   b. EM 1110-2-2104 – Strength Design for Reinforced Concrete Hydraulic Structures
   c. INP-SL-1 – Assessment of Underwater Concrete Technologies for in-Wet Construction of Navigation Structures
6. Other:
   a. U.S. Product Standard PS 20 - American Softwood Lumber Standard

1.3 UNIT PRICES

A. Refer to Section 01 20 00- Price and Payment Procedures

1.4 SUBMITTALS

A. Furnish submittals following procedures specified in applicable sections of the Contract Documents.

B. Shop Drawings:
   1. Indicate bar sizes, spacings, locations, splice locations, and quantities of reinforcing steel and welded wire fabric.
   2. Indicate bending and cutting schedules.

3. Indicate supporting and spacing devices.

C. Mix Designs: Prior to beginning the work, submit concrete mix designs, which shall show the proportions and gradations of materials proposed for each class and type of concrete as well as historical performance data showing that the mix designs will meet the requirements of these Specifications. When a water-reducing admixture is to be used, the Contractor shall furnish mix designs for concrete both with and without the admixture.

D. Delivery Tickets: Where ready-mix concrete is used, the Contractor shall furnish certified delivery tickets at the time of delivery of each load of concrete. Each ticket shall show the state-certified equipment used for measuring, and the total quantities, by weight, of cement, sand, each class of aggregate, admixtures, the amounts of water in the aggregate, and added at the batching plant. If water is added at the Site, that shall be included on the ticket. In addition, each certificate shall state the mix number, total yield in cubic yards, and the time of day to the nearest minute, corresponding to the time when the batch was dispatched, when it left the plant, when it arrived at the Site, when unloading began, and when unloading was finished.

E. Concrete Curing:
1. Manufacturer's Product Data and installation instructions.

1.5 QUALITY CONTROL

A. Perform Work in accordance with ACI 301.

B. Conform to ACI 305R when concreting during hot weather.

C. Conform to ACI 306.1 when concreting during cold weather.

D. Acquire cement and aggregate from one source for Work.

E. Perform Work in accordance with State of Michigan Department of Transportation Standard Specifications for Construction.

F. Maintain one copy of each standard affecting Work of this Section on site.

PART 2 – PRODUCTS

2.1 FORM AND FALSEWORK MATERIALS

A. Except as otherwise expressly accepted by the Owner, lumber brought on the Site for use as forms, shoring, or bracing shall be new material.

B. Materials for concrete forms, formwork, and falsework shall conform to the following requirements:
1. Lumber shall be local softwoods (spruce, hemlock, larch, fir or white pine), minimum Construction Grade or better, in conformance with U.S. Product Standard PS 20 - American Softwood Lumber Standard.

2. Form materials shall be metal, wood, plywood, or other material that will not adversely affect the concrete and will facilitate placement of concrete to the shape, form, line, and grade required.
3. Metal form panels shall be of commercial manufacture and in new or like-new condition. Form edges shall align and butt tightly together. Forms shall be clean and free of rust, pits, dents, holes, bends, and other damage.
4. Wood form panels shall be High-Density Overlay (HDO) plywood, specifically rated for use as concrete forms, and in new or like-new condition. Form edges shall align and butt tightly together. Forms shall be clean and free of splinters, tears, cuts, holes, bends, and other damage.

2.2 FORM TIES

A. Form ties shall be provided with a plastic cone or other suitable means for forming a conical hole to ensure that the form tie may be broken off back of the face of the concrete. The maximum diameter of removable cones for rod ties or other removable form-tie fasteners having a circular cross-section shall not exceed 1-1/2 inches; and such fasteners shall be such as to leave holes of regular shape for reaming.

B. Removable taper ties may be used when approved by the Owner.

C. Form ties and accessories shall not reduce the minimum effective cover of the reinforcing steel.

2.3 REINFORCING STEEL

A. General: Reinforcing steel for cast-in-place reinforced concrete construction shall conform to the following requirements:
1. Bar reinforcement shall be uncoated and conform to the requirements of ASTM A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement, for Grade 60 Billet Steel Reinforcement, unless otherwise indicated.
2. Welded wire reinforcement shall conform to the requirements of STM 185 - Steel Welded Wire Fabric, Plain, for Concrete Reinforcement, and the details indicated. Welded wire reinforcement shall be furnished in flat sheets only.
3. Spiral reinforcement shall be cold-drawn steel wire conforming to the requirements of ASTM A82 - Steel Wire, Plain, for Concrete Reinforcement.

B. Accessories:
1. Accessories shall include necessary chairs, slab bolsters, concrete blocks, tie wires, dips, supports, spacers, and other devices to position reinforcement during concrete placement. Bar supports shall meet the requirements of the CRSI Manual of Standard Practice including special requirements for supporting epoxy coated reinforcing bars. Wire bar supports shall be CRSI Class 1 for maximum protection with a 1/8-inch minimum thickness of plastic coating which extends at least 1/2-inch from the concrete surface. Plastic shall be gray in color.
2. Concrete blocks (dobies) used to support and position reinforcement steel shall have the same or higher compressive strength than required for the concrete in which they are located. Where concrete blocks are used on concrete surfaces exposed to view, the color and texture of the concrete blocks shall match that

required for the finished surface. Wire ties shall be embedded in concrete block bar supports.

3. No aluminum components or accessories will be accepted or entombed in concrete.

2.4 CONCRETE MATERIALS

A. Materials shall be delivered, stored, and handled to prevent damage by water or breakage. Only one brand of cement shall be used. Cement reclaimed from cleaning bags or leaking containers shall not be used. Cement shall be used in the sequence of receipt of shipments.

B. Materials for the Work shall comply with the requirements of Sections 201, 203, and 204 of ACI 301- Structural Concrete for Buildings, as applicable.

C. Storage of materials shall conform to the requirements of Section 205 of ACI 301.

1. Materials for concrete shall conform to the following MDOT requirements: Cement shall be Portland Cement (PC) conforming to ASTM C150 - Portland Cement, Type I/II, Type II, or a Portland Limestone Cement (PLC) conforming to ASTM C595 – Standard Specifications for Blended Hydraulic Cements (PLC – Portland Limestone Cement) Type 1L.
2. Where Portland Cement or Portland Limestone Cement plus a pozzolan is used the pozzolan shall not constitute more than 20% by weight of the total cementitious materials, unless otherwise specified. Pozzolan shall meet the requirements of ASTM C618 for Class N or F with the following additional requirements:
    a. The maximum percentage of sulfur trioxide shall be 4.0 percent for Class F.
    b. The maximum percentage loss on ignition shall be 8.0 percent for Class N and 2.5 percent for Class F.
    c. The pozzolanic activity index with lime shall be determined using 2-inch cubes and the minimum strength at seven (7) days shall be 900 pounds per square inch.
    d. Unless the Contractor selects aggregates that are not potentially alkali-reactive, pozzolan shall be tested for reduction of mortar expansion at fourteen (14) days as specified for Class N pozzolan under the optional physical requirements in Table 2A of ANSI/ASTM C618. However, the cement used in the test shall be low alkali. For the pozzolan to be acceptable, it shall result in an expansion reduction of zero percent or greater when compared to the control test.
3. Pozzolan shall not decrease the sulfate resistance of concrete. Before a Class N pozzolan is used, it shall be shown by test and experience not to detract from the sulfate resistance. Before a Class F pozzolan is used, it shall be shown to have an "R" factor of less than 2.5, determined in accordance with ASTM C114. Granulated blast furnace slag shall conform with ASTM C989 Grade 100 and contain less than 0.1% by weight free carbon or steel slag.
4. Water shall be potable, clean, and free from objectionable quantities of silty organic matter, alkali, salts, and other impurities. The water shall be considered potable, for the purposes of this Section only, if it meets local drinking water standards. Agricultural water with high total dissolved solids (over 1000 mg/l TDS) shall not be used.

5. Aggregates shall be obtained from pits acceptable to the Owner, shall be non-reactive, and shall conform to ASTM C33, and meet the durability requirements of the MDOT. Lightweight sand for fine aggregate will not be permitted. Sand shall not exceed 40% of the total aggregates.
   a. Maximum size of coarse aggregate shall be ¾ inch.
6. Ready-mixed concrete shall conform to the requirements of ASTM C94 – Ready-Mixed Concrete.
7. Air-entraining agent meeting the requirements of ASTM C260 - Air Entraining Admixtures for Concrete shall be used. Sufficient air-entraining agent shall be used to provide the specified air content. The Owner reserves the right, at any time, to sample and test the air-entraining agent. The air-entraining agent shall be added to
   the batch as specified by the manufacturer. Air content shall be tested at the point of placement. Air entraining agents shall be Micro-Air by Master Builders, Daravair by Grace Construction Products, Sika AEA-15 by Sika Corporation, or equal.
8. Admixtures: The Contractor may propose the addition of admixtures to control the set, affect water reduction, and increase workability. The use of an admixture shall be subject to acceptance by the Owner. In any case, the addition of an admixture shall be at the Contractor's expense. Concrete containing an admixture shall be first placed at a location determined by the Owner, in a test pour if so directed; such a test pour shall be at the Contractor's expense. If the use of an admixture is producing an inferior result, the Contractor shall discontinue use of the admixture. Admixtures shall conform to the requirements of ASTM C494 - Chemical Admixtures for Concrete. The required quantity of cement shall be used in the mix regardless of whether an admixture is used. Admixtures shall contain no free chloride ions, shall be non-toxic after 30 days, and shall be compatible with and made by the same manufacturer as the air entraining admixture.
   a. All chemical admixtures shall be from the same manufacturer.
   b. Concrete shall not contain more than one water-reducing admixture.
   c. Set controlling admixture may be either with or without water-reducing properties. Where the air temperature at the time of placement is expected to be consistently over 80 degrees F, a set retarding admixture such as Sika Corporation Plastocrete 161MR, Master Builder Pozzolith, Daratard 17 by Grace Construction Products, EUCON Retarder 100 by Euclid, or equal shall be used. Where the air temperature at the time of placement is expected to be consistently under 40 degrees, a set accelerating admixture such as Sika Corporation Plastocrete 161 FL, Polarset by Grace Construction Products, or equal shall be used.
   d. Normal range water reducer shall conform to ASTM C494, Type A. It shall be WRDA 79 by Grace Construction Products, Plastocrete 161 by Sika Corporation, EUCON 37 by Euclid Chemical, or equal. The quantity of admixture used, and the method of mixing shall be in accordance with the manufacturer's instructions and recommendations.
   e. Anti-Washout admixture such as MasterMatrix UW 450 by Master Builder, EUCON AWA by Euclid Chemical or equal.
9. Calcium Chloride: Calcium chloride will not be permitted in concrete.
10. Alumina: Alumina will not be permitted in concrete.

2.5 CURING COMPOUNDS AND MATERIALS

A. Compounds for curing concrete shall conform to the following requirements and ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete. Curing compounds must be from the same manufacture as the concrete admixtures. Curing compounds shall either be approved for potable water use per NSF 61 or removed after curing.

1. Curing compounds shall be white-pigmented and resin-based. Sodium silicate compounds shall not be allowed. Concrete curing compound shall be Kurez VOX White Pigmented by Euclid Chemical Company, Cure R-2 by L&M Construction Chemicals, 1200-White by W.R. Meadows, or equal. When curing, compound must be removed for finishes or grouting, curing compounds shall be Kurez DR VOX by Euclid Chemical Company, L&M Cure R by L&M Construction Chemicals, 1100- Clear by WR Meadows, or equal. Curing compounds shall meet local VOC requirements.

B. Materials for curing concrete shall be:

1. Saturated burlap blankets with drip lines.
2. Polyethylene sheet for use as concrete curing blanket shall be white and shall have a nominal thickness of 6 mils. The loss of moisture when determined in accordance with the requirements of ASTM C156 - Standard Test Method for Water Retention by Concrete Curing Materials, shall not exceed 0.055 grams per square centimeter of surface.

2.6 MISCELLANEOUS MATERIALS

A. Epoxy grout for grouting reinforcing bars shall be HIT-RE 500V3 two-component adhesive or approved equal. Adhesive shall be rated for use with deformed rebar in cracked and uncracked concrete under wet or dry installation and service conditions.

B. Joint filler: Conforming to ASTM D 1752; pre-molded sponge rubber fully compressible with recovery rate of minimum 95 percent.

C. Joint sealant: Polyurethane-based elastomeric sealant - Sikaflex -2c NS by Sika Corporation or approved equal. Form Release Agent: Provide a Form Release Agent product that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces. Provide form release agent that does not contain diesel fuel, petroleum- based lubricating oils, waxes, or kerosene.

2.7 CONCRETE MIX DESIGN REQUIREMENTS

A. General:

1. Concrete shall be composed of cement, admixtures, aggregates, and water of the qualities indicated. In general, the mix shall be designed to produce a concrete capable of being deposited to obtain maximum density and minimum shrinkage, and where deposited in forms, to have good consolidation properties and maximum smoothness of surface. The proportions shall be changed whenever necessary or desirable to meet the required results at no additional cost to the Owner. Mix changes shall be subject to review by the Owner.

2. The Contractor is cautioned that the limiting parameters below are NOT a mix design. Admixtures may be required to achieve workability required by the Contractor's construction methods and aggregates. The Contractor is responsible for providing concrete with the required workability.

B. Standard Classes of Concrete:

1. Structural Concrete (MDOT 4500HP): Proportion normal weight concrete as follows:
   a. Minimum Compressive Strength: 4,500 psi at 28 days.
   b. Maximum Water-Cementitious Materials Ratio: 0.45.
   c. Slump Limits: 4 to 8 inches according to ASTM C143 - Standard Test Method for Slump of Hydraulic Cement concrete. At no time shall water be added to concrete mix on-site. If higher slump is required a water reducing agent shall be added by the concrete supplier.
   d. Air Content: 6%, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.
   e. The temperature of concrete upon delivery from the truck shall not exceed 75°F.

2.8 MEASUREMENT OF MATERIALS

A. The amount of cement and of each separate size of aggregate entering into each batch of concrete shall be determined by direct weighing equipment furnished by the Contractor and acceptable to the Owner; provided that, where batches are so proportioned as to contain an integral number of conventional sacks of cement and the cement is delivered at the mixer in the original unbroken sacks, the weight of the cement contained in each sack may be taken without weighing as 94 pounds.

B. The quantity of water entering the mixer shall be measured by a suitable water meter or other measuring device of a type acceptable to the Owner and capable of measuring the water in variable amounts within a tolerance of one percent.

2.9 READY-MIXED CONCRETE

A. At the Contractor's option, ready-mixed concrete may be used if it meets the requirements as to materials, batching, mixing, transporting, placing, the supplementary requirements as required herein, and is in accordance with ASTM C94 – Ready-Mixed Concrete.

B. Ready-mixed concrete shall be delivered to the Work, and discharge shall be completed within 90 minutes after the addition of water to the cement and aggregates or before the drum has been revolved 250 revolutions, whichever comes first.

C. Truck mixers shall be equipped with electrically-actuated counters by which the number of revolutions of the drum or blades may be readily verified. The counter shall be of the resettable, recording type, and shall be mounted in the driver's cab. The counter shall be actuated at the time of starting the mixer at mixing speed. Materials including mixing water shall be in the mixer drum before actuating the revolution counter for determining the number of revolutions of mixing.

D. Each batch of ready-mixed concrete delivered to the Work shall be accompanied by a delivery ticket furnished to the Owner.

E. The use of non-agitating equipment for transporting ready-mixed concrete will not be permitted. Combination truck and trailer equipment for transporting ready-mixed concrete will not be permitted.

F. The quality and quantity of materials used in ready-mixed concrete and in batch aggregates shall be subject to continuous inspection at the batching plant by the Owner.

2.10 CEMENTITIOUS MORTAR

A. Manufacturers:

1. CGM, Incorporated.
2. ChemMasters, Inc.
3. Dayton Superior.
4. Euclid Chemical Company (The); an RPM company.
5. Fox Industries, Inc.
6. Kaufman Products, Inc.
7. Master Builders Solutions.
8. Sika Corporation.
9. Sto Corp.
10. Unitex by Dayton Superior.
11. US SPEC, Division of US MIX Company.
12. W.R. Meadows, Inc.
13. Engineer Approved Equal.

PART 3 - EXECUTION

3.1 FORMWORK

A. General Formwork Requirements:

1. Forms to confine the concrete and shape it to the required lines shall be used wherever necessary. The Contractor shall assume full responsibility for the adequate design of forms, and any forms that are unsafe or inadequate in any respect shall promptly be removed from the Work and replaced. A sufficient number of forms of each kind shall be available to permit the required rate of progress to be maintained.
2. The design and inspection of concrete forms, falsework, and shoring shall comply with applicable local, state and federal regulations. Design, construction, maintenance, preparation, and removal of forms shall be in accordance with ACI 347 - Guide to Formwork for Concrete and the requirements herein. Shoring design drawings shall be stamped by a licensed professional engineer in the State of Michigan.
3. Forms shall be true in every respect to the required shape and size, shall conform to the established alignment and grade, and shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations

incident to placing and vibrating the concrete, producing finished concrete that complies with the tolerances stated herein.

B. Form Ties:

1. Embedded Ties: Wire ties for holding forms will not be permitted. No form-tying device or part thereof, other than metal, shall be left embedded in the concrete. Ties shall not be removed in such manner as to leave a hole extending through the interior of the concrete members. The use of snap-ties which cause spalling of the concrete upon form stripping or tie removal will not be permitted. If steel panel forms are
used, rubber grommets shall be provided where the ties pass through the form to prevent loss of cement paste. Where metal rods extending through the concrete are used to support or to strengthen forms, the rods shall remain embedded and shall terminate not less than 1 inch back from the formed face or faces of the concrete.
2. Removable Ties: Where taper ties are approved for use, after the taper tie is removed, the hole shall be thoroughly cleaned and roughened for bond. A precast neoprene or polyurethane tapered plug shall be located at the wall centerline. The hole shall be filled with non-shrink cement grout. Exposed faces of walls shall have at least the outer 2 inches of the exposed face filled with a cement grout which shall match the color and texture of the surrounding wall surface.

C. Reuse of Forms

1. Forms may be reused only if in good condition and only if acceptable to the Owner. Light sanding between uses will be required wherever necessary to obtain uniform surface texture on exposed concrete surfaces. Exposed concrete surfaces are defined as surfaces which are permanently exposed to view.

D. Removal of Forms

1. Careful procedures for the removal of forms shall be strictly followed, and this Work shall be done with care to avoid injury to the concrete. No heavy loading on green concrete will be permitted.
2. Members which must support their own weight shall not have their forms removed until they have attained at least 75 percent of the 28-Day strength of the concrete. Forms for vertical or nearly-vertical walls and columns shall remain in place at least 48 hours after the concrete has been placed.
3. Forms for parts of the Work not specifically mentioned herein shall remain in place for periods of time as recommended in ACI 347 - Guide to Formwork for Concrete.

3.2 STEEL REINFORCEMENT

A. General Requirements: Reinforcement steel, welded wire fabric, couplers, and other appurtenances shall be fabricated and placed in accordance with the requirements of the Building Code and the supplementary requirements indicated herein.

B. Fabrication:

1. Reinforcement steel shall be accurately formed to the dimensions and shapes indicated, and the fabricating details shall be prepared in accordance with ACI

315 - Details and Detailing of Concrete Reinforcement and ACI 318, except as modified by the Drawings.

2. The Contractor shall fabricate reinforcement bars for structures in accordance with bending diagrams, placing lists, and placing drawings. Said drawings, diagrams, and lists shall be prepared by the Contractor.
3. Unless otherwise indicated, dowels shall match the size and spacing of the spliced bar.

C. Bending or Straightening: Reinforcement shall not be straightened or re-bent in a manner that will injure the material. Bars shall be bent or straight as indicated. Do not use bends different from the bends indicated. Bars shall be bent cold unless otherwise permitted by the Owner. No bars partially embedded in concrete shall be field-bent except as indicated or specifically permitted by the Owner.

D. Placing:
1. Reinforcement steel shall be accurately positioned as indicated and shall be supported and wired together to prevent displacement, using annealed iron wire ties or suitable clips at intersections. Reinforcement steel shall be supported by concrete, plastic or metal supports, spacers or metal hangers that are strong and rigid enough to prevent any displacement of the reinforcement steel.
   a. For concrete over formwork, the Contractor shall provide concrete, metal, plastic, or other acceptable bar chairs and spacers.
   b. Where concrete is to be placed on the ground, supporting concrete blocks (or dobies) may be used in sufficient numbers to support the bars without settlement, but in no case shall such support be continuous. Concrete blocks used to support reinforcement steel shall be tied to the steel with wire ties which are embedded in the blocks.
2. Tie wires shall be bent away from the forms or exposed surface.
3. Bars additional to those indicated which may be found necessary or desirable by the Contractor for the purpose of securing reinforcement in position shall be provided by the Contractor as part of the Work.
4. Unless otherwise indicated, reinforcement placing tolerances and minimum spacing requirements shall be as specified in ACI 318 - Building Code Requirements for Reinforced Concrete and USACE EM 1110-2-2104.
5. Welded wire fabric reinforcement placed over horizontal forms shall be supported on slab bolsters having gray, plastic-coated standard type legs. Slab bolsters shall be spaced not more than 30 inches on centers, shall extend continuously across the entire width of the reinforcing mat, and shall support the reinforcing mat in the plane indicated.
6. Welded wire fabric placed over the ground shall be supported on wired concrete blocks (dobies) spaced not more than 3 feet on centers in any direction. The practice of placing welded wire fabric on the ground and hooking into place in the freshly placed concrete shall not be used.

E. Splicing:
1. General: Reinforcement bar splices shall only be used at locations indicated. When it is necessary to splice reinforcement at points other than where indicated, the character of the splice shall be reviewed and accepted by the Owner.
2. Splices of Reinforcement:

a. The length of lap for reinforcement bars, unless otherwise indicated, shall be in accordance with ACI 318 - Building Code Requirements for Reinforced Concrete, Section 12.15.1 for a Class B splice.
b. Welded splices shall be performed in accordance with AWS D1.4. c. Laps of welded wire reinforcement shall be in accordance with the ACI 318 - Building Code requirements for Reinforced Concrete. Adjoining sheets shall be securely tied together with No. 14 tie wire, one tie for each 2 running feet. Wires shall be staggered and tied in such a manner that they cannot slip.

F. Cleaning and Protection:
1. Reinforcement steel shall always be protected from conditions conductive to corrosion until concrete is placed around it.
2. The surfaces of reinforcement steel and other metalwork to be in contact with concrete shall be thoroughly cleaned of dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed. Where there is delay in depositing concrete, reinforcing shall be reinspected and, if necessary recleaned.

G. Repairs:
1. Reinforcement: Weld new bar reinforcement to existing reinforcement.
2. Strength of Welded Reinforcement to exceed original stress values.
3. Exposed Structural, Shrinkage, and Settlement Cracks in Concrete: by epoxy injection method.
4. Fill voids flush with surface.

3.4 EPOXY-GROUTED DOWELS

A. Drill holes using equipment and tools specified in epoxy grout manufacturer's instructions.

B. Drill holes perpendicular to concrete surface unless otherwise indicated on drawings.

C. Drill holes to depth indicated on drawings, or minimum depth to fully develop dowels per manufacturer's data, whichever is greater.

D. Blow out with compressed air, brush, clean, and otherwise prepare holes per manufacturer's instructions.

E. Inject epoxy grout into hole per manufacturer's instructions.

F. Insert bar into hole per manufacturer's instructions.

G. Support bar, if necessary, and protect from disturbance until epoxy grout has cured.

3.5 CONCRETE PROPORTIONING AND MIXING

A. Proportioning of the concrete mix shall conform to the requirements of Section 4.2.3 "Proportioning" of ACI 301 – Specifications for Concrete Construction.

B. Mixing of concrete shall conform to the requirements of Section 4.3.1 “Measuring, batching, and mixing” of ACI 301.

C. Retempering of concrete or mortar which has partially hardened shall not be permitted.

3.6 PREPARATION OF SURFACES FOR CONCRETING

A. Embedded Items:
   1. Reinforcement, anchor bolts, sleeves, inserts, and similar items shall be set and secured in the forms at locations indicated or by Shop Drawings and shall be acceptable to the Owner before any concrete is placed.
   2. Surfaces of forms and embedded items that have become encrusted with dried grout from previous usage shall be cleaned before the surrounding or adjacent concrete is placed.
   3. Openings for pipes, inserts for pipe hangers and brackets, and anchors shall, where practicable, be provided for during the placing of concrete.
   4. Anchor bolts shall be accurately set and shall be maintained in position by templates while being embedded in concrete.

B. For Surface Repairs:
   1. Clean concrete surfaces of dirt, laitance, corrosion, and other contamination.
   2. Scrub with wire brush using water.
   3. Rinse surface and allow to dry. Flush out cracks and voids with water to remove laitance and dirt.
   4. Remove broken and soft concrete ¼ inch deep and remove corrosion from steel.

3.7 CONCRETE HANDLING, TRANSPORTING, AND PLACING

A. Placing of concrete shall conform to the applicable requirements of Section 5 of ACI 301 and the requirements of this Section.

B. No aluminum materials shall be used in conveying any concrete.

C. Concrete construction joints will not be permitted at locations other than those indicated, except as may be acceptable to the Owner. When a second lift is placed on hardened concrete, special precautions shall be taken in the way of the number, location, and tightening of ties at the top of the old lift and bottom of the new to prevent any unsatisfactory effect whatsoever on the concrete. Pipe stubs and anchor bolts shall be set in the forms where required.

D. The Contractor shall notify the Owner at least 72 hours in advance of placement of any concrete.

E. No concrete shall be placed until formwork, embedded items, reinforcement steel, and preparation of surfaces involved in the placing have been completed and accepted by the Owner at least four hours before placement of concrete.

F. No concrete shall be placed except in the presence of a duly authorized representative of the Owner.

G. Concrete which during or before placing is found not to conform to the requirements indicated herein shall be rejected and immediately removed from the Work. Concrete which is not placed in accordance with these Specifications, or which is of inferior quality shall be removed and replaced.

H. Conveyor Belts and Chutes: Ends of chutes, hopper gates, and other points of concrete discharge throughout the Contractor's conveying, hoisting, and placing system shall be so designed and arranged that concrete passing from them will not fall separated into whatever receptacle immediately receives it. Conveyor belts, if used, shall be of a type acceptable to the Owner. Chutes longer than 50 feet will not be permitted. Minimum slopes of chutes shall be such that concrete of the required consistency will readily flow in them. If a conveyor belt is used, it shall be wiped clean by a device operated in such a manner that none of the mortar adhering to the belt will be wasted. Conveyor belts shall be covered.

I. Temperature of Concrete: The temperature of concrete when it is being placed shall be not more than 75 degrees F nor less than 40 degrees F in moderate weather, and not less than 50 degrees F in weather during which the mean daily temperature drops below 40 degrees F. Concrete ingredients shall not be heated to a temperature higher than that necessary to keep the temperature of the mixed concrete, as placed, from falling below the required minimum temperature. If concrete is placed when the weather is such that the temperature of the concrete would exceed 85 degrees F, the Contractor shall employ effective means, such as precooling of aggregates and mixing water or using ice as necessary to maintain the temperature of the concrete, as it is placed, below 85 degrees F. The Contractor shall be entitled to no additional compensation on account of the foregoing requirements.

3.8 TAMPING AND VIBRATING

A. As non-tremie concrete is placed in the dry forms or in dry excavations, it shall be thoroughly settled and compacted, throughout the entire depth of the layer, which is being consolidated, into a dense, homogeneous mass, filling all corners and angles, thoroughly embedding the reinforcement, eliminating rock pockets, and bringing only a slight excess of water to the exposed surface of concrete. Vibrators shall be high speed power vibrators (8,000 to 12,000 rpm) of an immersion type in sufficient number and with at least one standby unit as required.

B. Non-tremie concrete in walls shall be internally vibrated and at the same time rammed, stirred, or worked with suitable appliances, tamping bars, shovels, or forked tools until it completely fills the forms or excavations and closes snugly against all surfaces. Subsequent layers of concrete shall not be placed until the layers previously placed have been worked thoroughly. Vibrators shall be provided in sufficient numbers, with standby units as required, to accomplish the required results within 15 minutes after concrete of the prescribed consistency is placed in the forms. The vibrating head shall not contact the surfaces of the forms. Care shall be taken not to vibrate concrete excessively or to work it in any manner that causes segregation of its constituents.

3.9 FINISHING CONCRETE SURFACES

A. Surfaces shall be free from fins, bulges, ridges, offsets, honeycombing, bug holes, or roughness of any kind, and shall present a finished, smooth, continuous hard surface.

B. Allowable deviations from plumb or level and from the alignment, profiles, and dimensions indicated are defined as tolerances and are indicated above. These tolerances are to be distinguished from irregularities in finish as described herein.

C. Aluminum finishing tools shall not be used.

D. Unless otherwise indicated, exterior corners in concrete members shall be provided with 1-inch chamfers or be tooled to a 1-inch radius. Re-entrant corners in concrete members shall not have fillets unless otherwise indicated.

E. All exposed edges and right-angled corners shall have a 1-inch 45-degree chamfer using wood or metal insert in the forms.

F. Formed Surfaces:
   1. As a minimum of formed surfaces shall receive a plain finish and rubbed finish.
   2. Plain Finish: Immediately after removal of forms, all fins and loose material shall be removed and all holes, voids, aggregate pockets and depressions shall be cut out to solid concrete. All such defective areas shall be cleaned and wetted thoroughly and immediately be brushed and net cement and filled with Portland Cement grout finished, flush with the adjacent surfaces. Patch work shall be damp cured for a period of 48 hours and, when exposed, it shall be finished to match adjacent surfaces.
   3. Rubbed Finish: All form marks and other such irregularities shall be removed by rubbing the surface with a Carborundum stone and water as soon as practical after form removal.
   4. Bagged Finish: All formed surfaces which are not earth backfilled shall receive a bagged finish. All air and water voids shall be finished flush with the wall surface. The wall shall first be moistened with water. Portland cement grout matching the color of the base concrete shall be worked into the voids using burlap or sponge rubber finishing pads.

G. Unformed Surface Finishes
   1. Troweled Finish: After a floated finish, provide a smooth surface, free of defects with a steel trowel. Follow the first troweling with a second troweling after the concrete has hardened sufficiently to produce a ringing sound as the towel is moved over the surface. The finish surface shall be essentially free of trowel marks, uniform in texture and appearance and shall be plane to 1/8” in 10 ft. tolerance.
   2. Broomed Finish: After receiving the floated and troweled finishes, apply a broomed finish with a fiber-bristle brush in a direction transverse to the line of traffic.
   3. Floated Finish: Place, consolidate, strike off and level concrete. After the concrete has stiffened sufficiently, floating shall begin using a had float, power trowel and float shoes or powered disc float. Cut down high spots and fill low spots to 1/4” in 10 ft. tolerance. Float to a uniform sandy texture.

4. Scratched Finish: After the concrete has been placed consolidated, struck off and leveled to a 1/4" in 2 ft. tolerance, roughen with stiff brushes or rakes before the final set.

3.10 CURING AND DAMP-PROOFING

A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Protect concrete footings from freezing for minimum of five days.

C. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

D. Cure concrete in accordance with ACI 308.1.

E. Membrane Curing Compound: Apply curing compound in accordance with manufacturer's instructions. Curing compound shall not contain any ingredients which might stain or otherwise injure the concrete or prevent a good bond for subsequent coatings or finishing's.

3.11 PROTECTION

A. The Contractor shall protect concrete against damage until final acceptance.

B. Fresh concrete shall be protected from damage due to rain, hail, sleet, or snow. The Contractor shall provide such protection while the concrete is still plastic and whenever precipitation is imminent or occurring.

3.12 APPLICATION OF REPAIR CEMENTITIOUS MORTAR

A. Bonding Agent:
   1. Apply sprayed coating to dry concrete surfaces.
   2. Provide full surface coverage.

B. Steel trowel to maximum thickness of 2 inches and tamp into place, filling voids at spalled areas.

3.13 TREATMENT OF SURFACE DEFECTS

A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

B. Repair or replacement of defective concrete will be determined by Engineer.

C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Engineer for each individual area.

3.14 CARE AND REPAIR OF CONCRETE

A. The Contractor shall protect concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance. Care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which may have been originally defective, which becomes defective at any time prior to the final acceptance of the completed Work, which departs from the established line or grade, or which, for and other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete.

END OF SECTION

SECTION 05 12 00

STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Structural Steel and architecturally exposed structural steel.
   2. Structural plates.
   3. Grout.

1.2 REFERENCE STANDARDS

A. American Institute of Steel Construction:
   1. AISC 303 - Code of Standard Practice for Structural Steel Buildings and Bridges.
   2. AISC 341 - Seismic Provisions for Structural Steel Buildings.
   3. AISC 360 - Specification for Structural Steel Buildings.

B. American Society of Civil Engineers:
   1. ASCE 19 - Structural Applications of Steel Cables for Buildings.

C. American Welding Society:
   1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
   2. AWS D1.1 - Structural Welding Code - Steel.

D. ASTM International:
   1. ASTM A36 - Standard Specification for Carbon Structural Steel.
   2. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
   3. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
   4. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
   5. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
   6. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
   7. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
   8. ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
   9. ASTM A786 - Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.
   10. ASTM A847 - Standard Specification for Cold-Formed Welded and Seamless High-Strength, Low Alloy Structural Tubing with Improved Atmospheric Corrosion Resistance.

11. ASTM A913 - Standard Specification for High-Strength Low-Alloy Steel Shapes of Structural Quality, Produced by Quenching and Self-Tempering Process.
12. ASTM A992 - Standard Specification for Structural Steel Shapes.
13. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
14. ASTM F959 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.
15. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
16. ASTM F2329 - Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners.

E. Research Council on Structural Connections:
1. RCSC - Specification for Structural Joints Using ASTM A325 or A490 Bolts.

F. SSPC: The Society for Protective Coatings:
1. SSPC - Steel Structures Painting Manual.
2. SSPC Paint 15 - Steel Joist Shop Primer/Metal Building Primer.
3. SSPC Paint 20 - Zinc-Rich Coating (Type I - Inorganic and Type II - Organic).
4. SSPC SP 3 - Power Tool Cleaning.
5. SSPC SP 6 - Commercial Blast Cleaning.
6. SSPC SP 10 - Near-White Blast Cleaning.

1.3 UNIT PRICES

A. Refer to Section 01 20 00- Price and Payment Procedures

1.4 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

1.5 SUBMITTALS

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

B. Shop Drawings:
1. Indicate sizes, spacing, locations of structural members, openings, attachments, and bolts.
2. Connections not detailed.
3. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.6 QUALITY ASSURANCE

A. Perform Work according to following:
1. Structural Steel: AISC 360
2. High-Strength bolted Connections: RCSC – Specification for Structural Joints Using ASTM A325 or ASTM A490 bolts.

B. Perform Work according to State of Michigan and local municipal standards.

1.7 QUALIFICATIONS

A. Installer Qualifications: Engage an experienced Installer who has completed structural steel work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Fabricator Qualifications: Engage a firm experienced in fabricating structural steel similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to fabricate structural steel without delaying the Work.
   1. Fabricator must participate in the AISC Quality Certification Program and be designated an AISC-Certified Plant as follows:
      a. Category: Category I, conventional steel structures.
      b. Category: Category II, complex steel building structures.
      c. Fabricator shall be registered with and approved by authorities having jurisdiction.

C. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in the jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for projects with structural steel framing that are similar to that indicated for this Project in material, design, and extent.

D. Welders and Welding Procedures: AWS D1.1 qualified within previous 12 months.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver structural steel to Project site in such quantities and at such times to ensure continuity of installation.

B. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration.
   1. Store fasteners in a protected place. Clean and re-lubricate bolts and nuts that become dry or rusty before use.
   2. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.9 SEQUENCING

A. Supply anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Structural Steel Shapes, Plates, and Bars: As follows:
   1. Carbon Steel: ASTM A 36.
   2. High-Strength, Low-Alloy Columbium-Vanadium Steel: ASTM A 572, Grade 50.
   3. High-Strength, Low-Alloy Structural Steel: ASTM A 588, Grade 50, corrosion resistant.
   4. Stainless Steel: ASTM 276, Type 304/304L where indicated on Drawings.

B. Cold-Formed Structural Steel Tubing: ASTM A 500, Grade B.

C. Rectangular, Hollow Structural Sections: ASTM A500, Grade B
   1. Stainless Steel: ASTM 276, Type 304/304L where indicated on Drawings.

D. Round, Hollow Structural Sections: ASTM A500, Grade B
   1. Stainless Steel: ASTM 276, Type 304/304L where indicated on Drawings.

E. Steel Pipe: ASTM A 53, Type E or S, Grade B.
   1. Weight Class: Standard.
   2. Weight Class: Extra strong.
   3. Weight Class: Double-extra strong.
   4. Finish: Black.
   5. Finish: Galvanized.
   6. Finish: Black, except where indicated to be galvanized.
   7. Stainless Steel: ASTM 276, Type 304/304L where indicated on Drawings.

F. Carbon-Steel Castings: ASTM A 27, Grade 65-35, medium-strength carbon steel.

G. High-Strength Steel Castings: ASTM A 148, Grade 80-50.

H. Shear Connectors: ASTM A 108, Grade 1015 through 1020, headed-stud type, cold-finished carbon steel, AWS D1.1, Type B.

I. Anchor Rods: As follow:
   1. ASTM F1554; Grade 36.
   2. Shape: Hooked.
   3. Plate Washers: ASTM A36

J. Threaded Rods:
   1. ASTM A 36, Hot-dip galvanize finish
   2. ASTM 316/316L Stainless Steel where indicated on Drawings.

K. Nonhigh-Strength Bolts, Nuts, and Washers: ASTM A 307, Grade A
   1. Finish: Plain, uncoated.
   2. Finish: Hot-dip zinc-coating, ASTM A 153, Class C.
   3. Finish: Mechanically deposited zinc-coating, ASTM B 695, Class 50.

L. High-Strength Bolts:

1. ASTM A 325, Type 1, hot-dip galvanized or Type 3, plain.
2. ASTM A193 Grade B8 Class 2, Stainless Steel; where Stainless Steel bolts indicated on Drawings.

M. Nuts:
1. ASTM ASTM A563; Grade A; heavy-hex type
2. ASTM A194 Grade 8, Stainless Steel; where Stainless Steel bolts indicated on Drawings.

N. Washers:
1. ASTM F436
   a. Type 1, circular.
   b. Furnish clipped washers where space limitations require.
   c. Finish: Hot-dip galvanized.
2. ASTM 276, Type 304, Stainless Steel; where Stainless Steel bolts indicated on Drawings

O. Direct-Tension Indicators:
1. ASTM F 959, Type 325.
   a. Finish: Plain, uncoated.
   b. Finish: Mechanically deposited zinc-coating, ASTM B 695, Class 50.
   c. Finish: Mechanically deposited zinc-coating, ASTM B 695, Class 50, epoxy coated.

P. Welding Electrodes: Comply with AWS requirements.

2.2 PRIMER

A. Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer with good resistance to normal atmospheric corrosion, complying with performance requirements of FS TT-P-664.

B. Primer: SSPC-Paint 25; red iron oxide, zinc oxide, raw linseed oil and alkyd primer.

C. Primer: SSPC-Paint 23, latex primer.

D. Primer: SSPC-Paint 15, Type I, red oxide.

E. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer.

F. Primer: Nonasphaltic primer complying with SSPC's "Painting System Guide No. 7.00."

G. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds and repair painting galvanized steel, with dry film containing not less than 93 percent zinc dust by weight and complying with DOD-P-21035A or SSPC-Paint 20.

2.3 GROUT

A. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404, Size No. 2. Mix at ratio of 1-part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

B. Metallic, Shrinkage-Resistant Grout: Premixed, factory-packaged, ferrous aggregate grout, complying with ASTM C 1107, of consistency suitable for application, and a 30-minute working time.

C. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, of consistency suitable for application, and a 30-minute working time.

2.4 FABRICATION

A. Fabricate and assemble structural steel in shop to greatest extent possible. Fabricate structural steel according to AISC specifications referenced in this Section and in Shop Drawings.
   1. Camber structural steel members where indicated.
   2. Identify high-strength structural steel according to ASTM A 6 and maintain markings until steel has been erected.
   3. Mark and match-mark materials for field assembly.
   4. Fabricate for delivery a sequence that will expedite erection and minimize field handling of structural steel.
   5. Complete structural steel assemblies, including welding of units, before starting shop-priming operations.
   6. Comply with fabrication tolerance limits of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel.

B. Fabricate architecturally exposed structural steel with exposed surfaces smooth, square, and free of surface blemishes, including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness.
   1. Remove blemishes by filling, grinding, or by welding and grinding, prior to cleaning, treating, and shop priming.
   2. Comply with fabrication requirements, including tolerance limits, of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for architecturally exposed structural steel.

C. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
   1. Plane thermally cut edges to be welded.

D. Finishing: Accurately mill ends of columns and other members transmitting loads in bearing.

E. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's printed instructions.

F. Steel Wall Framing: Select true and straight members for fabricating steel wall framing to be attached to structural steel framing. Straighten as required to provide uniform, square, and true members in completed wall framing.

G. Welded Door Frames: Build up welded door frames attached to structural steel framing. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure

removable stops to frames with countersunk, cross-recessed head machine screws, uniformly spaced not more than 10 inches (250 mm) o.c., unless otherwise indicated.

H. Holes: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on Shop Drawings.
   1. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.
   2. Weld threaded nuts to framing and other specialty items as indicated to receive other work.

2.5 SHOP PRIMING

A. Shop prime steel surfaces, except the following:
   1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
   2. Surfaces to be field welded.
   3. Surfaces to be high-strength bolted with slip-critical connections.
   4. Surfaces to receive sprayed-on fireproofing.
   5. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust, loose mill scale, and spatter, slag, or flux deposits. Prepare surfaces according to SSPC specifications as follows:
   1. SSPC-SP 2 "Hand Tool Cleaning."
   2. SSPC-SP 3 "Power Tool Cleaning."
   3. SSPC-SP 5 "White Metal Blast Cleaning."
   4. SSPC-SP 6 "Commercial Blast Cleaning."
   5. SSPC-SP 7 "Brush-Off Blast Cleaning."
   6. SSPC-SP 8 "Pickling."
   7. SSPC-SP 10 "Near-White Blast Cleaning."
   8. SSPC-SP 11 "Power Tool Cleaning to Bare Metal."

2.6 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel indicated for galvanizing according to ASTM A 123.

2.7 SOURCE QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Requirements for testing, inspection, and analysis.

B. Testing: Test bolted and welded connections as specified in PART 3 for field quality control tests.

C. Certificate of Compliance: When fabricator is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.
   1. Specified shop tests are not required for Work performed by approved fabricator.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Verify that bearing surfaces are at correct elevation.

C. Verify that anchor rods are set in correct locations and arrangements, with correct exposure for steel attachment.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.
   1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

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

C. Furnish templates for installation of anchor rods and embedments in concrete and masonry work.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section.

B. Base and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.
   1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
   2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
   3. Pack grout solidly between bearing surfaces and plates so no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.
      a. Comply with manufacturer's instructions for proprietary grout materials.

C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
   1. Maintain erection tolerances of architecturally exposed structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
   1. Level and plumb individual members of structure.
   2. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.

E. Splice members only where indicated.

F. Remove erection bolts on welded, architecturally exposed structural steel; fill holes with plug welds; and grind smooth at exposed surfaces.

G. Do not use thermal cutting during erection.

H. Finish sections thermally cut during erection equal to a sheared appearance.

I. Do not enlarge unfair holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts.

J. Do not field-cut or alter structural members without approval of Engineer.

K. After erection, touch up welds and abrasions to match shop finishes.

3.4 TOLERANCES

A. Section 01 40 00 - Quality Requirements: Requirements for tolerances.

B. Maximum Variation from Plumb: 1/4 inch per story, noncumulative.

C. Maximum Offset from Alignment: 1/4 inch.

3.5 FIELD CONNECTIONS

A. Install and tighten nonhigh-strength bolts, except where high-strength bolts are indicated.

B. Install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Install and tighten high-strength bolts according to RCSC's "Load and Resistance Factor Design Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
   1. Bolts: ASTM A 325 high-strength bolts, unless otherwise indicated.
   2. Bolts: ASTM A 490 high-strength bolts, unless otherwise indicated.
   3. Connection Type: Snug tightened, unless indicated as slip-critical, direct-tension, or tensioned shear/bearing connections.
   4. Connection Type: Slip-critical, direct-tension, or tensioned shear/bearing connections as indicated.

D. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.
   1. Comply with AISC specifications referenced in this Section for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
   2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without warp.
   3. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent surface bleeding of back-side welding on exposed steel surfaces. Grind smooth exposed fillet welds 1/2 inch and larger. Grind flush butt welds. Dress exposed welds.

3.6 GROUT INSTALLATION

A. Shim bearing plates and equipment supports to proper elevation, and snug-tighten anchor bolts.

B. Fill void under bearing surface with grout; install and pack grout to remove air pockets.

C. Moist-cure grout.

D. Remove forms after grout is set; trim grout edges to form smooth surface, splayed 45 degrees.

E. Tighten anchor bolts after grout has cured for a minimum of three days.

3.7 FIELD QUALITY CONTROL

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.

3.8 CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.
   1. Apply by brush or spray to provide a minimum dry film thickness of 1.5 mils (0.038 mm).

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on structural steel are included in Division 9 Section "Painting."

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and apply galvanizing repair paint according to ASTM A 780.

END OF SECTION

SECTION 07 19 00

WATER REPELLENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Water-repellent coating applied to exterior concrete surfaces.

B. Related Requirements:
   1. Section 03 31 00 – Structural Concrete

1.2 REFERENCE STANDARDS

A. ASTM International:
   1. ASTM C67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
   2. ASTM C97 - Standard Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone.
   3. ASTM C140 - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
   4. ASTM C642 - Standard Test Method for Density, Absorption, and Voids in Hardened Concrete.
   5. ASTM D1653 - Standard Test Methods for Water Vapor Transmission of Organic Coating Films.
   6. ASTM D5703 - Standard Practice for Preparatory Surface Cleaning for Clay Brick Masonry.
   7. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
   8. ASTM E514 - Standard Test Method for Water Penetration and Leakage Through Masonry.
   9. ASTM G154 - Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials.

1.3 UNIT PRICES

A. Refer to Section 01 20 00- Price and Payment Procedures.

1.4 PREINSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Requirements for preinstallation meeting.

B. Convene a meeting at least one week prior to starting work; require attendance of affected installers; invite Engineer and Owner.

1.5 SUBMITTALS

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

B. Product Data: Submit manufacturer's information, including product description, tests performed, limitations to coating, and chemical properties, including percentage of solids.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Manufacturer Instructions:
   1. Submit special procedures and conditions requiring special attention.
   2. Submit cautionary procedures required during application.

E. Qualifications Statements:
   1. Submit qualifications for manufacturer and applicator.
   2. Submit manufacturer's approval of applicator.

1.6 QUALITY ASSURANCE

A. Manufacturer's Inspection:
   1. Furnish manufacturer services before start of Work of this Section to verify substrate's substrates' acceptability and review installation procedures and completed Work, such that specified warranty can be issued.
   2. Promptly and satisfactorily repair unsatisfactory conditions disclosed by manufacturer's Site visits.

B. Perform Work according to State of Michigan and local municipal standards.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section approved by manufacturer.

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 and dust by storing in clean, dry location remote from construction operations areas.
   2. Protect coating liquid from freezing.
   3. Provide additional protection according to manufacturer instructions.

1.9 AMBIENT CONDITIONS

A. Section 01 50 00 - Temporary Facilities and Controls: Requirements for ambient condition control facilities for product storage and installation.

B. Do not apply coating if ambient surface temperatures or wind velocity exceeds manufacturer instructions.

1.10 FIELD CONDITIONS

A. Protect liquid materials from freezing.

1.11 WARRANTY

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

B. Furnish five-year manufacturer's warranty for water repellents.

PART 2 - PRODUCTS

2.1 WATER REPELLENTS

A. Manufacturers:
   1. Silane/Siloxane Water Repellants:
      a. Aqualnil Plus100, ChemMasters, Inc.
      b. Baracade Silane 100C, The Euclid Chemical Company
      c. Certi-Vex Penseal 244 100%, ChemMasters, Inc.
      d. MasterProtect H 1000, BASF Construction Chemicals, LLC Building Systems
      e. Protectosil BH-N, Evonik Degussa Corporation
      f. Sikagard 705L, Sika Corporation
      g. SIL-ACT ATS-200, Advanced Chemical Technologies
      h. Or approved equal.

B. Water Repellent: Non-glossy, colorless, penetrating, water-vapor-permeable, non-yellowing sealer, that dries invisible leaving appearance of substrate unchanged.
   1. Applications: Vertical surfaces and horizontal surfaces.

C. Silane/Siloxane-Blend, Penetrating Water Repellent.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Verify existing conditions before starting work.

C. Verify that joint sealants are installed and cured.

D. Verify that surfaces to be coated are dry, clean, and free of efflorescence, oil, or other matter detrimental to application of coating.

3.2 PREPARATION

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

B. Ensure all concrete to be sealed is at least 28 days old. Ensure the surface to be sealed is dry, clean and free from all contamination including, but not limited to: old coatings, dirt, form release agents, oil, grease, laitance, loose material, and curing compounds. Water blasting to be used to clean the surface per manufacturer recommendations.

C. Allow surfaces to dry completely to degree recommended by water repellent manufacturer before starting coating work.

3.3 APPLICATION

A. Apply water repellents to areas as indicated on plans.

B. Apply water repellent in accordance with manufacturer's instructions, using procedures and application methods recommended as producing the best results.

C. Remove water repellent from unintended surfaces immediately by a method instructed by water repellent manufacturer.

3.4 PROTECTION

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.

B. Protect adjacent surfaces not scheduled to receive coating.

C. Protect adjacent landscaping, property, and vehicles from drips and overspray.

D. If repellents are applied to unscheduled surfaces, remove immediately using methods provided by water repellent manufacturer.

END OF SECTION

SECTION 26 00 00

BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Basic Electrical Requirements specifically applicable to Division 26 Sections, in addition to Division 1 - General Requirements.

1.2 REFERENCES

A. ANSI/NFPA 70 - National Electrical Code.

1.3 UNIT PRICES

A. Refer to Section 01 20 00- Price and Payment Procedures

1.4 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal.

C. Mark dimensions and values in units to match those specified.

D. Submit shop drawings indicating layout of completed assemblies, interconnecting cabling, dimensions, weights, and external power requirements.

E. Submit product data under provisions of Section 01 33 00.

F. Submit product data for each component specified.

G. Submit manufacturer's installation instructions under provisions of Section 01 33 00.

1.5 REGULATORY REQUIREMENTS

A. Conform to applicable Building Code for City of Tecumseh.

B. Electrical: Conform to NFPA 70.

C. Furnish products listed and classified by Underwriters Laboratories, Inc. or testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

D. Fire Protection: Conform to NFPA 820.

E. Obtain permits, and request inspections from authority having jurisdiction.

1.6 PROJECT/SITE CONDITIONS

A. Install Work in locations shown on Drawings, unless prevented by Project conditions.

B. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of Owner before proceeding.

1.7 SEQUENCING AND SCHEDULING

A. Construct Work in sequence under provisions of Section 01 10 00.

END OF SECTION

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Building wire and cable
   2. Nonmetallic-sheathed cable
   3. Direct burial cable
   4. Service entrance cable
   5. Armored cable
   6. Metal clad cable
   7. Wiring connectors and connections

B. Related Sections:
   1. Section 26 05 53 - Identification for Electrical Systems.

1.2 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.

1.3 UNIT PRICES

A. Refer to Section 01 20 00- Price and Payment Procedures.

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.

6. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet.

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. Wet or Damp Interior Locations: Use only building wire, Type THHN/THWN insulation, in raceway, direct burial cable, armored cable or metal clad cable.
   4. Exterior Locations: Use only building wire, Type THHN/THWN insulation, in raceway, direct burial cable, service-entrance cable, armored cable or metal clad cable.
   5. Underground Locations: Use only building wire, Type THHN/THWN insulation, in raceway, direct burial cable, service-entrance cable, armored cable or metal clad cable.

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.

C. Substituting aluminum conductors for copper must be approved by owner and engineer prior to procurement and installation.

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 of an additional 10% or 10 feet, whichever is shorter, of length shown.

D. All control wire runs shall include the following minimum spare conductors of each type. Multiconductor cables may increase the number of conductors within the cable to meet spare conductor requirements, provided the additional conductors meet voltage separation, shielding, and other applicable isolation requirements.
   1. Discrete Signals: 20% or 2 conductors (whichever is greater).
   2. Analog Signals: 20% or a single multiconductor shielded cable (whichever is greater).
   3. Communications: 20% or 2 wires (whichever is greater).
   4. Manufacturer specific proprietary wiring: Coordinate with equipment manufacturer.

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 INSTRUMENTATION CABLE

A. Description: Twisted Shield Pair(s), single or multi pair with overall jacket.

B. Conductor: Copper, wire sized to match instrument per manufacturers recommendation.

C. Insulation Voltage Rating: 600 volts.

2.8 WIRING CONNECTORS

A. Split Bolt Connectors:
   1. Manufacturers:
      a. Burndy: Part of Hubbell Electrical Systems.
      b. ILSCO.
      c. Thomas & Betts Corporation; A Member of the ABB Group.

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; A Member of the ABB Group.
   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; A Member of the ABB Group.
      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; A Member of the ABB Group.
      d. Substitutions: Section 01 60 00 - Product Requirements.

2.9 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 EXISTING WORK

A. Remove exposed abandoned wire and cable. Patch surfaces.

B. Disconnect abandoned circuits and remove circuit wire and cable. Remove abandoned boxes when wire and cable servicing boxes is abandoned and removed. Install blank cover for abandoned boxes not removed.

C. Provide access to existing wiring connections remaining active and requiring access. Modify installation or install access panel.

3.4 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.

3.5 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.

F. Control Wiring Conductors: Yellow.

G. Instrumentation, Multiconductor cables:
   1. Two conductor cable:
      a. Black, White, with braided shield and Black PLC jacket.
      b. Black, Red, with braided shield and Black PLC jacket.

3.6 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements

B. Section 01 70 00 - Execution and Closeout Requirements.

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. Wire.
   3. Mechanical connectors.
   4. Exothermic connections.

1.2 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.

1.3 UNIT PRICES

A. Refer to Section 01 20 00- Price and Payment Procedures.

1.4 SYSTEM DESCRIPTION

A. Grounding systems use the following elements as grounding electrodes:
   1. Metal building frame.
   2. Concrete-encased electrode.
   3. Rod electrode.
   4. 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 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, unless otherwise indicated on drawings.
   3. Length: 10 feet, unless otherwise indicated on drawings.

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 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.

2.4 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 2 AWG bare copper wire in foundation footing as indicated on Drawings.

E. Install isolated grounding conductor for circuits supplying, personal computers and other such sensitive electronics in accordance with IEEE 1100.

F. Equipment Grounding Conductor: Install separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

G. 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.

H. 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.

I. 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.

J. Ground electrical system using continuous metal raceway system enclosing circuit conductors in accordance with NEC.

K. Permanently attach equipment and grounding conductors prior to energizing equipment.

3.5 FIELD QUALITY CONTROL

A. Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Grounding and Bonding: Perform inspections and tests listed in NETA ATS, Section 7.13.

D. Perform ground resistance testing in accordance with IEEE 142.

E. Perform leakage current tests in accordance with NFPA 99.

F. Perform continuity testing in accordance with IEEE 142.

G. 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. Equipment bases and supports.

1.2 REFERENCES

A. ASTM International:
   1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

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. Intertek Testing Services (Warnock Hersey Listed):
   1. WH - Certification Listings.

1.3 UNIT PRICES

A. Refer to Section 01 20 00- Price and Payment Procedures.

1.4 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.

D. Design Data: Indicate load carrying capacity of trapeze hangers and hangers and supports.

E. Manufacturer's Installation Instructions:
   1. Hangers and Supports: Submit special procedures and assembly of components.

F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with all applicable standards.

B. Maintain two copies of each document on site.

1.6 QUALIFICATIONS

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

B. Installer: Company specializing in performing work of this section with minimum three years documented experience or approved by manufacturer.

1.7 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.

1.8 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.

1.9 ENVIRONMENTAL REQUIREMENTS

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

B. 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: A Member of the ABB Group.
   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 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.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

A. Remove incompatible materials affecting bond.

B. Install backing and/or damming materials to arrest liquid material leakage where required.

C. Obtain permission from Engineer before using powder-actuated anchors.

D. 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 - 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.

3.5 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.

3.6 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements.

3.7 CLEANING

A. Section 01 70 00 - Execution and Closeout Requirements.

3.8 PROTECTION OF FINISHED WORK

A. Section 01 70 00 - Execution and Closeout Requirements.

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 05 83 - Equipment Wiring Connections.
5. Section 26 27 16 - Electrical Cabinets and Enclosures.
6. Section 26 27 26 - Wiring Devices.

1.2 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.

1.3 UNIT PRICES

A. Refer to Section 01 20 00- Price and Payment Procedures.

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. In Masonry Wall, Above Grade: Provide rigid steel conduit. Provide weatherproof cast metal or nonmetallic outlet, pull, and junction boxes.

H. 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.

I. 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.

J. 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.

K. Hazardous Locations: Provide rigid steel conduit, or plastic coated conduit. Provide Explosionproof boxes. Provide hinged enclosure for large pull boxes. All connections and penetrations shall be sealed to prevent intrusion of gases.

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 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 connected under Section 26 05 83.

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; A Member of the ABB Group.
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; A Member of the ABB Group.
   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 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.

2.8 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 feralloy. 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.

2.9 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 EXISTING WORK

A. Remove exposed abandoned raceway. Cut raceway flush with walls and floors, and patch surfaces.

B. Remove concealed abandoned raceway to its source.

C. Disconnect abandoned outlets and remove devices. Remove abandoned outlets when raceway is abandoned and removed. Install blank cover for abandoned outlets not removed.

D. Maintain access to existing boxes and other installations remaining active and requiring access. Modify installation as required.

E. Extend existing raceway and box installations using materials and methods compatible with existing electrical installations, or as specified.

F. Clean and repair existing raceway and boxes to remain or to be reinstalled.

3.3 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.

3.4 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 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.

3.5 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. Do not fasten boxes to piping systems.

E. Support boxes independently of conduit.

F. Install gang box where more than one device is mounted together. Do not use sectional box.

G. Install gang box with plaster ring for single device outlets.

3.6 ADJUSTING

A. Section 01 70 00 - Execution and Closeout Requirements.

B. 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.

1.2 UNIT PRICES

A. Refer to Section 01 20 00- Price and Payment Procedures.

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: Communication and cable type using industry standard designations or as indicated on Drawings.

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 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.

2.6 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.

3.2 EXISTING WORK

A. Install identification on existing equipment to remain in accordance with this section.

B. Install identification on unmarked existing equipment and materials associated with proposed work.

C. Replace lost nameplates, labels, and markers.

3.3 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.

F. 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 TO EQUIPMENT

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 REFERENCES

A. National Electrical Manufacturers Association:
   1. NEMA WD 1 - General Requirements for Wiring Devices.
   2. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

1.3 UNIT PRICES

A. Refer to Section 01 20 00- Price and Payment Procedures.

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:
   1. Multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
      a. Up to 277 Volts: Type SJO.
      b. Up to 600 Volts: Type SO.

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 EXISTING WORK

A. Remove exposed abandoned equipment wiring connections.

B. Disconnect abandoned utilization equipment and remove wiring connections. Remove abandoned components when connected raceway is abandoned and removed. Install blank cover for abandoned boxes and enclosures not removed.

C. Extend existing equipment connections using materials and methods compatible with existing electrical installations, or as specified.

3.3 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.

3.4 ADJUSTING

A. Section 01 70 00 - Execution and Closeout Requirements.

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 24 16

PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Branch circuit panelboards.
   2. Load centers.

B. Related Requirements:
   1. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
   2. Section 26 05 53 - Identification for Electrical Systems.
   3. Section 26 28 13 - Fuses.

1.2 REFERENCE STANDARDS

A. Institute of Electrical and Electronics Engineers:
   1. IEEE C62.41 - Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.

B. 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 KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
   5. NEMA PB 1 - Panelboards.
   6. NEMA PB 1.1 - General Instructions for Proper Installation, Operation, and Maintenance of Panelboards Rated 600 Volts or Less.

C. International Electrical Testing Association:
   1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

D. National Fire Protection Association:
   1. NFPA 70 - National Electrical Code.

E. UL:
   1. UL 50 - Cabinets and Boxes
   2. UL 67 - Safety for Panelboards.
   3. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures.
   4. UL 1283 - Electromagnetic Interference Filters.

5. UL 1449 - Transient Voltage Surge Suppressors.
6. UL 1699 - Arc-Fault Circuit Interrupters.

1.3 UNIT PRICES

A. Refer to Section 01 20 00- Price and Payment Procedures.

1.4 SUBMITTALS

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

B. Product Data: Submit catalog data showing specified features of standard products.

C. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker, and fusible switch arrangement and sizes.

D. Source Quality Control Submittals: Indicate results of shop or factory tests and inspections.

E. Field Quality Control Submittals: Indicate results of Contractor furnished tests and inspections.

1.5 CLOSEOUT SUBMITTALS

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

B. Project Record Documents: Record actual locations of panelboards and record actual circuiting arrangements.

C. Operation and Maintenance Data: Submit spare parts listing, source and current prices of replacement parts and supplies, and recommended maintenance procedures and intervals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

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

B. Extra Stock Materials:
1. Furnish two of each panelboard key. Panelboards keyed alike to Owner's current keying system.

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 BRANCH CIRCUIT PANELBOARDS

A. Manufacturers:
   1. Square D; by Schneider Electric.
   2. Substitutions: Not accepted.

B. Description: NEMA PB1, circuit breaker type, lighting and appliance branch circuit panelboard.

C. Materials:
   1. Panelboard Bus: Copper, current carrying components, ratings as indicated on Drawings. Furnish copper ground bus in each panelboard; furnish insulated ground bus as indicated on Drawings.
   2. For non-linear load applications subject to harmonics furnish 200 percent rated, plated copper, solid neutral.
   3. Minimum Integrated Short Circuit Rating: 10,000 A rms symmetrical for 240 V panelboards; 65,000 S rms symmetrical for 480 V panelboards, or as indicated on Drawings.
   4. Molded Case Circuit Breakers: UL 489, bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles, listed as Type SWD for lighting circuits, Type HACR for air conditioning equipment circuits, Class A ground fault interrupter circuit breakers as indicated on Drawings. Provide UL class 760 arc-fault interrupter circuit breakers as indicated on Drawings. Do not use tandem circuit breakers.
   5. Current Limiting Molded Case Circuit Breakers: UL 489, circuit breakers with integral thermal and instantaneous magnetic trip in each pole, coordinated with automatically resetting current limiting elements in each pole. Interrupting rating 100,000 symmetrical A, let-through current and energy level less than permitted for same size NEMA FU 1, Class RK-5 fuse.
   6. Surge Suppresser: External Device, installed to exterior of enclosure; refer to Section 26 35 53. Match Panelboard Manufacturer.
   7. Enclosure: NEMA PB 1, Type 1 (Indoor), Type 3R (Outdoor).
   8. Cabinet Box: Minimum 6 inches deep.

D. Cabinet Front: Flush or Surface cabinet front with concealed trim clamps, concealed hinge, metal directory frame, and flush lock keyed alike. Finishes:
   1. Finish in manufacturer's standard gray enamel.

PART 3 - EXECUTION

3.1 DEMOLITION

A. Disconnect abandoned panelboards and load centers. Install blank cover for abandoned panelboards and load centers.

B. Maintain access to existing panelboard and load centers remaining active and requiring access. Modify installation or provide access panel.

3.2 INSTALLATION

A. Install panelboards and load centers according to NEMA PB 1.1.

B. Install panelboards and load centers plumb.

C. Height: 6 feet to top of panelboard and load center; install panelboards taller than 6 feet with bottom no more than 4 inches above floor.

D. Install filler plates for unused spaces in panelboards.

E. Provide typed circuit directory for each branch circuit panelboard and load center. Revise directory to reflect circuiting changes to balance phase loads. Identify each circuit as to its clear, evident and specific purpose of use.

F. Install engraved plastic nameplates according to Section 26 05 53.

G. Install spare conduits out of each recessed panelboard to accessible location above ceiling or below floor. Minimum spare conduits: 25%, empty 1 inch. Identify each as spare.

H. Ground and bond panelboard enclosure according to Section 26 05 26. Connect equipment ground bars of panels according to NFPA 70.

3.3 FIELD QUALITY CONTROL

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

B. Inspect and test according to NETA ATS, except Section 4.

C. Perform circuit breaker inspections and tests listed in NETA ATS, Section 7.6.

D. Perform switch inspections and tests listed in NETA ATS, Section 7.5.

E. Perform controller inspections and tests listed in NETA ATS, Section 7.16.1.

3.4 ADJUSTING

A. Section 01 70 00 - Execution and Closeout Requirements.

B. Measure steady state load currents at each panelboard feeder; rearrange circuits in panelboard to balance phase loads to within 5 percent of each other. Maintain proper phasing for multi-wire branch circuits.

3.5 CLEANING

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

B. Clean existing panelboards and load centers to remain or to be reinstalled.

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 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.

1.3 UNIT PRICES

A. Refer to Section 01 20 00- Price and Payment Procedures.

1.4 SUBMITTALS

A. Section 01 33 00 - 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.

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; a brand of Pentair Equipment Protection.
   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, stainless steel
      a. NEMA 4X, Fiberglass where corrosive materials are present.
   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; a brand of Pentair Equipment Protection.
   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. Indoor, Wet or Damp Locations: Type 3R

c. Outdoor Locations: Type 3R
d. Hazardous Locations: Type 4X

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.

E. Spare Capacity: Minimum 25 percent space.
1. Space shall be defined as Square Inches of exposed Enclosure's Sub-panel, typically White in color, in which future components can be installed.

2.3 CONTROL PANEL ENCLOSURES

A. Manufacturers:
1. Saginaw Control Engineering
2. Hammond Mfg. Co. Inc.
3. Hoffman; a brand of Pentair Equipment Protection.
4. Substitutions: Section 01 60 00 - Product Requirements.

B. Description: NEMA 250, steel with continuously welded seams.
1. Indoor, Dry Locations: NEMA 12
2. Wet, Damp, or Outdoor Locations: NEMA 3R, 4, or 4X
3. Hazardous Locations: NEMA 4X, stainless steel.
a. NEMA 4X, Fiberglass where corrosive materials are present.
4. Gasketed door(s), held closed by lockable 3-Point latching handle.
5. Furnish interior metal sub-panel for mounting terminal blocks and electrical components; finish with white enamel.
6. Enclosure Finish: Manufacturer's standard enamel, unless stainless steel or non-metallic.
7. Spare Capacity: Minimum 25 percent spare "white space" on enclosure's interior sub-panel.

2.4 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.

C. Spare Capacity: Minimum 25 percent additional Terminals for each power and signal type including, but not limited to:
   1. Power: 480vac, 120vac, 24vdc.
   2. Signal: Discrete Input, Discrete Output, Analog Input, Analog Output.

2.5 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.

2.6 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 DEMOLITION

A. Remove abandoned cabinets and enclosures and deliver to owner.

B. Maintain access to existing cabinets and enclosures and other installations remaining active and requiring access. Modify installation or provide access panel.

C. Extend existing cabinets and enclosures using materials and methods compatible with existing electrical installations, or as specified.

3.2 REPAIR AND RESTORATION

A. Repair existing cabinets and enclosures to remain or to be reinstalled.

3.3 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.

3.4 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; receptacles; multioutlet assembly; and device plates and decorative box covers.

B. Related Sections:
   1. Section 26 05 33 - Raceway and Boxes for Electrical Systems: Outlet boxes for wiring devices.

1.2 REFERENCES

A. National Electrical Manufacturers Association:
   1. NEMA WD 1 - General Requirements for Wiring Devices.
   2. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

1.3 UNIT PRICES

A. Refer to Section 01 20 00- Price and Payment Procedures.

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:
   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. 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.
   1. Status Indicator Light: Red or Green LED
   2. TEST and RESET Pushbuttons

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: Ivory enamel.
   1. Wet, Damp, or Outdoor Locations: 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 EXISTING WORK

A. Disconnect and remove abandoned wiring devices.

B. Modify installation to maintain access to existing wiring devices to remain active.

C. Clean and repair existing wiring devices to remain or to be reinstalled.

3.4 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. 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.

G. Use jumbo size plates for outlets installed in masonry walls.

H. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

3.5 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 / walking surface.

C. Install convenience receptacle Minimum 18 inches above finished floor.

3.6 FIELD QUALITY CONTROL

A. Section 01 70 00 - Execution and Closeout Requirements.

B. Inspect each wiring device for defects.

C. Operate each wall switch with circuit energized and verify proper operation.

D. Verify each receptacle device is energized.

E. Test each receptacle device for proper polarity.

F. Test each GFCI receptacle device for proper operation.

3.7 ADJUSTING

A. Section 01 70 00 - Execution and Closeout Requirements.

B. Adjust devices and wall plates to be flush and level.

3.8 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 REFERENCE STANDARDS

A. National Electrical Manufacturers Association:
   1. NEMA FU 1 - Low Voltage Cartridge Fuses.

1.3 UNIT PRICES

A. Refer to Section 01 20 00- Price and Payment Procedures.

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 DEMOLITION

A. Remove fuses from abandoned circuits.

B. Maintain access to existing fuses and other installations remaining active and requiring access. Modify installation or provide access panel.

3.2 INSTALLATION

A. Install fuse with label oriented so manufacturer, type, and size are easily read.

END OF SECTION

SECTION 26 28 16

ENCLOSED SWITCHES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Fusible.
   2. Nonfusible switches.

B. Related Requirements:
   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 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.

1.3 UNIT PRICES

A. Refer to Section 01 20 00- Price and Payment Procedures.

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. Square D; by Schneider Electric.
   2. Eaton.
   3. Siemens Power Transmission & Distribution, Inc.
   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. Fuse clips: Designed to accommodate NEMA FU 1 fuses.
      a. Fuse Class to match required application.
   2. 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.
      d. Hazardous Locations: Type 4X.
   3. Service Entrance: Switches identified for use as service equipment are to be labeled for this application. Furnish solid neutral assembly and equipment ground bar.
   4. Furnish switches with entirely copper current carrying parts.

2.2 NONFUSIBLE SWITCH ASSEMBLIES

A. Manufacturers:
   1. Square D; by Schneider Electric.
   2. Eaton.
   3. Siemens Power Transmission & Distribution, Inc.
   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.
      d. Hazardous 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 DEMOLITION

A. Disconnect and remove abandoned enclosed switches.

B. Maintain access to existing enclosed switches and other installations remaining active and requiring access. Modify installation or provide access panel.

3.2 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.

3.3 REPAIR AND RESTORATION

A. Repair and restore existing enclosed switches to remain or to be reinstalled in accordance to Owner’s standards and requirements.

3.4 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.

3.5 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 26 35 53

VOLTAGE REGULATORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Transient voltage surge suppressors.

B. Related Sections:
   1. Section 26 24 16 - Panelboards: Transient voltage surge suppressors integrated in panelboards.

1.2 REFERENCES

A. Institute of Electrical and Electronics Engineers:
   1. IEEE 1100 - Recommended Practice for Powering and Grounding Electronic Equipment.
   2. IEEE C62.41 - Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.
   3. IEEE C62.45 - Guide on Surge Testing for Equipment Connected to Low-Voltage AC Power Circuits.

B. National Electrical Manufacturers Association:
   1. NEMA LS 1 - Low Voltage Surge Protection Devices.

C. National Fire Protection Association:
   1. NFPA 70 - National Electrical Code.
   2. NFPA 780 - Standard for the Installation of Lightning Protection Systems.

D. UL:
   1. UL 1283 - Electromagnetic Interference Filters.
   2. UL 1449 - Transient Voltage Surge Suppressors.

1.3 UNIT PRICES

A. Refer to Section 01 20 00- Price and Payment Procedures.

1.4 SUBMITTALS

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

B. Product Data: Submit capacity, dimensions, weights, details, and wiring configuration.

C. Test Reports:
   1. Indicate let-through voltage test data.

2. Submit spectrum analysis of each unit.
3. Submit test reports from nationally recognized independent testing laboratory verifying suppressors can survive published surge current rating.

D. Manufacturer's Installation Instructions: Submit installation instructions and connection requirements.

E. Manufacturer's Certificate: Certify transient voltage surge suppression device complies with UL 1449 Second Edition Surge Voltage Ratings.

1.5 CLOSEOUT SUBMITTALS

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

B. Project Record Documents: Record actual locations of transient voltage surge suppressors.

C. Operation and Maintenance Data: Submit manufacturer's descriptive literature, installation instructions, and maintenance and repair data.

1.6 QUALITY ASSURANCE

A. List individual units under UL 1449 and UL 1283.

B. Perform Work according to all applicable Federal, State, and Local Codes and Ordinances.

C. Maintain one copy of each document on Site.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept equipment on Site in factory packaging. Inspect for damage.

C. Protect equipment from damage by providing temporary covers until construction is complete in adjacent space.

1.9 WARRANTY

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

B. Furnish five-year manufacturer's warranty for transient voltage surge suppressor part failure.

PART 2 - PRODUCTS

2.1 TRANSIENT VOLTAGE SURGE SUPPRESSOR (TVSS)

A. Manufacturers:
   1. Square D, by Schneider Electric.
   2. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: Surge protective devices for protection of AC electrical circuits.

C. Types: Service entrance switches, Power panelboards, Lighting panelboards.

D. Unit Operating Voltage: As indicated on Drawings.

E. Maximum Continuous Operating Voltage: Greater than 115 percent of nominal system operating voltage.

F. Construction:
   1. Finish: Factory finish of baked enamel.
   2. Balanced Suppression Platform: Equally distribute surge current to metal oxide varistor (MOV) components to ensure equal stressing and maximum performance. Furnish surge suppression platform with equal impedance paths to each matched MOV.
   3. Internal Connections: Hardwired with connections using low impedance conductors and compression fittings.
   4. Safety and Diagnostic Monitoring: Equipped with standard overcurrent protection:
      a. Continuous monitoring of fusing system.
      b. Monitor individual MOVs (including neutral to ground). Capable of identifying open circuit failures not monitored by conventional fusing systems.
      c. Monitor for overheating in each mode due to thermal runaway.
      d. Furnish green and red solid state indicator light on each phase. Absence of green light and presence of red light indicates which phases have been damaged. Fault detection activates flashing trouble light. Units not capable of detecting open circuit damage, thermal conditions, and over current will not be accepted.
   5. Labeling: Permanently affix UL 1449 suppression voltage ratings and CSA to unit.

G. Rating:
   1. Electrical Noise Filter: Furnish each unit with high performance EMI/RFI noise rejection filter. Electric line noise attenuation no less than 45 dB at 100 kHz using MIL-STD-220A insertion loss test method.

H. Accessories:
   1. Digital display transient event counter with manual reset.
   2. Local audible alarm.
   3. Form C dry contacts one normally open (NO) and one normally closed (NC) for remote status monitoring.
   4. Push-to-test feature.

I. Surge Current Capacity:
   1. Total Surge Current Survival Based on 8-by-20-microsecond Waveform:

a. Service Entrance (Switchboards, Switchgear, and MCCs):
   1) Minimum Surge Current per Phase: 250kA.
   2) Minimum Surge Current per Mode: 125kA.
b. High-Exposure Rooftop Locations:
   1) Minimum Surge Current per Phase: 160kA.
   2) Minimum Surge Current per Mode: 80kA.
c. Distribution and Branch Locations (Panelboards, MCCs, Bus Ducts):
   1) Minimum Surge Current per Phase: 120kA.
   2) Minimum Surge Current per Mode: 60kA.

J. Protection Modes: For Wye configured system, furnish device with directly connected suppression elements between line-neutral (L-N), line-ground (L-G), and neutral-ground (N-G). For Delta configured system, furnish device with suppression elements between line to line (L-L) and line to ground (L-G).

K. Do not exceed following for maximum UL 1449 suppression voltage ratings:
1. WYE; L-N, L-G, N-G:
   a. 208Y/120: 400 V.
   b. 480Y/277: 800 V.
   c. 600Y/347: 1,200 V.
2. Delta; L-L, L-G:
   a. 208Y/120: 800 V.
   b. 480Y/277: 1,500 V.
   c. 600Y/347: 2,000 V.

L. ANSI/IEEE Catalog C3 Let Through Voltage: Based on ANSI/IEEE C62.41 and C62.45 recommended procedures for Catalog C3 surges (20 kV, 10kA) and not less than:
1. 208Y/120; L-N: 500 V.
2. 480Y/277; L-N: 900 V.
3. 600Y/347; L-N: 1,300 V.

M. ANSI/IEEE Cat. B3 Let Through Voltage: Based on ANSI/IEEE C62.41 and C62.45 recommended procedures for ANSI/IEEE Catalog B3 Ringwave (6 kV, 500 amps) not less than:
1. 208Y/120:
   a. WYE; L-N, L-G, N-G: 400 V.
   b. L-N: 170 V.
2. 480Y/277:
   a. WYE; L-N, L-G, N-G: 800 V.
   b. L-N: 300 V.
3. 600Y/347:
   a. WYE; L-N, L-G, N-G: 1,200 V.
   b. L-N: 470 V.

2.2 SOURCE QUALITY CONTROL AND TESTS

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

B. Test units to specified surge ratings to ensure devices will achieve required life expectancy and reliability. Testing to full ratings also verifies internal construction quality of suppressors. Provide withstand testing for each mode and each phase basis.

C. Perform actual let-through voltage test data in form of oscillograph results for ANSI/IEEE C62.41 Catalog C3 (20 kV, 10 kA), Catalog C1 (6 kV, 3 kA), and Catalog. B3 (6 kv, 500 A at 100 kHz) tested according to ANSI/IEEE C62.45.

D. Perform spectrum analysis of each unit based on MIL-STD-220A test procedures between 50 kHz and 200 kHz verifying device noise attenuation exceeds 45 dB at 100 kHz.

E. Perform test verifying suppressors can survive published surge current rating for each mode and each phase basis. Test wave based on ANSI/IEEE C62.41, 8-by-20-microsecond current wave.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Verify mounting area is ready for equipment.

C. Verify circuit rough-ins are at correct location.

3.2 INSTALLATION

A. Install according to IEEE 1100.

B. Install service entrance suppressors in switchboard or switchgear at point of origination for each power configuration within distribution system.

C. Install distribution and branch suppressors externally, next to panelboards.

D. Install using direct bus bar connection.

E. Install with maximum conductor length of 14 inches. Install suppressor with internal fusing.

END OF SECTION

SECTION 26 56 00

EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes exterior luminaries, poles, and accessories.

1.2 REFERENCES

A. American National Standards Institute:
   1. ANSI C82.1 - American National Standard for Lamp Ballast-Line Frequency Fluorescent Lamp Ballast.
   2. ANSI C82.4 - American National Standard for Ballasts-for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type).
   3. ANSI O5.1 - Wood Poles, Specifications and Dimensions.

1.3 UNIT PRICES

A. Refer to Section 01 20 00- Price and Payment Procedures.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate dimensions and components for each luminaire not standard Product of manufacturer.

C. Product Data: Submit dimensions, ratings, and performance data.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Store and handle solid wood poles in accordance with ANSI O5.1.

1.7 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Furnish bolt templates and pole mounting accessories to installer of pole foundations.

1.8 MAINTENANCE MATERIALS

A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.

B. Furnish one spare of each fixture installed.

C. Furnish two ballasts of each type installed.

PART 2 - PRODUCTS

2.1 LUMINAIRES

A. Product Description: Complete exterior luminaire assemblies, with features, options, and accessories as required.

B. Refer to Section 01 60 00 - Product Requirements for product options.

C. Manufacturers:
1. Lithonia.
2. Lumark
3. RAB.
4. Substitutions: Section 01 60 00 - Product Requirements.

D. Product Description: LED area lighting fixture with adjustable slipfitter mount, twist-lock photocell, and adjustable light output module.

E. Ratings:
1. Power: 120vac, 100 Watt (Max)
2. Distribution: Type II
3. Color Temp: 4000K
4. Output: 10,000 Lumens

2.2 METAL POLES

A. Manufacturers:
1. General Steel.
2. RAB Lighting.
3. Substitutions: Section 01 60 00 - Product Requirements.

B. Material and Finish: Steel with bronze finish.

C. Section Shape and Dimensions: 4 inch, square, straight.

D. Height: As indicated on Drawings.

E. Base: Non-breakaway.

F. Accessories:
   1. Handhole.
   2. Anchor bolts.
   3. Tenon for slipfitter mount.
   4. GFCI Receptacle with Lockable, Metallic, Weatherproof While-In-Use Cover.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and Project conditions.

B. Verify foundations are ready to receive fixtures.

3.2 EXISTING WORK

A. Disconnect and remove abandoned exterior luminaries.

3.3 INSTALLATION

A. Install poles plumb. Install double nuts to adjust plumb. Grout around each base.

B. Bond and ground luminaries, metal accessories, and metal poles in accordance with Section 26 05 26.

3.4 FIELD QUALITY CONTROL

A. Section 01 70 00 - Execution and Closeout Requirements.

B. Operate each luminaire after installation and connection. Inspect for improper connections and operation.

C. Measure illumination levels to verify conformance with performance requirements.

D. Take measurements during night sky, without moon or with heavy overcast clouds effectively obscuring moon.

3.5 ADJUSTING

A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.

B. Aim and adjust luminaries to provide illumination levels and distribution as indicated on Drawings.

3.6 CLEANING

A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.

B. Clean photometric control surfaces as recommended by manufacturer.

C. Clean finishes and touch up damage.

3.7 PROTECTION OF FINISHED WORK

A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished work.

B. Replace luminaries having failed components at Substantial Completion.

END OF SECTION

SECTION 31 05 13

SOILS FOR EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

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

B. Related Sections:
   1. Section 31 05 16 - Aggregates for Earthwork.
   2. Section 31 22 13 - Rough Grading.
   3. Section 31 23 23 - Fill.
   4. Section 31 37 00 - Riprap.
   5. Section 32 91 19 - Landscape Grading.
   6. Section 31 35 21- Slope protection and erosion control.

1.2 REFERENCES

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

B. ASTM International:
   1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
   2. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).
   3. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

1.3 UNIT PRICES - MEASUREMENT AND PAYMENT

A. Refer to Section 01 20 00- Price and Payment Procedures.

1.4 SUBMITTALS

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

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

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

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

1.5 QUALITY ASSURANCE

A. Furnish each subsoil and topsoil material from single source throughout the Work. A second source may be requested for approval by the Engineer.

B. Perform Work in accordance with State of Michigan Department of Transportation standard specifications for construction.

PART 2 - PRODUCTS

2.1 SUBSOIL MATERIALS

A. Subsoil Type **1**: Native site soils conforming to the requirements of the geotechnical report, free of gravel larger than 3 inches, rocks larger than 2 inches, and debris, compacted to a minimum 90 percent of the materials maximum dry density in layers not to exceed 12 inches loose depth unless otherwise specified or as approved by the Engineer.

B. Subsoil Type **2:** Imported Silty sand conforming to the requirements of the geotechnical report, compacted to a minimum 90 percent of the materials maximum dry density in layers not to exceed 12 inches loose depth unless otherwise specified or as approved by the Engineer.

2.2 TOPSOIL MATERIALS

A. Type B Fill: MDOT Class II granular material – for dry excavation, compacted to 95 percent of maximum density.

B. Type D Fill: Acceptable Native Subsoil: Reused, free of gravel larger than 3 inch size, and debris, compacted to 95 percent of maximum density.

C. Topsoil: Material conforming to MDOT Standard Specifications for Construction.

D. Native Topsoil:
   1. Graded.
   2. Free of roots, rocks larger than 1/2 inch, subsoil, debris, large weeds and foreign matter.
      a. Screening: Double screened.

2.3 SOURCE QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Testing and Inspection Services Testing and analysis of soil material.

B. Testing and Analysis of Subsoil Material: Perform in accordance with AASHTO T180.

C. Testing and Analysis of Topsoil Material: Perform in accordance with AASHTO T180.

D. When tests indicate materials do not meet specified requirements, change material and retest.

E. Furnish materials of each type from same source throughout the Work.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Excavate subsoil and topsoil from areas designated. Strip topsoil to full depth of topsoil in designated areas.

B. Stockpile excavated material meeting requirements for subsoil materials and topsoil materials.

C. Remove excess excavated materials subsoil and topsoil not intended for reuse, from site.

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

3.2 STOCKPILING

A. Stockpile materials on site at locations indicated Engineer.

B. Stockpile in sufficient quantities to meet Project schedule and requirements.

C. Separate differing materials with dividers or stockpile apart to prevent mixing.

D. Stockpile topsoil 8 feet high maximum.

E. Prevent intermixing of soil types or contamination.

F. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

G. Stockpile unsuitable and/or hazardous materials on impervious material and cover to prevent erosion and leaching, until disposed of.

3.3 STOCKPILE CLEANUP

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

END OF SECTION

SECTION 31 05 16

AGGREGATES FOR EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Coarse aggregate materials.
   2. Fine aggregate materials.

B. Related Sections:
   1. Section 31 05 13 - Soils for Earthwork: Fill and grading materials.
   2. Section 31 22 13 - Rough Grading.
   3. Section 31 23 23 - Fill.
   4. Section 31 37 00 - Riprap.
   5. Section 33 40 00 - Storm Drain Utilities.
   6. Section 31 35 21 - Slope protection and erosion control.

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials:
   1. AASHTO M147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses.
   2. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. ASTM International:
   1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
   2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
   3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).
   4. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
   5. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.3 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Refer to Section 01 20 00- Price and Payment Procedures.

1.4 SUBMITTALS

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

B. Samples: May be requested for submittal by the Engineer for testing..

C. Materials Source: Submit name of imported materials suppliers.

D. Manufacturer's Certificate: Certify Products meet or exceed Michigan Department of Transportation 22A crush limestone specification or 6A.

1.5 QUALITY ASSURANCE

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

B. Perform Work in accordance with State of Michigan and Lenawee County Drain Commissioner standards for construction.

C. Maintain one copy of each document on site.

PART 2 - PRODUCTS

2.1 COARSE AGGREGATE MATERIALS

A. Coarse Aggregate Type A1 6A compacted crushed limestone: Compacted to a minimum 95 percent of its maximum dry density in layers not to exceed 12 inches loose depth, unless otherwise specified, conforming to State of Michigan Department of Transportation standard within the following limits.

Sieve Size	Percent Passing
2 inches	100
1 inch	95 to 100
3/4 inch	
1/2 inch	30 to 60
3/8 inch	
No. 4	0 to 8
No. 8	
No. 40	
No. 200	2 to 1

B. Coarse Aggregate Type A2 22A crushed limestone: Compacted to a minimum 95 percent of its maximum dry density in layers not to exceed 12 inches loose depth, conforming to State of Michigan Department of Transportation standard specification for construction within the following limits:

Sieve Size	Percent Passing
2 inches	100
1 inch	100
3/4 inch	90 to 100
1/2 inch	
3/8 inch	65 to 85
No. 4	

No. 8	30 to 50
No. 40	
No. 200	4 to 8

C. Drainstone: Compacted to a minimum 95 percent of its maximum dry density in layers not to exceed 12 inches loose depth, conforming to the geotechnical report requirements for construction within the following limits:

Sieve Size	Opening	Percent Passing
2 inches	50 mm	100
1 ½ inches	37.5 mm	90 to 100
3/4 inch	19 mm	40 to 85
1/2 inch	12.5 mm	10 to 50
3/8 inch	9.5 mm	5 to 40
No. 4	4.75 mm	0 to 25
No. 8	2.36 mm	0 to 10
No. 200	0.075 mm	0 to 3

2.2 FINE AGGREGATE MATERIALS

A. Fine Aggregate Type A3 MDOT Class II (2NS): Conforming to State of Michigan Department of Transportation standard specification for construction.

Sieve Size	Percent Passing
No. 4	95 to 100
No. 8	65 to 95
No. 16	35 to 75
No. 30	20 to 55
No. 50	10 to 30
No. 100	0 to 10
No. 200	3

B. Fine Aggregate Type A4 MDOT Class III A: Conforming to State of Michigan Department of Transportation standard specification for construction (used for sanitary sewer backfill – 1’ over top of pipe only.

Sieve Size	Percent Passing
3/8 inches	100
No. 4	50 to 100
No. 100	0 to 30
No. 200	0 to 15

C. Filter Sand: Conforming to the geotechnical report requirements for construction.

Sieve Size		Percent Passing
1 inch	25 mm	100
½ inch	12.5 mm	75 to 100
3/8 inch	9.5 mm	65 to 100

No. 4	4.75 mm	50 to 95
No. 8	2.36 mm	30 to 75
No. 16	1.18 mm	10 to 50
No. 30	0.60 mm	0 to 30
No. 50	0.30 mm	0 to 10
No. 100	0.15 mm	0 to 5
No. 200	0.075 mm	0 to 3

2.3 SOURCE QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Testing and inspection services.

B. Coarse Aggregate Material - Testing and Analysis: Perform in accordance with MTM 109 and MTM 108 and other applicable MDOT testing standards.

C. Fine Aggregate Material - Testing and Analysis: Perform in accordance with MTM 109 and MTM 108 and other applicable MDOT testing standards.

D. When tests indicate materials do not meet specified requirements, change material and retest.

PART 3 - EXECUTION

3.1 STOCKPILING

A. Stockpile materials on site at locations indicated by the Engineer.

B. Stockpile in sufficient quantities to meet Project schedule and requirements.

C. Separate different aggregate materials with dividers or stockpile individually to prevent mixing.

D. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

E. Stockpile hazardous materials on impervious material and cover to prevent erosion and leaching, until disposed of.

3.2 STOCKPILE CLEANUP

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

END OF SECTION

SECTION 31 10 00

SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

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

B. Related Sections:
   1. Section 02 41 16 - Structure Demolition: Removing underground storage tanks and designated utilities including site storm sewerage systems, water lines, gas lines, storm sewers, and telephone cable and power lines.
   2. Section 31 22 13 - Rough Grading.
   3. Section 31 25 00 - Erosion and Sedimentation Controls.
   4. Section 31 23 16 - Excavation.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Refer to Section 01 20 00- Price and Payment Procedures.

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.

1.4 DEFINITIONS

A. Site Clearing as defined herein shall mean the removal, hauling, and disposal of surface debris and vegetation from the limits of site disturbance shown on the Design Drawings.

B. Grubbing shall consist of the removal and satisfactory disposal of stumps, roots, and matted roots from the designated grubbing areas. Grubbing also includes filling of all holes and depressions, which result from the removal of stumps, roots, and matted roots below the depth where stripping or excavation is required.

C. Stripping shall consist of the removal and satisfactory disposal of weeds, grass, and other vegetative materials to the ground surface and removal and satisfactory disposal of soil containing roots, organic matter, or other deleterious materials.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Herbicide: type, approved by authority having jurisdiction.

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.

C. Begin site clearing and grubbing only after erosion and sediment control measures are in place.

D. The Contractor shall verify with the Engineer prior to initiating any clearing operations in that area. Unauthorized clearing will not be entitled for payment.

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 Miss Dig 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.

   1. All protection measures must be approved by the Engineer.

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

A. Clear areas required for access to site and execution of Work as approved by Engineer.

B. Remove trees and tree stumps within excavated areas and project limits as specified on the drawings and as necessary for construction. Haul all material and dispose of offsite.

C. Remove existing storm sewer, fences, catch basins, etc. as described on the drawings and within the influence of construction. Any structure or piping shown on the drawing to be affected by the proposed work shall be removed completely.

D. Clear all undergrowth, debris and downfalls with minimum disturbance to soil. Seed all disturbed areas according to Seeding Specification.

E. Apply herbicide to remaining stumps to inhibit growth.

F. Grubbing shall extend 5 feet outside foundation or excavation and fill lines.

G. Tree trunks and stumps shall be removed by excavation, including removal of trunk, stump, rootball, and all roots greater than 1-½ inches in diameter, unless otherwise directed by the Engineer.

H. Roots to remain within the embankment limits shall be sealed with a polyurethane sealant to minimize decay.

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. Remove abandoned utilities. Indicated removal termination point for underground utilities on Record Documents.

D. Continuously clean-up and remove waste materials from site. Do not allow materials to accumulate on site.

E. 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, relandscaped, or regraded, marked areas, entire site, 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 SCHEDULES

A. Debris shall be disposed of as indicated on the plans and as directed by the Engineer.

B. All woody debris shall be hauled from site.

C. All other debris shall be removed from the site and disposed of in accordance with local and state regulations.

D. Coordinate debris management with Engineer prior to construction.

3.8 DEBRIS MANAGEMENT

A. Debris shall be disposed of as indicated on the plans and as directed by the Engineer.

B. All woody debris shall be hauled from site.

C. All other debris shall be removed from the site and disposed of in accordance with local and state regulations.

D. Coordinate debris management with Engineer prior to construction.

3.9 FENCES AND/OR OTHER PRIVATE PROPERTY

A. Contractor shall notify Landowners and Engineer of conflicts and provide reasonable cooperation and assistance.

B. Any structures outside of the dam's easement shall not be disturbed. Contractor shall correct all damage outside of right-of-way at own expense.

C. Contractor shall disassemble fence, etc. and stockpile off of the dam's easement, and Landowner is responsible for reassembly unless otherwise noted in the drawings. No extra payment will be made for fences, etc.

D. Haul and dispose of unsalvageable structures and storm sewer.

E. Haul and dispose of waste material resulting from construction. Waste material includes, but is not limited to unusable spoils from excavation, landscaping, site grading, etc.

END OF SECTION

SECTION 31 22 13

ROUGH GRADING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Excavating topsoil.
a. Strip and stockpile topsoil.
b. Strip and remove wetland topsoil.
2. Excavating subsoil.
a. Surficial sand excavation.
3. Cutting, grading, filling, rough contouring, compacting, rough grading, and site for site structures, building pads, embankment construction, roadway embankment and cut, clay liner, scarify, blend, and compact subgrade, and.

B. Related Sections:
1. Section 31 05 13 - Soils for EarthWork: Soils for fill.
2. Section 31 05 16 - Aggregates for EarthWork: Aggregates for fill.
3. Section 31 10 00 - Site Clearing: Excavating topsoil.
4. Section 31 23 23 - Fill: General building area backfilling.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Refer to Section 01 20 00- Price and Payment Procedures.

1.3 REFERENCES

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

B. ASTM International:
1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
3. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
4. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).
5. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
6. ASTM D2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
7. ASTM D2434 - Standard Test Method for Permeability of Granular Soils (Constant Head).

8. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
9. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

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

1.4 SUBMITTALS

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

B. Samples: Submit, in air-tight containers, 10 lb. sample of each type of fill to testing laboratory.

C. Materials Source: Submit name of imported materials suppliers.

D. 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. Perform Work in accordance with ASTM C136, ASTM D2419, and ASTM D2434.

B. Perform Work in accordance with Michigan Department of Transportation standards.

C. Maintain one copy of each document on site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Refer to the following sections:
1. Section 31 05 13 – Soils for Earthwork.
2. Section 31 05 16 – Aggregates for Earthwork.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Verify site conditions under provisions of Section 31 10 00 – Site Clearing**.**

C. Verify survey bench mark and intended elevations for the Work are as indicated on Drawings.

D. Verify that fill materials to be used are acceptable.

3.2 PREPARATION

A. Call Miss Dig 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.

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 benchmarks, survey control point, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

3.3 TOPSOIL EXCAVATION

A. Excavate topsoil from areas to be further excavated, relandscaped, or regraded and/or marked areas, 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. Stockpile material on impervious material and cover over with same material, until disposal.

E. Remove topsoil from site or do not remove topsoil from site at the engineer’s discretion.

3.4 SUBSOIL EXCAVATION

A. Excavate subsoil from areas to be further excavated, relandscaped, or regraded and/or marked areas.

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. Remove excess subsoil not intended for reuse, from site.

E. Stockpile subsoil in area designated on site to depth not exceeding 8 feet and protect from erosion.

F. Benching Slopes: Horizontally bench existing slopes greater than 1: 4 to key placed fill material to slope to provide firm bearing.

G. Stability: Replace damaged or displaced subsoil as specified for fill.

H. 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 in accordance with the plan details.

C. Maintain optimum moisture content of fill materials to attain required compaction density.

D. Slope grade away from building 2 percent slope for minimum distance of 10 ft, unless noted otherwise.

E. Make grade changes gradual. Blend slope into level areas.

F. Repair or replace items indicated to remain damaged by excavation or filling.

G. Install Work in accordance with Michigan Department of Transportation standards.]

3.6 TOLERANCES

A. Top Surface of Subgrade: Plus or minus 1/10 foot tolerance from required elevation.

3.7 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements, 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

B. Perform laboratory material tests in accordance with ASTM D1557.

C. Perform in place compaction tests in accordance with the following:
   1. Density Tests: ASTM D1556
   2. Moisture Tests: ASTM D3017

D. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

END OF SECTION

SECTION 31 23 19

DEWATERING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Dewatering system.
   2. System operation and maintenance.
   3. Water disposal.

B. Related Sections:
   1. Section 31 05 16 - Aggregates for Earthwork.
   2. Section 31 25 00 - Erosion and Sedimentation Controls.

1.2 REFERENCES

A. ASTM International:
   1. ASTM C33 - Standard Specification for Concrete Aggregates.

1.3 UNIT PRICES

A. Refer to Section 01 20 00- Price and Payment Procedures.

1.4 DEFINITIONS

A. Dewatering includes the following:
   1. Lowering of ground water table, intercepting horizontal water seepage, and water from utilities to prevent water from entering excavations trenches.
   2. Disposing of removed water.

B. Surface Water Control: Removal of surface water within open excavations.

1.5 SYSTEM DESCRIPTION

A. Provide dewatering and surface water control systems to permit Work to be completed on dry and stable subgrade.

1.6 PERFORMANCE REQUIREMENTS

A. Design dewatering systems to:
   1. Lower water table within areas of excavation to below bottom of excavation to permit Work to be completed on dry and stable subgrade.
   2. Relieve hydrostatic pressures in confined water bearing strata below excavation to eliminate risk of uplift or other instability of excavation.

3. Prevent damage to adjacent properties, buildings, structures, utilities, and facilities from construction operations.
4. Prevent loss of fines, quick condition, or softening of foundation subgrade.
5. Maintain stability of sides and bottoms of excavations and trenches.

B. Design surface water control systems to:
1. Collect and remove surface water and seepage entering excavation.

1.7 QUALITY ASSURANCE

A. Comply with authorities having jurisdiction for the following:
1. 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 Municipal, State and Federal Standards.

1.8 QUALIFICATIONS

A. Installer: Company specializing in performing work of this section with minimum 3 years' experience and responsible for design, operation, and maintenance of dewatering system.
1. Assume sole responsibility for dewatering and surface water control systems and for loss or damage resulting from partial or complete failure of protective measures and settlement or resultant damage caused by ground water control operations.

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 dewatering and surface water control systems minimum 1 day before starting excavation trenching.

1.10 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

B. Coordinate work to permit construction operations to be completed on dry stable substrate.

PART 2 - PRODUCTS

2.1 DEWATERING EQUIPMENT

A. Select dewatering equipment to meet specified performance requirements.

2.2 ACCESSORIES

A. Filter Sand: Fine aggregate Type MDOT Class II Sand as specified in Section 31 05 16.

B. Filter Aggregates: Course aggregate type MDOT 6A Compacted Crushed Limestone as specified in Section 31 05 16.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Call Local Utility Line Information service at 811 not less than three working days before performing Work.
   1. Request underground utilities to be located and marked within and surrounding construction areas.

3.2 PREPARATION

A. Protect existing adjacent buildings, structures, and improvements from damage caused by dewatering operations.

B. Maintain monitoring wells until groundwater is allowed to return to normal level.

3.3 DEWATERING SYSTEM

A. Install dewatering system as required to complete work stated in the proposal.

B. Locate system components to allow continuous dewatering operations without interfering with installation of permanent Work and existing public rights-of-way, sidewalks, and adjacent buildings, structures, and improvements.

C. Install sand filter and aggregate surrounding the pump as required for dewatering.

D. Use pumps in accordance with manufacturer’s instructions.

E. Connect pumps to discharge header. Install valves to permit pump isolation.

3.4 SURFACE WATER CONTROL SYSTEM

A. Provide ditches, berms, and other devices to divert and drain surface water from excavation area as specified in Section 31 25 00.

B. Divert surface water and seepage water within excavation areas into sumps and pump water into drainage channels storm drains settling basins in accordance with requirements of agencies having jurisdiction.

C. Control and remove unanticipated water seepage into excavation.

3.5 SYSTEM OPERATION AND MAINTENANCE

A. Operate dewatering system continuously until backfill is minimum 2 feet above normal ground water table elevation.

B. Provide 24-hour supervision of dewatering system by personnel skilled in operation, maintenance, and replacement of system components.

C. Conduct daily observation of dewatering system and monitoring system. Make required repairs and perform scheduled maintenance.

D. Fill fuel tanks before tanks reach 25 percent capacity.

E. Start emergency generators at least twice each week to check operating condition.

F. When dewatering system cannot control water within excavation, notify Architect/Engineer and stop excavation work.
   1. Supplement or modify dewatering system and provide other remedial measures to control water within excavation.
   2. Demonstrate dewatering system operation complies with performance requirements before resuming excavation operations.

G. Modify dewatering and surface water control systems when operation causes or threatens to cause damage to new construction, existing site improvements, adjacent property, or adjacent water wells.

H. Correct unanticipated pressure conditions affecting dewatering system performance.

I. Do not discontinue dewatering operations without Engineer’s approval.

3.6 WATER DISPOSAL

A. Discharge water into existing storm sewer system drainage channels settling basins specified in Section 31 25 00.

3.7 SYSTEM REMOVAL

A. Remove dewatering and surface water control systems after dewatering operations are discontinued.

B. Repair damage caused by dewatering and surface water control systems or resulting from failure of systems to protect property.

3.8 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. After dewatering system is installed, perform pumping test to determine when selected pumping rate lowers water level in well below pump intake. Adjust pump speed, discharge volume, or both to ensure proper operation of each pump.

C. Submit weekly monitoring reports including the following:
   1. Dewatering flow rates.
   2. Piezometer readings.
   3. Test reports of discharge water analysis.
   4. Maintenance records for dewatering and surface water control systems.

END OF SECTION

SECTION 31 23 23

FILL

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all layout, products, materials, equipment, tools, services, transportation, supervision, and labor t complete all fill required for the Work as shown on the Design Drawings and including the following:
   1. Aggregate and soil materials for earthwork.
   2. Subgrade preparation.
   3. Site filling and backfilling.
   4. Compacting soil and aggregate materials.
   5. Incidental items not covered under other Specification sections such as grading and restoration.

B. Related Sections:
   1. Section 31 05 13 - Soils for Earthwork: Soils for fill.
   2. Section 31 05 16 - Aggregates for Earthwork: Aggregates for fill.
   3. Section 31 22 13 - Rough Grading: Site filling.
   4. Section 31 37 00 - Riprap.
   5. Section 33 40 00 - Storm Drain Utilities.
   6. Section 33 46 00 - Subdrainage: Filter aggregate.

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 C 88 Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
   2. ASTM C 117 Standard Test Method for Materials Finer Than 75-Micrometers (No. 200) Sieve in Mineral Aggregates by Washing.
   3. ASTM C 127 Standard Test Method for Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.
   4. ASTM C 131 Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
   5. ASTM C 136 Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
   6. ASTM D 75 Standard Practice for Sampling Aggregates.
   7. ASTM D 422 Test Method for Particle-Size Analysis of Soils.
   8. ASTM D 698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
   9. ASTM D 1140 Standard Test Methods for Determining the Amount of Material Finer than 75-µm (No. 200) Sieve in Soils by Washing.

10. ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
11. ASTM D 1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).
12. ASTM D 2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
13. ASTM D 2216 Laboratory Determination of Water (Moisture) Content of Soil Rock, and Soil-Aggregate Mixtures.
14. ASTM D 2487 Standard Practice for Classification of Soils for Engineering Purposes.
15. ASTM D 2488 Practice for Description and Identification of Soils (Visual-Manual Procedure).
16. ASTM D 2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
17. ASTM D 2937 Test method for Density of Soil in Place by the Drive-Cylinder Method.
18. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
19. ASTM D 3080 Standard Test Method for Direct Shear Test of Soils Under Consolidated Drained Conditions.
20. ASTM D 4253 Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
21. ASTM D 4254 Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
22. ASTM D 4318 Standard Test Method for Liquid Limit, Plastic Limit, Plasticity Index of Soils.
23. ASTM D 4767 Standard Test Method for Consolidated Undrained Triaxial Compression Test for Cohesive Soils.
24. ASTM D 4959 Test Method for Determination of Water Content (Moisture) by Direct Heating Method.
25. ASTM D 5084 Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.
26. ASTM D 5268 Standard Specification for Topsoil for Landscape Purposes.
27. ASTM D 6938 Standard Test Methods for Density and Water Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
28. ASTM D 6951 Standard Test Method for Use of the Dynamic Cone Penetrometer in Shallow Pavement Applications.

C. Michigan Department of Transportation (MDOT)
1. MDOT Standard Specification for Construction, current edition.
2. MDOT Standard Specification for Construction, 2012 edition.
3. MDOT Density Control Handbook, current edition.

D. American Association of State Highway and Transportation Officials (AASHTO):
1. AASHTO T27 Standard Method of Test for Family of Curves-One Point Method, in the Standard Specifications for Transportation Materials and Methods of Sampling and Testing, Part II Tests.

E. 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.

F. American National Standards Institute (ANSI): Z35.1, Safety Color Red.

G. American Public Works Association (APWA): Uniform Color Code for Temporary Marking of Underground Utility Locations.

1.3 UNIT PRICES

A. Refer to Section 01 20 00- Price and Payment Procedures.

1.4 SUBMITTALS

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

B. Product Data: Submit data for geotextile fabric indicating fabric and construction.

C. Samples: Submit, in air-tight containers, 10 lb sample of each type of fill to testing laboratory.

D. Materials Source: Submit name of imported fill materials suppliers.

E. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

F. Samples: Submit a 5 gallon bucket sample of each type of fill to Engineer in airtight containers.

1.5 QUALITY CONTROL

A. Contractor Quality Control (CQC) is the responsibility of the Contractor, and consists of observations, testing, measurements, and documentation generated and/or performed by the Contractor to confirm that the final product meets the requirements of the Design Drawings, Specifications, and Contract Documents.

B. Provide certified quality control test results for all imported material. Provide submittal prior to importing materials. Provide tests as specified during production.

C. Notify the Engineer when any one of the following occur:
1. Backfill is about to be placed on prepared foundation, or backfill operations are about to be resumed after a period of inactivity.
2. Structures are ready for backfilling, or backfilling operations are about to be resumed after a period of inactivity.
3. Soft or loose surface is encountered where fill or backfill is to be placed.
4. Materials appear to be deviating from the Specifications.
5. Initial sampling of imported material is to be conducted or importing of a material to the site is about to begin.

D. Provide adequate survey control to avoid unauthorized over excavation.

E. The Contractor shall be responsible for and shall repair all damage to any such utility, equipment, pavement and structure.

F. Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades in settled, eroded, and rutted areas to prevent ponding and promote positive drainage.

1.6 QUALITY ASSURANCE

A. The Engineer will perform field quality assurance tests to measure density and water content of soil in place, laboratory full compaction and associated one-point compaction tests, and gradation or index tests to confirm that materials placed meet the requirements of these Specifications.

B. Contractor shall remove surface material and provide assistance as necessary with sampling and testing.

1.7 WEATHER LIMITATIONS

A. Material excavated when frozen or when air temperature is less than 32ºF shall not be used as fill or backfill until material completely thaws.

B. Material excavated during inclement weather shall not be used as fill or backfill until after material drains and dries sufficiently or is appropriately moisture conditioned for proper compaction.

PART 2 - PRODUCTS

2.1 FILL MATERIALS

A. Refer to the following sections:
   1. 31 05 13 – Soils for Earthwork.
   2. 31 05 16 – Aggregates for Earthwork.
   3. 03 31 00 – Structural Concrete.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and Project conditions.

B. Verify subdrainage, damp proofing, or waterproofing installation has been inspected.

C. Verify underground tanks are anchored to their own foundations to avoid flotation after backfilling.

D. Verify structural ability of unsupported walls to support loads imposed by fill.

E. Verify that all fill materials to be used are acceptable.

F. Verify foundation and/or perimeter drainage installation has been inspected.

3.2 PREPARATION

A. Compact subgrade to density requirements for subsequent backfill materials.

B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with granular or Structural fill and compact to density equal to or greater than requirements for subsequent fill material at the Engineers discretion.
   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. 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. Employ placement method that does not disturb or damage other Work or foundation perimeter drainage conduit in trenches.

D. Maintain optimum moisture content of backfill materials to attain required compaction density.

E. Backfill against supported foundation walls. Do not backfill against unsupported foundation walls.

F. Slope grade away from building minimum 2 percent slope for minimum distance of 10 ft, unless noted otherwise.

G. Make gradual grade changes. Blend slope into level areas.

H. Leave fill material stockpile areas free of excess fill materials.

I. Machine compact under springline of pipe with T-bar or Engineer approved equivalent.

J. Backfill simultaneously on all side of utility structures, manholes, and manholes.

K. Compact all material by mechanical means. If tests indicate that compaction or moisture content is not as specified, or if compaction equipment being used is not as specified, terminate material placement and take corrective action prior to resuming material placement.

L. Operate compaction equipment in strict accordance with manufacturer's instructions and recommendations. Maintain equipment in such condition that it will deliver the manufacturer's rated compaction effort.

M. Operate tamping foot rollers at speed less than 5 miles per hour, and vibratory drum roller at speeds less than 3 miles per hour.

N. Operate sheepsfoot and tamping foot rollers to maintain the spaces between the individual feet clear of adherent materials that impair the effectiveness of the roller.

O. Where a minimum number of coverages is specified, provide 20 percent overlapping roller passes for each complete roller coverage per lift.

P. Provide suitable numbers of equipment to keep pace with fill and backfill placement activities. Restrict material placement rates if compaction equipment cannot keep pace with fill and backfill placement.

3.4 MOISTURE CONDITIONING AND PROCESSING

A. Provide supplemental sprinkling on the fill to keep material within specified moisture content limits throughout the placement and compaction process, and to preserve moisture in completed courses until placement of overlying courses.

B. Blend material by disking, blading, or harrowing to maintain uniform moisture content throughout the lift.

C. Do not attempt to compact material that contains excessive moisture. Material that becomes too wet shall be removed or reworked. Aerate material by blading, disking, harrowing, or other methods to hasten the drying process.

D. Provide suitable types and numbers of watering and blending equipment to keep pace with fill and backfill placement activities. Provide additional equipment or restrict material placement rates if watering and blending equipment cannot keep pace with fill and backfill placement.

E. Maintain moisture conditions of the fill surface during nights, weekends, holidays, and other periods of temporary work stoppage.

3.5 COMPACTION

A. Compact all material by mechanical means. If tests indicate that compaction or moisture content is not as specified, or if compaction equipment being used is not as specified, terminate material placement and take corrective action prior to resuming material placement.

B. Operate compaction equipment in strict accordance with manufacturer's instructions and recommendations. Maintain equipment in such condition that it will deliver the manufacturer's rated compaction effort.

C. Operate tamping foot rollers at speed less than 5 miles per hour, and vibratory drum roller at speeds less than 3 miles per hour.

D. Operate sheepsfoot and tamping foot rollers to maintain the spaces between the individual feet clear of adherent materials that impair the effectiveness of the roller.

E. Where a minimum number of coverages is specified, provide 20 percent overlapping roller passes for each complete roller coverage per lift.

F. Provide suitable numbers of equipment to keep pace with fill and backfill placement activities. Restrict material placement rates if compaction equipment cannot keep pace with fill and backfill placement.

G. Machine compact under springline of pipe with T-bar or Engineer approved equivalent.

H. Saturate Filter Sand as necessary prior to compaction.

3.6 TOLERANCES

A. The intention is that the work will be built generally to the required elevations, slope, and grade and that the outer surfaces shall be even and present a neat appearance. Placed material not meeting these limits shall be removed or reworked. Excess placed material will not be paid for and the cost of replacing and/or removing this stone or fill will be deducted from amounts due the Contractor.

B. Top Surface of Backfilling Within Building Areas: Plus or minus 1/2 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.

3.7 EXCESS MATERIAL

A. Inform the Construction Manager if there is excess material from excavations that cannot be reused onsite. The Construction Manager will designated a spot onsite for disposal.

3.8 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements, 017000 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

B. Establish and maintain a Quality Control (QC) Process for all work performed at the job site, to assure compliance with Contract requirements. Maintain records of QC tests, inspections,

and corrective actions. QC measures shall cover all materials, equipment, tests, and construction operations including but not limited to the following:

1. Procurement of materials that meet the Contract requirements.
2. Placement of all materials to the slope and grade lines shown on the Drawings and in accordance with this Section.
3. Compaction of all materials to meet the Contract requirements.
4. Confirmation of survey control points, grade stakes, excavation limits and fill grades.

C. Earthwork test and observation locations must be provided to the nearest 10 feet horizontally and 1 foot vertically. If reference staking is available and is nearby, then estimates meeting this accuracy are possible. If not, then testing locations must be measured using survey equipment including GPS.

D. Compaction Testing of Fill and Backfill:
   1. Perform laboratory material tests in accordance with AASHTO T180.
   2. Perform in place compaction tests in accordance with the following:
   3. Density Tests: ASTM D1556 or ASTM D2922.
   4. Moisture Tests: ASTM D3017.
   5. When tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.
   6. Tests and analysis of fill material will be performed in accordance with One Point Michigan Cone Test.
   7. Compaction testing will be performed in accordance with MDOT standard requirements.
   8. Frequency of tests: At the discretion of the Engineer.
   9. Proof roll compacted fill surfaces under slabs-on-grade.

E. Perform DCP Testing (ASTM D 6951) to evaluate the density of the Drainage Stone, Riprap Bedding, and Dense Graded Aggregate. Calibrate DCP results to a Sand Cone (ASTM D 1556) once per 100 tests for the Dense Graded Aggregate.

3.9 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.

C. Contractor shall be responsible for care and maintenance of all slopes and materials until final acceptance by the Owner. Damage to any incomplete section prior to acceptance shall be repaired by the Contractor at no additional cost. Incomplete sections are defined as sections of the structure where the fill has not been placed to the final grades with final site restoration features.

D. The Contractor shall take adequate precautions to protect all fill and backfill materials in the event of storms, high water conditions and floods. The Contractor shall not be entitled to additional time to repair impacted sections if, in the sole opinion of the Owner, inadequate precautions were taken to prevent damage. All repair operations shall be performed without cost to the Owner.

END OF SECTION

SECTION 31 25 00

EROSION AND SEDIMENTATION CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Rock materials.
2. Concrete materials and reinforcement.
3. Block, stone, aggregate, and soil materials.
4. Planting materials.
5. Pipe materials.
6. Stabilized construction entrances.
7. Filter socks.
8. In-water siltation control devices.
9. On-land silt fence.
10. Erosion control blankets.
11. Baled hay.
12. Soil stabilization fabric.
13. Filtration geotextile.
14. Anchoring devices.
15. Accessories.

B. Related Requirements:
1. Section 31 05 13 "Soils for Earthwork."
2. Section 31 05 16 "Aggregates for Earthwork."
3. Section 31 10 00 "Site Clearing."
4. Section 31 23 16 "Excavation."
5. Section 31 23 16.13 "Trenching."
6. Section 31 23 23 "Fill."
7. Section 32 91 19 "Landscape Grading."
8. Section 32 92 19 "Seeding."

1.2 UNIT PRICES

A. Refer to Section 01 20 00- Price and Payment Procedures.

1.3 SYSTEM DESCRIPTION

A. Methods of control are identified on Drawings by numbers corresponding to the Michigan Association of County Drain Commissioner’s keying system for soil erosion and sedimentation control

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 site conditions and applicable enforcing agency having project jurisdiction.

1.4 QUALITY ASSURANCE

A. Perform and maintain Work in accordance with the Soil Erosion and Sedimentation Control, Part 91 of Act 451 of 1994.

B. State of Michigan Act 347 – Soil Erosion and Sedimentation Control Act.

C. Michigan “Permit by Rule.”

D. National Pollutant Discharge Elimination System (NPDES) Regulations.

E. Michigan Department of Transportation (MDOT) 2020 Standard Specifications for Construction, current edition.

1.5 FIELD CONDITIONS

A. Minimum Conditions:

1. Do not place grout when air temperature is below freezing.
2. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

1.6 REGULATORY REQUIREMENTS

A. Submittals

1. 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.
2. Grading permit from local governing authority.
3. Stormwater discharge permit as required from local governing authority.
4. Copy of “Notice of Intent.”
5. Permit for disposal of excess materials and/or debris.
6. Soil Erosion Control Inspection Logs.

B. 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 governing APA. 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.

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 Contractor of Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Wildlife-safe materials for erosion control and site restoration will be used throughout the project area. Erosion control products containing plastic mesh netting or other similar material that could entangle wildlife will not be used. Several products for soil erosion and control exist that do not contain plastic netting including net-less erosion control blankets (for example, made of excelsior), loose mulch, hydraulic mulch, soil binders, unreinforced silt fences, and straw bales. Others are made from natural fibers (such as jute) and loosely woven together in a manner that allows wildlife to wiggle free. For further information please visit https://www.fws.gov/midwest/eastlansing/ecp.html.

B. While not required, it is recommended tree clearing/cutting/trimming of live trees and/or snags ≥3 inches DBH that have exfoliating bark, cracks, and/or cavities be completed during the October 1 – March 31 period.

C. In accordance with applicable Section for specified materials.

D. Riprap:
   1. As defined in Section 31 37 00 – Riprap.

E. Erosion Control Matting
   1. Erosion control matting shall be composed of fibers and/or filaments that are biodegradable or photodegradable within 2 years but without substantial degradation over the period of intended usage; are mechanically, structurally or chemically bound together to form a continuous matrix of even thickness and distribution that resist raindrop splash and when used with seeding allow vegetation to penetrate the matting; are of sufficient structural strength to withstand stretching or movement by wind or water when installed in accordance with the manufacturer's recommendations; are free of any substance toxic to plant growth and unprotected human skin or which interferes with seed germination; contain no contaminants that pollute the air or waters of the State when properly applied; and provide either 80% to 95% soil coverage when used as a substitute for mulch for seeding or 100% initial soil coverage when used as a temporary soil protection measure.

F. Planting Materials
   1. Seeding and Soil Supplements: as specified in Section 32 92 19 Seeding.
   2. Mulch: as specified in Section 32 92 19 Seeding.

G. Silt Fence
   1. The silt fence geotextile properties shall conform to the requirements of MDOT Standard Specification Section 91 0. 04.

2. The silt fence shall be fabricated in accordance with the requirements of MDOT Standard Specification Section 91 0. 02.

H. Straw Wattles
1. Straw wattles used for short-term or long-term erosion control, silt fencing, and as vegetation aid shall be certified weed free.

I. Cofferdams
1. Refer to Section 12 24 13

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 written 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 prior to work involving site clearing, stripping, and stockpiling topsoil, excavation, and earthwork.

B. Schedule planned control measures with construction operations 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.

F. Install permanent soil erosion control measures for all slopes, channels, ditches, or any disturbed land area within 5 calendar days after final grading or final earth change in the area has been completed or if significant earth change activity ceases.

G. Maintain permanent control measures until final acceptance by Owner.

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 complete according to Section 32 91 19 – Landscape Grading and Section 32 92 19 – Seeding, as required.

3.4 SILT FENCE

A. Silt fence shall be one-piece or continuously sewn to make one-piece geotextile for full height of the fence, including portion buried in the toe trench.

B. Silt fence should accommodate no more than 0.5 to 1 acre of drainage per 100 feet of fence and on slopes less than 1:2 (V:H).

C. When joints are necessary, join sections of silt fence by wrapping ends together in a roll joint.

D. Geotextile shall not extend more than 24 inches above the ground surface. Silt fence should be embedded 6 inches into the ground and backfilled with compacted soil on both sides. A small ridge should be created on the upslope side of the fence. Staple the geotextile fabric to wooden stakes set 6 to 10 feet apart and driven a minimum of 12 inches into the ground.

E. Install straw wattle parallel to the silt fence on the upslope side if directed by the Engineer. Secure with wooden stakes as needed. Geotextile shall not be stapled to existing trees.

F. Take precaution not to puncture geotextile during installation. Repair or replace damaged areas.

3.5 CONSTRUCTION ENTRANCE

A. Stabilized construction entrances shall be located at every point where construction traffic enters or leaves a construction site. Vehicles leaving the site must be routed over the ingress/egress corridor.

3.6 DUST CONTROL

A. The Contractor shall implement measures to minimize dust.

B. The Contractor will develop a dust plan that will be reviewed and approved by the APA/Owner.
   1. Wet application shall be required several times daily or as directed by the Engineer.
   2. All surfaces must be swept or vacuumed at minimum at the end of each work day and may be required more often at the direction of the Engineer.

C. The plan shall include but not be limited to the implementation of a combination of any or all of the following techniques as determined to be applicable to this Project by the Engineer.
   1. Wet Suppression.

2. Vehicle Speed Reduction.
3. Surface Cleaning.
4. Traffic Control.
5. Windbreaks.
6. Good Operating Practices.
7. Chloride Application.

3.7 MAINTENANCE

A. Inspect control system at least once per week, immediately after each rainfall and several times during prolonged rainfall. Make repairs immediately.

B. Replace control system promptly if fabric decomposes or system becomes ineffective prior to the expected usable life. The silt fence should be reinstalled if water is seeping underneath it or if the fence has become ineffective.

C. Maintain or replace system until no longer necessary for the intended purpose. Silt fence should be removed once vegetation is established and up-slope area has stabilized.

3.8 REMOVAL OF TEMPORARY FACILITIES

A. Do not remove erosion control facilities without written approval from Engineer.

B. All erosion control facilities will be the property of Contractor and shall be removed and disposed of off-site after all Work is complete.

C. Remove and dispose of sediments collected in the sediment control systems in accordance with Section 01 50 00: Temporary Facilities and Controls.

END OF SECTION

SECTION 31 32 21

FILTER FABRIC

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Filter Fabric for Groundwater Infiltration Applications.
   2. Filter Fabric for Cobblestone Applications.
   3. Filter Fabric for Plain Riprap Applications and Concrete Box Culvert Joints.
   4. Filter Fabric for Heavy Riprap Applications.
   5. Filter Fabric for Articulated Concrete Mat Applications.

B. Related Sections:
   1. Section 31 22 13 – Rough Grading
   2. Section 31 25 00 – Erosion and Sedimentation Controls
   3. Section 31 35 21 – Slope Protection and Erosion Control
   4. Section 31 37 00 - Riprap

1.2 REFERENCES

A. ASTM International:
   1. ASTM D-4632 - Test method for Tensile Strength and Elongation
   2. ASTM D-3786 - Test method for Mullen Burst.
   3. ASTM D-4533 - Test method for Trapezoidal Tear Strength.
   4. ASTM D-3787 - Test method for Puncture Strength.
   5. ASTM D-4751 - Test method for Apparent Opening Size.
   6. ASTM D-4491 - Test method for Coefficient of Permeability

1.3 UNIT PRICES

A. Refer to Section 01 20 00- Price and Payment Procedures.

1.4 SUBMITTALS

A. Section 01 70 00 – Execution and Closeout Requirements: Requirements for Submittals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Mechanically bonded, non-woven, long-chain polymeric fibers or yarns.
   1. Filter fabric for groundwater infiltration (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	200 psi

Trapezoidal Tear Strength	40 lbs
Puncture Strength	65 lbs
Apparent Opening Size (max)	0.210 mm
Coef. Of Permeability	0.15 cm/sec

2. Filter fabric for cobblestone grade and bank protection shall have, at minimum the following properties:

Tensile Strength	120 lbs
Tensile Elongation (max)	100%
Mullen Burst	230 psi
Trapezoidal Tear Strength	45 lbs
Puncture Strength	70 lbs
Apparent Opening Size (max)	0.210 mm
Coef. Of Permeability	0.15 cm/sec

3. Filter fabric for plain riprap grade and bank protection shall have, a minimum, the following properties:

Tensile Strength	155 lbs
Tensile Elongation (max)	100%
Mullen Burst	315 psi
Trapezoidal Tear Strength	65 lbs
Puncture Strength	90 lbs
Apparent Opening Size (max)	0.210 mm
Coef. Of Permeability	0.15 cm/sec
Open Area	

4. Filter fabric for heavy rip-rap grade and bank protection to have, at minimum, the following properties:

Tensile Strength	200lbs
Tensile Elongation (max)	100%
Mullen Burst	350 psi
Trapezoidal Tear Strength	75 lbs
Puncture Strength	100 lbs
Apparent Opening Size (max)	0.210 mm
Coef. Of Permeability	0.15 cm/sec
Open Area	

5. Filter fabric for rock ford crossings to have, at minimum, the following properties:

Tensile Strength	265 lbs
Tensile Elongation (max)	120%
Mullen Burst	470 psi
Trapezoidal Tear Strength	130 lbs
Puncture Strength	160 lbs
Apparent Opening Size (max)	0.149 mm
Coef. Of Permeability	0.25 cm/sec
Open Area	

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 – Administrative Requirements: Verification of Existing Conditions before Starting Work.

B. Verify compacted subgrade is acceptable and ready to support devices and imposed loads.

C. Verify gradients and elevations of required lines, levels, contours, and datum are correct.

D. Verify the correct fabric is specified for the specific use.

E. 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.

F. 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. Install according to manufacturer’s instructions.

B. All joints/overlaps in material shall be a minimum of 2 feet.

C. 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.

D. Finish according to specific use requirements.

E. 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.”

F. Maintain permanent control measures until final acceptance by Owner.

G. Install silt fences around all catchbasin inlets, to be removed after final inspection of the project.

H. Construct trap by excavating and forming embankments as specified in Section 31 23 16, and Section 31 23 17.

I. Place coarse aggregate or rock at outlet as indicated on Drawings.

J. Place geotextile fabric, as specified for rock energy dissipater.

K. When required, obtain borrow excavation for formation of embankment, as specified in Section 31 23 16.

L. On entire sediment trap area, apply soil supplements and sow seed as specified in Section 32 92 19.

M. Mulch seeded areas with hay as specified in Section 32 92 19.

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 35 21

SLOPE PROTECTION AND EROSION CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Live Wattles (soft shore engineering).
2. Live Stakes (soft shore engineering).
3. Rip-rap – see Section 31 37 00.

1.2 RELATED SECTIONS

A. Related Sections
1. Section 31 05 13 – Soils for Earthwork
2. Section 31 05 16 – Aggregates for Earthwork
3. Section 31 10 00 – Site Clearing
4. Section 31 22 13 - Rough Grading
5. Section 31 23 16 - Excavation
6. Section 31 23 17 - Trenching
7. Section 31 23 23 – Backfill
8. Section 31 25 00 – Soil Erosion and Sedimentation Controls
9. Section 31 32 21 - Filter Fabric
10. Section 31 37 00 - Riprap
11. Section 32 91 19 - Landscape Grading
12. Section 32 92 19 – Seeding

1.3 REFERENCES

A. ASTM D-4595 - Test Method for geo-grid tensile strength.

B. Part 91 of Act No. 451, of 1994, relative to Soil Erosion and Sedimentation Control Act.

C. National Crushed Stone Association (N.C.S.A.).

D. Michigan Department of Transportation: Standard Specifications for Construction.

E. ANSI Z60.1 - Nursery Stock; current edition

F. American Standard for Nursery Stock; current edition

G. Hortus III - current edition. Bailey Horatium, Cornell University

1.6 SUBMITTALS

A. Submit under provisions of Section 01300 - Submittals.

B. Submit shop drawings and product data for all items to be installed and/or constructed within this Section.

1.7 REGULATORY REQUIREMENTS

A. Plant Materials: Certified by State Department of Agriculture as described by ANSI-Z60.1 to be free of disease or hazardous insects.

B. Comply with state agencies for plant material certification and inspection. EGLE Permit.

1.8 ENVIRONMENTAL REQUIREMENTS

A. All planting of woody vegetation shall be accomplished during the dormant season, between October 1st and May 15th. Any planting outside of this must take proper care with regular watering for plant survival.

1.9 COORDINATION

A. Coordinate work under provisions of Section 01 03 9.

B. Perform Planting as other construction activities allow.

C. Do not install plant materials prior to acceptance of final grades.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Plain Rip-rap - Sound, tough, durable rock or crushed limestone free from structural defects. Sound pieces of concrete may be used in place of plain rip-rap when approved by the Engineer. Material to be uniform in size and not less than 8 inches in the least dimension. MDOT 8.19.02.

B. Heavy Rip-rap - Sound, tough, durable rock or crushed limestone free from structural defects. Material to be uniform in size and not less than 16 inches in the least dimension. MDOT 8.19.03.

C. Filter Fabric - In accordance with Section 31 32 21 - Filter Fabric.

D. Geo-Grid Netting - For reinforced grass spillways shall meet or exceed the following requirements as per ASTM D-4595:
   1. Tensile Strength 2,000 lbs/ft
   2. Tensile Modules at 5% Strain14,900 lbs/ft
   3. Maximum Aperture Area 1 sq. inch

E. Metal Pins - Shall be those specified by the manufacturer to use with geo-grid netting and as approved by the Engineer.

F. Straw Mulch - 2" thickness of oat or wheat straw or an erosion control blanket that uses straw or straw/coconut mulch at the rate of 0.5 lbs. per sq. yd.

PART 3 - EXECUTION

3.1 PREPARATION

A. Implement temporary controls under provisions of Section 01 50 00 - Temporary Controls.

END OF SECTION

SECTION 31 37 00

RIPRAP

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Provide all layout, products, materials, equipment, tools, services, transportation, supervision, and labor to complete all riprap required for the Work as shown on the Design Drawings.

B. Related Sections:
1. Section 31 05 16 - Aggregates for Earthwork.
2. Section 31 22 13 - Rough Grading.
3. Section 31 23 16 - Excavation: Excavating for riprap.
4. Section 31 23 17 - Trenching
5. Section 31 23 23 - Fill.
6. Section 32 91 19 - Landscape Grading: Topsoil placement.

1.2 REFERENCES

A. The following is a list of standards, which may be referenced in this Specification:

1. ASTM International (ASTM):
   a. ASTM C88 – Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
   b. ASTM C127 – Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate.
   c. ASTM C136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
   d. ASTM C535 – Standard Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
2. Michigan Department of Transportation (MDOT) 2020 Standard Specifications for Construction.
3. AASHTO M 288.

1.3 UNIT PRICES

A. Refer to Section 01 20 00 - Price and Payment Procedures.

1.4 SUBMITTALS

A. Pre-Production Submittals:

1. Description and location of proposed sources of Riprap and Bedding.
2. Certificates of Compliance that Riprap and Bedding shall meet the Specification requirements.
3. Certified Test Results documenting material conformance with Specifications as follows:
   a. A gradation report shall be provided for riprap sources to verify the D50 requirements can be met for approval of the source.

B. Production Submittals:

1. Trip tickets showing source, type, and weight of each load of material delivered to site and provided to Engineer.
2. Certified Test Results documenting material conformance with Specifications as follows:
   a. Gradation.
   b. Abrasion resistance.
   c. Bulk density.
   d. Soundness.

1.5 QUALITY ASSURANCE

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

B. Perform Work in accordance with Michigan Department of Transportation standard.

C. Maintain one copy of each document on site.

PART 2 - PRODUCTS

2.1 BEDDING

A. Shall meet the requirement of MDOT 4AA coarse aggregate in accordance with MDOT 2012 Standard Specifications Section 902, Table 902-1.

B. Gradation Limits:

Sieve Size	Percent Passing (%)
2.5-inch	100
2-inch	90 – 100
1.5”	40 – 60
3/4”	0 – 12
No. 200	<2.0

C. Shall meet the following quality requirements:

1. Bulk Density - Minimum 155 pounds per dry cubic foot (ASTM C127).
2. Soundness - Sodium Sulfate (ASTM C88) Less than 10% loss at 5 cycles.
3. Abrasion Resistance - L.A. Abrasion (ASTM C535) Less than 20% loss at 100 revolutions, and less than less than 40% loss at 500 revolutions.
4. Free from deleterious matter.

D. Where placed above Plain Riprap as a choking layer, stone gradation shall be retained within the top layer of Plain Riprap and provide a driving surface.

2.2 RIPRAP

A. PLAIN RIPRAP

1. Shall meet the requirement of plain riprap in accordance with MDOT Standard Specifications Section 91 6. 01.C.
2. Plain Riprap must be crushed limestone. Crushed concrete or precast concrete block will not be allowed as Plain Riprap.

3. Plain Riprap shall meet the following size requirements:
   a. Minimum size of 8 inches
   b. Maximum size of 16 inches
   c. Minimum Mean particle size, D50 of 10 inches or greater.
   d. Maximum-to-minimum dimension ratio no greater than 3H:1V.

B. HEAVY RIPRAP

1. Shall meet the requirement of heavy riprap in accordance with MDOT Standard Specifications Section 91 6. 01.C.
2. Heavy Riprap must be crushed limestone. Crushed concrete or precast concrete block will not be allowed as Heavy Riprap.
3. Heavy Riprap shall meet the following size requirements:
   a. Minimum size of 16 inches
   b. Maximum size of 24 inches
   c. Minimum Mean particle size, D50 of 18 inches or greater.
   d. Maximum-to-minimum dimension ratio no greater than 3H:1V.

2.3 R2200 STONE

A. Shall meet the quality requirements of heavy riprap in accordance with MDOT Standard Specifications Section 91 6. 01.C.

B. R2200 Riprap must be crushed limestone. Crushed concrete or precast concrete block will not be allowed.

C. R2200 Riprap shall meet the following size requirements:
   1. Minimum D15 size of 18 inches
   2. Maximum size of 32 inches
   3. Minimum Mean particle size, D50 of 24 inches or greater.
   4. Minimum D85 particle size of 29 inches or greater.
   5. Maximum-to-minimum dimension ratio no greater than 3H:1V.

2.4 SALVAGED EXISTING RIPRAP

A. Salvaged existing riprap may be reused if approved by the Engineer.

B. Salvaged existing riprap shall be free from soil, organic matter, debris, and any other deleterious materials.

C. Riprap shall be angular and composed of durable rock free from cracks, seams and other defects that would increase its deterioration from water, heat, freezing or other natural causes.

D. Salvaged riprap must have a gradation to confirm size prior to reuse.

2.5 SALVAGED CONCRETE

A. Salvaged concrete may not be used as Plain or Heavy Riprap.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Do not place riprap bags over frozen or spongy subgrade surfaces.

3.2 MATERIALS HANDLING

A. Dump trucks should be equipped with bottom-hinged tailgates if rock is placed directly into position with the trucks and for stockpiling purposes.

B. Limit drop height during all phases of materials handling to prevent breakage. Riprap that is degraded through mishandling is subject to rejection by the Engineer.

3.3 PLACING RIPRAP

A. Strip topsoil and organics and rough grade to required contours.

B. Install geotextile underlayment as shown on the Drawings.

C. Place in accordance with lines, grades and thickness shown on the Design Drawings.

D. Allowable drop height for riprap shall be in accordance with AASHTO M 288.

E. No mechanical compaction of riprap is required. Plain or Heavy Riprap should be placed to achieve a minimum two (2) stone thickness.

F. Work stone as necessary to distribute it and eliminate detrimental voids. Avoid overworking or long pushes that result in segregation of particle sizes.

G. Grade surface free from irregularities and to tolerances of
   1. Plain Riprap - ± 0.25 foot from established grade.
   2. R2200 and Heavy Riprap - ± 0.5 foot from established grade.

H. Place and grade from a low elevation up to high elevation in a manner that avoids subgrade disturbance and damage to the geotextile layer. Do not push material down slope.

3.4 SCHEDULES

A. Culvert Pipe Ends: Bagged riprap, placed one layer thick, 6 inch (150 mm) average thickness, concealed with topsoil fill.

B. Sloped Grade At Retaining Wall: Individual riprap units, 6 inch (150 mm) thickness; placed prior to finish topsoil.

END OF SECTION

SECTION 31 50 13

EXCAVATION SUPPORT SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Sheeting, Shoring, and Bracing.

B. Related Sections:
   1. Section 31 22 13 – Rough Grading.
   2. Section 31 23 16 – Excavation.
   3. Section 31 23 17 – Trenching.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Refer to Section 012000- Price and Payment Procedures.

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 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. Refer to Section 01 20 00- Price and Payment Procedures.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Topsoil: Min. 2 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.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify substrate base has been contoured and compacted.

B. 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, plants, and structures to prevent damage.

H. Lightly compact placed topsoil in preparation for seeding, fertilizing, and mulching.

I. Remove surplus subsoil and topsoil from Site.

J. Import topsoil as necessary to match the depths as specified on the plans.

K. Leave stockpile area and site clean and raked, ready to receive landscaping.

L. Place required trees, shrubs, fences, and mailboxes in their proper locations.

M. 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. 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.

C. Protect landscaping and other features remaining as final Work.

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 05 13 – Soils for Earthwork
2. Section 32 91 19 - Landscape Grading
3.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Refer to Section 01 20 00 – Price and Payment Procedures

1.3 REFERENCES

A. ASTM International:

1. ASTM C602 - Standard Specification for Agricultural Liming Materials.

1.4 DEFINITIONS

A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.5 SUBMITTALS

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

B. Product Data: Submit data for seed mix, mulch, and other accessories.

C. Manufacturer's Certificate: Products meet or exceed specified requirements.

1.6 CLOSEOUT SUBMITTALS

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

B. Operation and Maintenance Data: Include maintenance instructions, cutting method and maximum grass height; types, application frequency, and recommended coverage of fertilizer.

1.7 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. Perform Work in accordance with State of Michigan Department of Transportation Standards.

C. Maintain one (1) copy of each document on Site.

1.8 QUALIFICATIONS

A. Seed Supplier: Company specializing in manufacturing Products specified in this Section with minimum three (3) years' documented experience.

B. Installer: Company specializing in performing Work of this Section with minimum three (3) years' documented experience.

1.9 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.

1.10 MAINTENANCE SERVICE

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

B. Maintain seeded areas immediately after placement until grass is well established, exhibits a vigorous growing condition and is accepted by Owner. Guarantee replacement of dead material for one (1) year from date of substantial completion.

PART 2 - PRODUCTS

2.1 SEED MIXTURE

A. Furnish materials in accordance with municipal, federal and state standards.

B. Seed Mixture:

Kentucky Blue Grass	30 percent
Creeping Red Fescue Grass	40 percent
Perennial Rye Grass (Manhattan)	30 percent

2.2 ACCESSORIES

A. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.

1. Mulch:
    a. 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.

B. Mulch Blankets:

1. Install S75BN Mulch Blanket or equivalent in areas with slopes 4 horizontal to 1 vertical and steeper as indicated on the Drawings or directed by the Engineer.
2. Install all mulch blankets with 6-inch North American Green Eco Stakes or Engineer-approved equivalent. Stake according to manufacturer's recommendations as approved by the Engineer.

C. Lime: ASTM C602, Class T agricultural limestone containing a minimum 80 percent calcium carbonate equivalent.

D. Water: Clean, fresh and free of substances or matter capable of inhibiting vigorous growth of grass.

E. Erosion Fabric: Jute matting, open weave.

F. Stakes: Softwood lumber, chisel pointed.

G. String: Inorganic fiber.

H. Hydroseeding Mulching Material:

1. Apply 1400 pounds/acre of Conwed Verdoyl #2000 with hydraulic seeder.

2.3 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 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.

E. Notify Engineer 72 hours prior to hydroseeding and fertilizing for approval to proceed.

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. See Section 32 91 19 – Landscape Grading.

3.2 SEEDING

A. Apply seed at rate of 500 lbs per acre evenly in two (2) intersecting directions. Rake in lightly.

B. Do not seed areas in excess of that which can be mulched on same day.

C. Planting Season: May 1 to October 10 unless otherwise approved by the Engineer.

D. Do not sow immediately following rain, when ground is too dry, or when winds are over 12 mph.

E. Roll seeded area with roller not exceeding 112 lbs/linear foot.

F. Immediately following seeding and compacting, apply mulch to thickness of 1/8-inch. Maintain clear of shrubs and trees.

G. Apply water with fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.

3.3 HYDROSEEDING

A. Apply mulch and seeded slurry with hydraulic seeder at rate of 12 lbs per 1000 sq ft evenly in one pass.

B. After application, apply water with fine spray immediately after each area has been hydroseeded. Saturate to 4 inches of and maintain moisture levels 2 to 4 inches.

3.4 SEED PROTECTION

A. Cover seeded slopes where grade is 6 inches per foot or greater with erosion fabric. Roll fabric onto slopes without stretching or pulling.

B. Lay fabric smoothly on surface, bury top end of each section in 6-inch-deep excavated topsoil trench. Overlap edges and ends of adjacent rolls minimum 12 inches. Backfill trench and rake smooth, level with adjacent soil.

C. Secure outside edges and overlaps at 36-inch intervals with stakes.

D. Lightly dress slopes with topsoil to ensure close contact between fabric and soil.

E. At sides of ditches, lay fabric laps in direction of water flow. Lap ends and edges minimum 6 inches.

3.5 MAINTENANCE

A. Immediately reseed areas which show bare spots.

B. Repair any eroded areas and reseed immediately.

C. Contractor shall guarantee a uniform grass growth over the entire Project and shall reseed bare and thin areas until this is accomplished at no additional cost to the Project.

D. Water to prevent grass and soil from drying out.

E. Roll surface to remove minor depressions or irregularities.

F. Control growth of weeds. Apply herbicides. Remedy damage resulting from improper use of herbicides.

G. Repair washouts or gullies.

END OF SECTION

SECTION 33 40 00

STORM DRAINAGE UTILITIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Storm sewerage drainage piping, fittings, and accessories, and bedding.

B. Connection of storm water drainage system to existing storm sewerage drainage.

C. Catch basins, manholes and paved area drainage.

D. Driveway Culverts and End Sections.

E. Under drain.

1.2 RELATED SECTIONS

A. Section 31 05 16 – Aggregates for Earthwork.

B. Section 31 23 16 – Excavating

C. Section 31 23 23 – Fill

D. Section 31 32 21 – Filter Fabric

1.3 REFERENCE STANDARDS

A. ASTM D-3350 – Polythylene Plastics Pipe and Fittings.

B. ANSI/ASTM C14 - Concrete Sewer, Storm Drain, and Culvert Pipe.

C. ANSI/ASTM C76 - Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.

D. ANSI/ASTM C443 - Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.

E. ANSI/ASTM C478 - Precast Reinforced Concrete Manhole Sections.

F. ANSI/ASTM D2241 - Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series) Fittings.

G. ANSI/ASTM D2321 - Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.

H. ANSI/ASTM D2729 – Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

I. ANSI/ASTM D3034 - Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe Fittings.

J. ASTM D1785 - Standard Specification for Poly (Vinyl Chloride) PVC Plastic Pipe Schedules 40, 80, and 120.

K. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

L. ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.

M. MDOT Standard Specifications for Construction – Current Edition.

N. Corrugated Metal Pipe – size, corrugation, and gate as indicated on plans, or MDOT Class B* or equal.

1.4 UNIT PRICES

A. Refer to Section 01 20 00- Price and Payment Procedures.

1.5 DEFINITIONS

A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.6 SUBMITTALS

A. Submit under provisions of Section 01300 - Submittals.

B. Product Data: Provide data indicating pipe, pipe accessories, and sock.

C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

1.7 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 01700 - Contract Closeout.

B. Accurately record actual locations of pipe runs, connections, catch basins, Cleanouts, and invert elevations.

C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.8 REGULATORY REQUIREMENTS

A. Conform to applicable code for materials and installation of the Work of this Section.

B. Conform to applicable standards for pipe and fitting identification markings.

1.9 FIELD MEASUREMENTS

A. Verify that field measurements and elevations are as indicated.

1.10 COORDINATION

A. Coordinate work under provisions of Section 01039 - Coordination and Meetings.

PART 2 – PRODUCTS

2.1 SEWER PIPE MATERIALS

A. Description:
   1. Material: Concrete (RCP).
   2. Comply with ASTM C76
   3. Nominal Diameter: As indicated on Drawings.
   4. Joints: Rubber Compression or wrapped/concrete collared butt joint

B. Description:
   5. Material: Slotted PVC.
   6. Comply with ASTM D2729.
   7. Nominal Diameter: As indicated on Drawings.

2.2 PIPE ACCESSORIES

A. Fittings: Same material as pipe, molded and formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

B. Filter Fabric: As specified in Section 02279 - Filter Fabric.

C. Couplings: Solid plastic

D. Plugs: Furnished by the pipe manufacturer for the specific use with that pipe as approved by the Engineer.

E. Concrete Collars: Class A concrete, 6 inches thick and 12 inches minimum on either side of the joint with 6" wide strip of filter fabric around joint. Use to join different types of pipe when a Fernco type or other manufactured coupling will not work.

F. Rodent Guard

2.9 FILL MATERIAL

Drainstone Materials: As specified in Section 31 05 16 - Aggregates for Earthwork and Geotechnical Report

A. Filter Sand Materials: As specified in Section 31 05 16 - Aggregates for Earthwork and Geotechnical Report

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that trench cut excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.

3.2 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with fill material specified in Section 02223 – Backfilling and 0222 – Excavation.

B. Remove large stones or other hard matter, which could damage piping or impede consistent backfilling or compaction.

C. Cut out soft areas of subgrade not capable of insitu compaction. Backfill with MDOT 6A Stone and compact to density equal to or greater than requirements for support of pipe or structure and subsequent backfill material.

D. Excavate pipe trench in accordance with Section 02222 - Excavation for work of this section. Hand trim excavation for accurate placement of pipe to elevations indicated, allowing for bedding thickness.

3.3 BEDDING

A. Place bedding material at trench bottom, level materials in continuous layer not exceeding 6 inches compacted depth.

B. Maintain optimum moisture content of bedding material to attain required compaction density.

C. Dig out for pipe bells.

3.4 INSTALLATION - PIPE

A. Install pipe, fittings, and accessories in accordance with ASTM Standards and manufacturer's instructions.

B. Place pipe on specified bedding.

C. Lay pipe to slope gradients noted on layout drawings by the use of a laser beam alignment method proven reliable and operated by competent, experienced personnel.

D. Place remainder of bedding, as specified. Do not displace or damage pipe when compacting.

E. Install and compact backfill according to Section 02223 - Backfilling. Do not displace or damage pipe when compacting.

F. Contractor shall use appropriate measures, approved by the engineer to provide a sealed connection between the storm sewer and appurtenances.

G. Place bitumastic joint compound in the top 2/3 of concrete pipe. Leave bottom 1/3 open.

H. Wrap joints of concrete pipe with a 24" wide strip of filter fabric overlapping ends 12-inch minimum. Secure with tape.

3.5 SEWER SERVICES

A. Do not disturb existing storm sewer services along the limits of the Project.

B. Provide new sump lead connections as shown on the plans and stated in the specifications.

C. Maintain active services for uninterrupted use.

D. Connect new sump leads to proposed sewer, as it is installed, with approved pipe and approved coupling for uninterrupted use as shown on the drawings.

E. Provide couplings, adapters, and pipe for a complete connection.

3.6 INSTALLATION RODENT GUARD

A. Add rodent guard to end of each of the three (3) underdrains.

3.7 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01400 - Quality Control.

B. Request inspection prior to and immediately after placing aggregate cover over pipe.

3.8 PROTECTION

A. Protect finished work under provisions of Section 01500 - Construction Facilities and Temporary Controls.

B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION

SECTION 40 05 57

ACTUATORS FOR PROCESS VALVES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Manual actuators.
2. Pneumatic actuators.
3. Electric motor actuators.

B. Related Requirements:
1. Section 260583 "Wiring Connections" for motor connections for electric actuators.

1.2 COORDINATION

A. Coordinate Work of this Section with installation of valves and accessories.

1.3 PREINSTALLATION MEETINGS

A. N/A

1.4 SUBMITTALS

A. Product Data:
1. Electric motor actuators.

B. Shop Drawings:

1. Indicate parts list, materials, sizes, position indicators, limit switches, control system, actuator mounting, wiring diagrams, control system schematics on assembly drawings.
2. Submit actuator Shop Drawings with gate submittal.
3. Signed and sealed by the qualified professional engineer responsible for their preparation.

C. Source Quality-Control Reports: For actuators.

D. Field Quality-Control Reports: For actuators.

E. Qualifications Statements: For manufacturer and installer.

F. Manufacturer's Approval: For installer.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations and types of actuators.

1.6 QUALITY ASSURANCE

A. Manufacturers Qualifications: Company specializing in manufacturing products specified in this Section with minimum three years' experience.

B. Installers Qualifications: Company specializing in performing Work of this Section with minimum three years' experience and approved by the manufacture.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

B. Store materials according to manufacturer instructions.

C. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Furnish temporary end caps and closures on piping and fittings and maintain in place until installation.
3. Provide additional protection according to manufacturer instructions.

1.8 WARRANTY

A. Furnish five-year manufacturer's warranty for actuators.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Perform Work according to:

1. The State of Michigan Department of Transportation standards.
2. The Municipality of City of Tecumseh Public Works standards.
3. Lenawee County Drain Commissioner standards.

2.2 DESCRIPTION

A. Furnish gear and power actuators with position indicators.

B. Provide actuators with position indicators.

2.3 ELECTRIC MOTOR ACTUATORS

A. Motor, reduction gearing, and limit switches.

B. Comply with AWWA C542.

C. Actuators shall be Rotork IQ3, Auma SA series, or approved equal

2.4 SOURCE QUALITY CONTROL

A. Provide shop inspection and testing of completed assemblies.

B. Certificate of Compliance:

1. If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.
2. Specified shop tests are not required for Work performed by approved manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Verify that field dimensions are as indicated on Shop Drawings.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Securely mount actuators using brackets or hardware specifically designed for attachment to valves.

3.3 FIELD QUALITY CONTROL

A. After installation, inspect for proper supports and interferences.

B. Repair damaged coatings with material equal to original coating

C. Prepare test and inspection reports.

END OF SECTION 40 05 57

SECTION 40 05 59.23

STAINLESS STEEL SLIDE GATES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Stainless steel slide gates.

B. Related Requirements:
   1. Section 40 05 57 "Actuators for Process Valves and Gates" for powered lifting devices.

1.2 DEFINITIONS

A. FRP: Fiberglass-reinforced plastic.

B. UHMW: Ultra-high molecular weight.

C. Design Head: The maximum differential head that will be applied on the gate under worst case conditions, measured from the gate invert.

D. Seating Head: Head applied on a wall mounted gate, in the direction that pushes the gate against the wall it is installed on.

E. Unseating Head: Head applied on a wall mounted gate in the direction pulling the gate away from the wall it is installed on.

F. Operating Head: The highest differential head that is to be applied on the gate when it needs to be operated, measured from the gate invert.

1.3 PREINSTALLATION MEETINGS

A. N/A

1.4 SUBMITTALS

A. Product Data: Stainless steel slide gates.

B. Shop Drawings:

   1. Indicate system materials and component equipment.
   2. Complete description of all materials cross-referenced to a sectional drawing listing material by trade name and ASTM reference number.

3. Certified shop and installation Drawings showing all details of construction, dimensions and anchor bolt locations. Submit installation and anchoring requirements, fasteners, and other details.
4. Descriptive literature, bulletins and/or catalogs of the equipment.
5. The weight of each component.
6. Description of surface preparation and shop prime painting of gates and accessories.
7. Indicate gate identification number, location, service, type, size, design pressure, operator details, stem details, and loads.
8. A listing of all forces transmitted to floor stands if applicable.

C. Delegated Design Submittals: Submit signed and sealed Shop Drawings with design calculations and assumptions.

D. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

E. Manufacturer Reports:

1. Certify that equipment has been installed according to manufacturer instructions.
2. Indicate activities on Site, adverse findings, and recommendations.

F. Qualifications Statements: For manufacturer, installer, and licensed professional.

G. Manufacturer's Approval: For installer.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of installed slide gates and components.

1.6 QUALITY ASSURANCE

A. The gates supplied under this section shall conform to all requirements of the latest edition of ANSI/AWWA C561.

B. The gates supplied under this section shall be standard products of a manufacturer regularly engaged in the design and manufacturing of water control gates such as FONTAINE-AQUANOX Series 20 Slide Gates manufactured by ISE Metal Inc or approved equal.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

B. Store materials according to manufacturer instructions.

C. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

1.8 WARRANTY

A. Furnish three-year manufacturer's warranty for slide gates.

B. Furnish five-year manufacturer's warranty that clear plastic stem covers will not crack, discolor, or become opaque, If applicable

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seating Pressure:

1. Approximately 3.5 feet of water. Contractor to field verify.
2. Measurement: From maximum water surface to centerline of gate.

B. Minimum Vertical Loading: 50 percent of force on the gate from operating head acting on horizontal centerline of gate, multiplied by effective gate area, plus weight of slide and stem.

C. Gate Reinforcement: As required for deflection not greater than 1/360 of span.

D. Operating Head:

1. Safety Factor: Design gate to operate under specified operating head with safety factor of five

2.2 STAINLESS STEEL SLIDE GATES

A. Manufacturers:

1. Fontaine-Aquanox – ISE Metal Inc.
2. Approved Equal

B. Self-contained stainless steel slide gate with extended frame, yoke, lifting stem attached to yoke, lift and lift support, stem, stem guide, and stem block.

C. Non-self-contained stainless steel slide gate with limited frame, lifting stem, lift and lift support, stem, stem guide, and stem block.

D. Comply with AWWA C561.

E. Size: As indicated on Drawings and verified in the field prior to manufacturing

F. Operating Head: As indicated on Drawings and verified in the field prior to manufacturing

G. Closure: Conventional

H. Opening: Upward

I. Gates:

1. Material: Type stainless steel.
2. Minimum Thickness: 0.25 inch
3. Size: As indicated on drawings and verified in the field prior to manufacturing
4. Configuration: Removable.

J. Yokes:

1. Material: As specified by manufacturer.
2. Mounting: Bolted to gate frame.

K. Seats:

1. Impacted into dovetail slots and held in position without use of screws or other fasteners.
2. Maximum Clearance between Seating Faces: 0.004 inch when gate is fully closed.

L. Wedges:

1. Description: Machined brass blocks with angled faces and secured with a stud bolt to prevent slippage during operation.
2. Furnish side, top, and bottom wedges.

M. Frames:

1. Configuration: One piece.
2. Material: Type stainless steel.
3. Minimum Thickness: 0.25 inch
4. Mounting: Upstream wall face
5. Seats: UHMW polymer
6. Bottom Flush Closure: Resilient seal securely attached to frame along invert.

N. Lifting Devices:

1. Description: Stem, lifting nut, supports, bushings, stem cover, position indicator, and electric-motor actuator.
2. Mounting: Fabricated-steel pedestal.
3. Powered Lift Devices:

    a. As specified in Section 40 05 57 "Actuators for Process Valves and Gates."

O. Handwheels:

1. Material: Cast aluminum
2. Diameter: Determined by manufacturer
3. Configuration: Removable.
4. Fully lubricated.
5. Mounting: Locate center 36 inches above operating floor.

P. Lifting Nut:

1. Material: Brass.

2. Furnish grease fitting.
3. Furnish polymer bearing pads above and below lifting nut.

Q. Lifting Stem:

1. Material: Type stainless steel.
2. Configuration:

    a. Rising
    b. Removable.

3. Thread:

    a. Type: Acme, double lead.
    b. Cut threads are not acceptable.

4. Diameter: As determined by manufacturer
5. Fully lubricated.
6. Maximum Number of Turns: 16 per foot of travel.
7. Stem Covers:

    a. Material: Clear polycarbonate
    b. Configuration: Capped and vented.
    c. Length: As required to allow full travel of gate.

2.3 FINISHES

A. Stainless Steel Surfaces: Mill finish.

2.4 ACCESSORIES

A. Hardware: Stainless steel.

2.5 SOURCE QUALITY CONTROL

A. Inspection and Testing:

1. Provide shop inspection and testing of completed assemblies.
2. Comply with AWWA C561.

B. Owner Inspection:

1. Make completed slide gate assembly available for inspection at manufacturer's factory prior to packaging for shipment.
2. Notify Owner at least seven (7) days before inspection is allowed.

C. Owner Witnessing:

1. Allow witnessing of factory inspections and test at manufacturer's test facility.

2. Notify Owner at least three days before inspections and tests are scheduled.

D. Certificate of Compliance:

1. If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.
2. Specified shop tests are not required for Work performed by approved manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that facilities are ready to receive slide gates.

3.2 PREPARATION

A. Clean adjacent surfaces according to manufacturer instructions.

3.3 INSTALLATION OF STAINLESS STEEL SLIDE GATES

A. According to manufacturer instructions.

B. Ensure that products are installed plumb, true, and free of warp or twist.

C. Locate operators to avoid interference with handrails and other Work.

D. Guides:

1. Surface and Flange Mounting:

a. Install guides with expansion anchors.
b. Position guides at elevation as indicated on Drawings.

2. Recess Mounting:

a. Cut slot in concrete to receive guides.
b. Position guides at elevation as indicated on Drawings.
c. Grout guides in place according to manufacturer instructions.

E. Sealant:

1. Apply 1/8-inch thick layer of elastomeric sealant to back of frame.
2. Tighten nuts snug until sealant begins to flow beyond frame.
3. Remove excess sealant.
4. Cure sealant for minimum seven days.
5. Tighten nuts to their final positions.

F. Lubricants: Provide oil and grease as required for initial operation.

3.4 FIELD QUALITY CONTROL

A. Inspection:

1. Verify alignment of gate and components.
2. Verify that gate operates smoothly and does not bind or scrape.

B. Testing:

1. Comply with AWWA C561.
2. Leakage: Not exceeding 0.1 gpm/ft. of seating perimeter under 20 feet of seating head and not exceeding 0.21 gpm/ft. under 20 feet of unseating head.

C. Manufacturer Services: Furnish services of manufacturer's representative experienced in installation of products furnished under this Section for not less than three days on Site for installation, inspection, field testing, and instructing Owner's personnel in maintenance of equipment.

D. Equipment Acceptance:

1. Adjust, repair, modify, or replace components failing to perform as specified and re-inspect.
2. Make final adjustments to equipment under direction of manufacturer's representative.

E. Furnish installation certificate from equipment manufacturer's representative attesting that equipment has been properly installed and is ready for startup and testing.

3.5 ADJUSTING

A. Adjust slide gates to provide smooth operation.

3.6 DEMONSTRATION

A. Demonstrate equipment operation, routine maintenance, and emergency repair procedures to Owner's personnel.

END OF SECTION 40 05 59.23

SECTION 40 63 43

PROGRAMMABLE LOGIC CONTROLLERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Programmable controllers and accessories.

B. Related Requirements:
   1. Section 26 05 26 - Grounding and Bonding for Electrical Systems: Grounding components.
   2. Section 26 05 53 - Identification for Electrical Systems: Identification methods.

1.2 REFERENCE STANDARDS

A. National Electrical Manufacturers Association:
   1. NEMA IA 2.2 - Programmable Controllers - Equipment Requirements and Tests.
   2. NEMA IA 2.3 - Programmable Controllers - Programming Languages.
   3. NEMA ICS 3 - Industrial Control and Systems: Factory Built Assemblies.
   4. NEMA ICS 6 - Industrial Control and Systems: Enclosures.

1.3 UNIT PRICES

A. Refer to Section 01 20 00- Price and Payment Procedures.

1.4 SUBMITTALS

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

B. Product Data: Submit catalog data for each component specified showing electrical characteristics and connection requirements.

C. Shop Drawings: Indicate electrical characteristics and connection requirements, including layout of completed assemblies, interconnecting cabling, dimensions, weights, and external power requirements.

D. Test and Evaluation Reports: Indicate procedures and results for specified factory and field testing and inspection.

E. Manufacturer Reports: Indicate activities on-Site, adverse findings, and recommendations.

F. Qualifications Statements:
   1. Submit qualifications for manufacturer and supplier.
   2. Submit manufacturer's approval of supplier.

1.5 CLOSEOUT SUBMITTALS

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

B. Project Record Documents: Record actual locations of controller cabinets and input and output devices connected to system. Include interconnection wiring and cabling information, and terminal block layouts in controller cabinets. Include copy of manufacturer's certified drawings.

C. Operation and Maintenance Data: Submit bound copies of operating and programming instructions, and include card replacement, adjustments, and preventive maintenance procedures and materials.

1.6 MAINTENANCE MATERIAL SUBMITTALS

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

B. Spare Parts: Furnish one spare circuit card for each unique circuit card type installed.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience, and with service facilities within 100 miles (161 km) of Project.

B. Supplier: Authorized distributor of specified manufacturer with minimum three years' documented experience.

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. Conform to specified service conditions during and after installation of programmable controllers.

C. Maintain area free of dirt and dust during and after installation of products.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Configuration: Standalone programmable controller incorporated into Lake Level Control Panel.

B. Sequence of Operation:
   1. See Section 40 67 00 - Control System Equipment Panels and Racks.

2.2 PROGRAMMABLE CONTROLLER

A. Manufacturers:

1. Allen-Bradley, by Rockwell Automation.
2. Substitutions: Section 01 60 00 - Product Requirements.

B. Description: Controller conforming to NEMA IA 2.2, and with required memory and functional capacity to perform specified sequence of operation with scheduled input and output points.

C. Programming Language: Conform to NEMA IA 2.3.

D. Programming Software: Furnish one license for program for use with general purpose microcomputer and Microsoft Windows operating system. Software licenses shall be prepaid and shall not require annual subscription fees.

E. Networking Connections:
1. Ethernet/IP: RJ-45
2. Serial: 9-Pin D-Sub or RJ-45
3. MODBUS

F. Spare Input/Output Capacity: 20 percent.

G. Input Voltage: 24 volts, DC.

H. Enclosure: NEMA ICS 6; Type 12.

2.3 SOURCE QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Requirements for testing, inspection, and analysis.

B. Testing: Test programmable controller according to NEMA IA 2.2.

PART 3 - EXECUTION

3.1 PREPARATION

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

B. Disconnect and remove abandoned programmable controller components.

3.2 INSTALLATION

A. Connect input and output devices as required for a complete and operable system. Interposing relays shall be utilized for change in signal voltage and/or dry contacts where required.

B. Install engraved plastic nameplates according to Section 26 05 53 - Identification for Electrical Systems.

C. Ground and bond programmable controllers according to Section 26 05 26 - Grounding and Bonding for Electrical Systems.

3.3 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. Perform operational testing on control systems to verify proper operation and field wiring connections.

D. Manufacturer's Field Services: Prepare and start up programmable controller.

3.4 DEMONSTRATION AND TRAINING

A. Furnish 4 hours of instruction each for two persons, to be conducted at Project Site with manufacturer's representative.

3.5 MAINTENANCE

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

B. Furnish service and maintenance of programmable controllers for one year from date of Substantial Completion.

END OF SECTION

SECTION 40 63 53

WEB HOSTED SCADA SERVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Web Hosted SCADA System.

1.2 UNIT PRICES

A. Refer to Section 01 20 00- Price and Payment Procedures.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate front and side views of enclosures with overall dimensions and weights shown; conduit entrance locations and requirements; and nameplate legends.

C. Product Data: Submit catalog sheets showing voltage, controller size, ratings and size of switching and overcurrent protective devices, short circuit ratings, dimensions, and enclosure details.

D. Test Reports: Indicate field test and inspection procedures and test results.

E. Manufacturer's Field Reports: Indicate start-up inspection findings.

1.4 CLOSEOUT SUBMITTALS

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

B. Operation and Maintenance Data: Submit instructions complying with NEMA ICS 7.1. Include procedures for starting and operating controllers, and describe operating limits possibly resulting in hazardous or unsafe conditions. Include routine preventive maintenance schedule.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience, and with service facilities within 100 miles of project.

1.6 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing products specified in this Section with a minimum of three years' experience.

1.7 EXISTING CONDITIONS

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

PART 2 - PRODUCTS

2.1 WEB HOSTED SCADA SYSTEM

A. Manufacturers:
   1. KI Station Master, by Kennedy Industries.
   2. Substitutions: Not accepted.

B. General:
   1. The hosted SCADA service shall be provided by a company that is regularly engaged in the work required by owner and as specified herein. The infrastructure for supporting the Hosted SCADA must have been in place for three years and be supporting a minimum of 100 customer sites at the time a proposal is submitted. A list of 10 customer references shall be submitted with the proposal.
   2. Contractor shall pre-pay for one year, all Web-Hosted SCADA System Supplier Monthly Monitoring Fees for all sites in this project.
   3. SCADA shall employ computerized monitoring software that facilitates communications with most standard field hardware devices using industry-standard protocols. Software shall employ a graphical user interface (GUI) as the Supervisory Control and Data Acquisition (SCADA).
   4. Software shall be compatible with a COTS (commercial off-the shelf) PC running Windows.
   5. Provide a complete and functional monitoring and control system that functions in accordance with and fulfills all the requirements set forth in this Specification, set forth as indicated on the Drawings. Any omission of details from this Specification or from the Drawings shall not relieve the Contractor from furnishing a complete, operating system. In the event of a discrepancy between the Drawings and specifications, the more stringent requirements shall apply.
   6. Coordination: Coordinated installation, configuration and startup of the Web Hosted SCADA system with process equipment installation and facility construction provided under this contract and the other contracts comprising the overall project. Due to the nature of this project, only portions of the Web Hosted SCADA system may be delivered, installed and placed in service at any time. Coordinate system work with the various Contractors and conform to the overall project construction sequence and schedule.

C. Hosted SCADA Service:
   1. The Hosted SCADA Company shall be available to the CUSTOMER 24 hours per day, 7 days per week. At minimum, the Hosted SCADA Company shall have a controls team with a least three (3) Controls Engineers, two (2) Controls Technicians, one (1) Controls Coordinator, and seven (7) field service technicians.
   2. The hardware and software of hosted SCADA service shall be installed into two separate facilities.
   3. The Main Hosted SCADA facility shall include the following:
      a. Facility shall be located in Michigan.

b. Facility shall be in a location historically free from natural disasters such as hurricanes, floods, earthquakes, and tsunamis. The Facility shall be above the 500 year flood plain.
c. Facility shall be monitored by Facility staff 24 hours a day, 365 days a year.
d. Facility shall have doorways managed by a card access system with dual authentication with biometric scanner for physical access which records all access. Security alarms to elicit an armed response.
e. Facility at a minimum shall be AICPA SOC2 Type II audited. SOC2 Type II is a nationally recognized standard used to assess procedures and controls. The SOC2 Type II audit evaluates the security, operational polices and systems in use. The audit appraises the physical building security, room access control, network resiliency, backup power, environmental controls such as heat rejection, and safety systems including fire suppression.
f. Facility at a minimum shall have nine redundant fiber paths for Internet connectivity leading to multiple upstream carriers. Including: AT&T, Comcast, Comlink, Level3, US Signal, and Waveform Tech with connectivity capabilities to CenturyLink, Orange Business, Sprint, Verizon, and XO Communications.
g. Facility cooling and HVAC at a minimum shall be configured to ASHRAE standards with 20 degree differential between hot and cold isles.
h. Facility at a minimum shall utilize an N+N UPS system with independent power delivery from transfer switch to racks. Total battery life shall be at least 20 minutes at full load. UPS system at minimum to meet or exceed concurrent maintainability tier II requirements of the Uptime Institute.
i. Facility at a minimum shall be FEMA rated and utilize N+N generator backup system. Including two diesel generators and two 2,000 gallon fuel tanks. System must run for at least 96 hours under full load before refueling.
j. Facility at a minimum shall utilize a waterless fire suppression system.
k. Facility at a minimum shall have an advanced security framework to safeguard both the interior and exterior of the facility. At a minimum the system shall track all environmental functions including room temperature, humidity, and equipment conditions.

4. The Backup Hosted SCADA facility shall include the following:
   a. The Backup facility shall include identical SCADA hardware and software as the Main facility.
   b. The Backup facility SCADA software shall be securely synced with the Main facility SCADA software at all times. This includes SCADA software programming and historical data logging.
   c. The Backup facility shall continuously monitor the Main facility and act as a hot-backup when the Main facility is unavailable. The Backup facility shall perform all Hosted SCADA functions immediately and automatically.
   d. The Backup facility shall be on a different power grid than the Main facility.
   e. The Backup facility shall be owned by the Hosted SCADA provider.
5. The hosted SCADA system shall include the following hardware:
   a. Main runtime SCADA server utilizing Server operating system and server features.
   b. Backup runtime SCADA server utilizing Server operating system and server features.
   c. Twelve (12) available voice modems for alarm callouts. Six (6) voice modems to be installed on main runtime server. Six (6) voice modems to be installed on backup runtime server.

d. Four (4) different voice phone line technologies shall be used: Standard POTS lines, Cellular voice lines, Digital PBX lines, and VOIP lines.

6. The Main SCADA system and Backup SCADA system shall have provisions in place to monitor and ensure the uptime of the Hosted SCADA service. This shall be performed by a 3rd party:
   a. IT Infrastructure Audit – The Hosted SCADA main and backup IT infrastructure shall be audited yearly by a 3rd party IT professional. Recommendations by the 3rd party IT professional shall be implemented within 6 months.
   b. Disaster Recovery Testing – The Hosted SCADA main and backup IT infrastructures shall be tested against a disaster recovery plan yearly. The disaster recovery plan shall be reviewed and tested by a 3rd party IT professional.
   c. Uptime Monitoring of Hosted SCADA Service – The Hosted SCADA main and backup IT infrastructures shall be monitored by a 3rd party company every 5 minutes. If the 3rd party company is unable to access the Main SCADA system or Backup SCADA system, the 3rd party shall notify the Hosted SCADA Company immediately.
   d. IT Infrastructure Health Monitoring – The Hosted SCADA main and backup IT infrastructure shall be monitored by 3rd party software. If the 3rd party software identifies an issue with the IT infrastructure, another 3rd party voice callout provider shall notify the Hosted SCADA Company immediately.

D. I/O Communications:
   1. The hosted SCADA system shall provide the ability to communicate to customer equipment using cellular communications. The cellular communication shall incorporate the following:
      a. Contracts with multiple service providers including Verizon, AT&T and Sprint.
      b. Cellular data to be private and secured by service provider. hosted SCADA system shall have VPN access to each cellular service provider to securely access cellular data.
   2. Communications diagnostics tools shall be included to aid in the visualization of proper communications. Tools shall include methods for monitoring communication statistics and reporting errors.
   3. Software shall be capable of supporting local I/O communications (i.e. on the primary application server) or distributed I/O servers (i.e. on computers other than the primary server.) There shall be no limit to the number of allowable redundant I/O servers for any driver.
   4. Software shall be capable of pooling modems connected to one of more servers, for use in I/O communications.
   5. Software shall support multiple communications protocols over a single communications port. Communications drivers shall be capable of sharing communications equipment, such as a radio tower (where there is no difference in radio frequency) or a pool of shared modems.
   6. Software shall support redundant physical links to any field device, such as primary connectivity via Ethernet and redundant connectivity via serial port. Redundant links shall support similar or different protocols.
   7. I/O drivers shall be available at no additional cost for a variety of protocols, as follows:
      a. Modbus (TCP, RTU, ASCII, Plus, Serial)
      b. AB DF1
      c. CIP
      d. DNP3
      e. Omron Hostlink and FINS
      f. Bristol Babcock BSAP and IBP

g. GE SNP and SNPX
h. SNMP

8. OPC Client connectivity shall be available at no additional cost for drivers not included in the preceding list. This shall support OPC Servers from developers.
9. DDE Client connectivity shall be available at no additional cost.
10. Software shall support the development of additional I/O drivers where necessary.
11. To optimize system performance, software must support multi-threaded operations for I/O drivers.
12. Software shall provide tools for polling remote devices (e.g. RTUs) directly. Software shall allow real-time tuning of each device's polling frequency without interrupting the polling cycle or restarting the application.
13. To optimize I/O communications for telemetry applications, the polling order shall be configurable and polling shall be asynchronous (if permitted by the remote telemetry unit), allowing the system to continue its polling sequence in the event of a communications error with the remote device.
14. Software shall support radio diagnostics drivers for the following radio devices:
    a. Dataradio/Calamp
    b. MDS
15. Software shall support writing to multiple output tags via a single write request. This shall allow writing a set of default values to a set group of field device registers.
16. Software shall support rewriting the last written value to an output.

E. System Configuration:
1. Configuration files and configuration history shall be encrypted.
2. Change deployment shall be either automatic or manual. User's choice.
3. Software shall allow configuration changes to be reviewed before they are deployed. Users shall have the option to roll back specific changes and deploy others.
4. Software shall be capable of on-line configuration. That is, changes to tag configuration, server lists, user displays, security, reports development and I/O communications shall be carried out without stopping and restarting the application or the computers and without recompiling the application.
5. Software shall be capable of testing on-line configuration changes to tags and screens using live data before changes are deployed.
6. Software shall allow multiple users to configure an application simultaneously.
7. Software shall be capable of offline changes which can be manually imported to the running application and extracted automatically.
8. Software shall allow changes to the application server lists without requiring the application to be restarted.
9. Any client computer not running the application while changes are being made shall automatically download newly deployed changes from the primary application server when the client is restarted.
10. All application servers and clients shall automatically synchronize with the primary application server. No manual file duplication shall be required.

F. Version Control
   1. Software shall offer integrated version control, such that a complete version history exists for any application. The entire version history shall reside in an encrypted repository.
   2. The version history shall include the time and date when the change was applied, the user who deployed the change and any comments entered by the user when deploying this change.
   3. The version history shall allow review of any incremental application changes, including displays, graphics, tags and scripts for each deployed version.
   4. A tool shall be available to determine what versions of the application each (full installation) client or server computer is currently running.
   5. Software shall allow rollback to a previous version of the application without stopping and restarting the application

G. Tag Database:
   1. Software shall be tag-based.
   2. Tag structures shall be supported, such that a custom tag structure can include a set of typical I/O tags (e.g. a lift station.) Structures shall support a base address such that its I/O may use referential addressing.
   3. Tag structures shall be treated as templates in that any structure can be copied and pasted to create any number of identical structures.
   4. A browser shall be provided for creation, modification and deletion of each individual tag.
   5. The tag browser shall include a summary of all tags' current values.
   6. Software shall provide a tool for export of all application tags to Microsoft office applications for bulk tag changes and for import of all tags from the same programs.

H. Graphics and Displays:
   1. Software shall not limit the number of application displays that can be created.
   2. Software shall support both animated and static graphic objects. Animated graphic objects shall provide real-time process information to the user via displays.
   3. Software shall include a standard library of graphics and shall allow additional graphical elements (e.g. BMP, JPG, PNG) to be inserted into the library.
   4. Software shall support the following display sizing and placement features.
      a. Minimum and maximum display sizes for each display.
      b. Resizing, minimizing, maximizing.
      c. Automatic resizing displays to the workstation resolution of each user viewing the application. This shall be supported on both fully installed and browser clients.
   5. Process displays shall be event-driven, in that data will be delivered to client computers by the server immediately upon receipt. Client computers will not poll the server for new data.
   6. Standard tag types with graphics shall be provided for the following:
      a. Analog/digital inputs.
      b. Analog/digital outputs.
      c. Retentive counters with reset. (Values should persist if power is lost and subsequently restored.)
      d. Retentive totalizers with reset. (Values should persist if power is lost and subsequently restored.)
      e. Multi-position switches. Position changes sent to field devices must include feedback of status received and verification of field action taken. For example, a switch intended to

turn on a pump shall generate an alarm if the pump running status is not received within a predefined timeout.

f. Alarms.

7. Software shall include pre-built displays for standard SCADA features. The following pre-built displays shall be provided as a minimum:
   a. Alarm display that can be filtered by name and includes current, unacknowledged, disabled and history.
   b. Trending and tabular viewing of historical data.
   c. Report creator.
   d. Operator notebook.
8. Software shall include the following navigation tools:
   a. A menu for navigating from one display to another. Menu shall be configurable to allow logical grouping of displays where necessary.
   b. Hot box for navigating to a specific display.
   c. Button for navigating to a specific display.
   d. Browser-like forward and reverse buttons to view 10 (or more) previously viewed displays.
9. Software shall allow color translations, changing brightness, contrast and transparency for all graphical library objects. An easy-to-use integrated interface shall be provided to facilitate these changes.
10. Software shall allow calculations to be associated with each graphic object to facilitate movement, visibility and sizing.
11. Software shall allow multiple objects to be saved as a grouped template. The following template capabilities shall be supported:
    a. A template may be associated with a tag structure.
    b. Each new instance of the template will inherit the properties of the template, such that changes to the template will automatically update all instances created from it.
    c. The template may have any number of parameters, including tags and text values, which can be used to animate objects within the template. Each new object created from the template may include different parameters.
    d. Templates may be imported from other projects.
    e. Copy/paste/rename/delete for any template
    f. Ungrouping of any instance of the template.
12. Project displays shall be treated as template displays. The following capabilities shall be supported:
    a. A template display may be associated with a tag structure.
    b. Each new instance of the template will inherit the properties of the template, such that changes to the template will automatically update all instances created from it.
    c. The template may have any number of parameters, including tags and text values, which can be used to animate objects within the template. Each new object created from the template may include different parameters.
    d. Templates may be imported from other projects.
    e. Copy/paste/rename/delete for any template.
13. Means shall be provided to allow the operator to print graphical displays.
14. Software shall support flagging tags as ‘questionable data’ or ‘not commissioned’, though they will continue to display the incoming values. These flags shall be removable by users with sufficient privileges.

15. Software shall include an object-oriented graphics and animation editor with the following capabilities:
    a. Drawing tools with CAD-like capabilities for drawing animated and static objects and text. Developers shall have access to a user- configurable grid for use in positioning objects.
    b. Editing tools for adding, aligning, layering, sizing, copying, cutting, pasting, and deleting objects.
    c. Creating graphics that rotate/move at a rate corresponding to the value they are displaying.
    d. Importing 3D graphic images rendered using external software tools.
16. There shall be no limit to the number of animation graphics that can be used to represent the same I/O tag.
17. Software shall support background bitmaps on graphical pages.
18. Software shall be capable of displaying multiple graphical windows simultaneously.

I. Historical Data Storage
1. Software shall include an integrated, no-cost historian and have an available MSSQL historian for backup and custom reporting.
2. Software shall be capable of logging up to 10,000 values per second.
3. A synchronization scheme shall be included such that an exact copy of all historical data resides in two computers. The scheme shall provide synchronization of data between the software's primary and backup historian. Software shall be capable of synchronizing up to 4000 values per second across each historian type.
4. If, at any time a historian is out of service for duration of time, this historian shall be automatically resynchronized with the historian holding the most recent logged data.

J. Historical Data Analysis
1. Any tag configured as an Analog Status or Digital Status tag shall be automatically available for trending on screen displays.
2. Software shall provide a tool for users to generate ad-hoc trends of historical data and shall allow these trends to be saved for later recall.
3. Software shall display historical and real-time data in both plot and tabular format. Historical and real-time plotted values shall be shown in a continuous, uninterrupted, scrolling fashion.
4. The plot's time frame shall be operator selectable from a minimum of one second to five years. Time intervals shall be clearly marked on the x-axis with date/time stamps and shall scroll with the data.
5. Scaling of each displayed tag value shall be either user-configurable or shall follow the scaling of the tag. Changing the scaling of the tag plot shall not affect the scaling of the tag.
6. User shall be able to see the value of plotted tags for any selected point in time.
7. Software shall be capable of displaying an unlimited number of analog and digital tag plots on a single display. Color shall be used to differentiate between tags. Means must be provided to quickly determine the name and description of each tag displayed.
8. Means must be provided for the following:
    a. Stop/pause scrolling.
    b. Zoom in/out on the time (x) and value (y) axis'.
    c. Pan/Scroll along the time axis or select a particular date to display.
    d. Move analog tag plots vertically (in the value (y) axis), either individually or as a group.
    e. Display statistical data, including average, minimum and maximum values, for each plot.

9. Ability to print displayed plots shall be provided.
10. Ability to associate an operator note with a particular point in time shall be provided.

11. Trend data shall be exportable to comma separated value (.csv) file or directly to a database, for use by 3rd-party data analysis software.
12. Software shall include simple methods for generating historical calculations, such as average flow over last 24 hours.

K. Alarms and Events Managements
1. A synchronization scheme shall be included such that an exact copy of all alarms and events data resides in two computers.
2. If, at any time an alarms/events server is out of service for duration of time, it shall be automatically resynchronized with the more updated alarms/events server.
3. Software shall allow the application to be split into functional areas such that the alarms a user sees/acknowledges are determined by the areas to which the user has access.
4. Software shall support generation of an alarm or event for I/O driver loss of communications, tag value change or outside range, calculated value, user logon/logoff, excess rate of change, stale value and server startup.
5. Software shall provide user-configurable settings for deadband on analog alarms and delay on analog and digital alarms.
6. Each alarm and event shall be written to the application's alarms/events history.
7. Software shall support printing of alarms/events created over a range of dates/times.
8. Alarms and events records shall include:
    a. Time/Date stamp.
    b. The name and description of the alarm tag.
    c. Priority.
    d. Status of Alarm (i.e. Active, Acknowledged, Cleared). Alarm Acknowledgement records shall include the name of the user.
9. Users shall be able to filter the alarms display to show current, unacknowledged, disabled or historical alarms/event. Alarms shall be filterable by priority or by alarm areas/groups.
10. Software shall support an unlimited number of alarm priorities and shall allow unique annunciation sounds and colors for each.
11. Alarm annunciation shall be configurable to use alarm tones, text to speech descriptions, or sound files.
12. Users must be notified, both visibly and audibly, of the occurrence of an alarm, regardless which display is presently being viewed.
13. Alarm acknowledgement shall immediately be propagated to all user interfaces.

L. Alarm Dialer
1. The dialer shall perform alarm annunciation via dial-out over voice modem (using text-to-speech), text message, email and/or alphanumeric pager. It shall support alarm acknowledgement during voice modem calls and via email.
2. The dialer shall be configurable from the SCADA software configuration license and be automatically synchronized with the tag database at all times.
3. Email messages shall support outgoing mail with transport layer security (e.g. Gmail, Yahoo Mail).
4. The dialer shall share the SCADA system security, requiring users to enter a user name and security code access data and to acknowledge alarms.

5. The dialer shall be capable of annunciating alarms to rosters of users with up to 30 contacts per roster. An unlimited number of rosters shall be supported.
6. The dialer shall be able to make rosters active/inactive manually or automatically. Changes to rosters and active/inactive status changes shall be made without stopping and restarting the application or computer.

M. Security
1. Software shall include a security system with privilege and role based user accounts. Level-based access shall not be acceptable.
2. Security system shall support an unlimited number of user accounts, roles, and access privileges.
3. System shall allow creation of an unlimited number of additional security privileges where necessary.
4. User passwords shall be stored in an encrypted format.
5. User passwords must be configurable to require a minimum length, contain alphanumeric characters, and expire after a pre-set period.
6. System shall allow changes to user accounts, roles and privileges while the application is running. Changes shall become effective immediately. Networked users whose accounts have been altered shall be affected by the changes immediately without requiring application restart.
7. User login and logout activity shall be recorded in the application event log.
8. Disabling accounts after X failed attempts shall be supported.

N. Electric Operator Notebook
1. Software shall include a networked electronic operator notebook. All notes entered into the notebook shall be immediately viewable from all clients and servers.
2. Each note shall be recorded with a time/date stamp and the name of the user's account.
3. Notes shall be encrypted to minimize the risk of tampering.
4. Users shall be permitted to select any date to review notes generated on that date.
5. Software shall support printing of notes created over a range of dates/times.

O. Report Generation System
1. Software shall be capable of producing reports using historical data. Reports may be created for one-time use or saved for reuse.
2. Report generation shall be invoked either on demand, by a monitored event, or on a scheduled basis.
3. The report generation system shall be field configurable, allowing an operator to create, modify and generate reports and export data to third party software. The report generation system shall be capable of displaying reports to the user interface display or of exporting files per the following:
    a. To a comma separated value (.csv) file.
    b. To a text file.
    c. To an ODBC-compliant database.
    d. To any direct-connected or networked printer.
    e. Directly to a new MS Excel spreadsheet.
    f. Directly to a new MS Excel template.
    g. To an e-mail.

4. Reports shall be able to display any analog, digital or calculated tag data from the historical database.
5. The hosted SCADA system shall perform custom reporting utilizing templates as needed by the customer. The system shall be able to report using MS Excel utilizing custom VBA coding, or by using XLReporter software.

P. Internet Connectivity
1. The hosted SCADA system shall provide a custom domain name for the customer.
2. The Internet Client shall be protected with Secure Socket Layer (SSL) security.
3. The Internet Client shall require users to enter a user name and security code to run the client.
4. Internet connectivity shall not require the installation or configuration of Internet server software (e.g. Microsoft IIS, Apache).
5. On-line configuration changes shall be pushed immediately to all Internet client interfaces without requiring the browser interface to be restarted or refreshed.
6. Internet clients shall require only the latest version Microsoft Internet Explorer to communicate with the application. Internet clients shall require no software to be manually installed.
7. Internet clients shall cache displays in order to reduce display access time.
8. Internet clients shall have graphical displays identical to the standard full- installation client and shall not require separate development time or a separate development interface. The automatic display generation process shall not distort the graphical layout of any display.
9. Tools shall be provided to monitor Internet client connectivity and to disconnect users when necessary.
10. The hosted SCADA system shall provide FTP access to a secure area of the hosted servers. This functionality provides electronic storage for any document(s) selected by the customer.

Q. Handheld Device Connectivity
1. Handheld device connectivity shall share the SCADA system security, requiring users to enter a user name and security code.
2. Software shall support the following functionality via hand-held devices, such as iPhone, iPad, Blackberry and Android, etc.
    a. Alarms access and acknowledgement.
    b. Analog and digital input monitoring.
    c. Analog and digital output control.
    d. Real-time and historical data trends.
3. Zoom in (pinch) and zoom out shall be supported for historical data trends.

R. Screen Display
1. The software shall include 3D models of customer pumps and other process equipment. The models shall be developed in CAD software. The pumps shall show a red impeller when not running. The pumps shall show a green impeller, with animation for rotation, when running.
2. The software shall include models of all analog inputs scaled as indicated in the written controls sequences.
3. The software shall include operator adjustable models of all alarm and control set points on the screen.

S. Server Redundancy and Load Balancing
1. A minimum of three levels of redundancy for all application services shall be supported.

2. Software shall support automatic failover from a primary server to one or more backup servers for all application services. No manual intervention shall be required.
3. Software shall support distribution of services across any number of computers to facilitate load sharing.
4. Software shall automatically redirect Internet Client connections to the Internet Server with the least active connections.
5. All servers shall be aware of which server is in control of each software process. No two servers shall perform the same function at the same time (e.g. I/O communications to a specific device, incrementing a totalizer.) This ensures efficient use of network communications and synchronization of data across the SCADA network.
6. Software must not require each redundant server to use a second network card to monitor the status of the primary server.
7. Software shall support redundant networks and shall be able to use these for load distribution when both are available. In the event one network connection is lost, network communications shall automatically fail-over to the second connection.

T. Application Upgrades / Support / Diagnostics / Debugging
1. Users must have the capability to upgrade the base software product as new versions become available. Such upgrades shall not require significant changes to the existing application.
2. Support shall include phone, email, user forum and remote access methods.
3. Training shall be available for users of all levels (i.e. Operators, Developers, Administrators)
4. Diagnostic/debugging tools shall be provided for:
    a. Server-to-server and server-to-client activity monitoring within the SCADA network.
    b. Computer resource usage for all servers and full installation clients.
    c. Communication driver activity monitoring.
    d. Script language debugging.

END OF SECTION

SECTION 40 67 00

CONTROL SYSTEM EQUIPMENT PANELS AND RACKS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes pump control system including power disconnect, pump alternation, intrinsically safe control, lightning protection, push buttons, indicating lights, and control relays.

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.
3. Section 26 05 83 - Wiring Connections.

1.2 REFERENCES

A. National Electrical Manufacturers Association:
1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

B. Underwriters' Laboratories
1. UL 508 - Industrial Control Equipment.

1.3 UNIT PRICES

A. Refer to Section 01 20 00- Price and Payment Procedures.

1.4 PERFORMANCE REQUIREMENTS

A. Sequence of Operation:
1. Lake Level Monitoring and Control: Free-Air Radar Transmitter.
2. Monitor Lake Level (Elevation) and position of 7 Gates.
3. Each Gate’s operation mode shall be selected by individual HAND-OFF-AUTO selector switches.
4. In HAND mode, the operator shall set the Gate’s position by use of a momentary OPEN-CLOSE selector switch located at the control panel.
   a. When held in the OPEN position, the Gate’s Actuator shall continuously OPEN the Gate until the selector switch is released or until fully OPENED.
   b. When held in the CLOSE position, the Gate’s Actuator shall continuously CLOSE the Gate until the selector switch is released or until fully CLOSED.
5. In AUTO mode, each Gate will be sent a position setpoint command in the form of a 4-20mA Analog Signal. Each Gate will travel to the position of the setpoint command and maintain this position until the setpoint changes.
   a. The Position Setpoint Command shall be manually set by operator via local interface and/or cloud-based SCADA system.
   b. The Position Setpoint Command shall be set to INCHES OPENED and scaled from 0 to 100% OPENED.

6. Each Gate will have a REMOTE-OFF-LOCAL selector switch at the Actuator.
    a. When set to REMOTE, all HAND and AUTO mode controls operate as stated above.
    b. When set to OFF, the Actuator enters a “fail in place” mode, ignoring all control signals.
    c. When set to LOCAL, the Actuator only responds to the local OPEN-CLOSE momentary selector switch. This operates in the same manner as the OPEN-CLOSE selector switch at the Control Panel.
7. The following signals shall be available via cloud-based SCADA system.
    a. Discrete Inputs:
        1) Gate 1 Fault.
        2) Gate 2 Fault.
        3) Gate 3 Fault.
        4) Gate 4 Fault.
        5) Gate 5 Fault.
        6) Gate 6 Fault.
        7) Gate 7 Fault.
        8) General Alarm.
        9) Power Failure / Phase Monitor.
        10) Camera System Alert (Future).
    b. Analog Inputs:
        1) Lake Level (Radar Transmitter).
        2) Gate 1 Position Feedback
        3) Gate 2 Position Feedback
        4) Gate 3 Position Feedback
        5) Gate 4 Position Feedback
        6) Gate 5 Position Feedback
        7) Gate 6 Position Feedback
        8) Gate 7 Position Feedback
    c. Analog Outputs:
        1) Gate 1 Position Command
        2) Gate 2 Position Command
        3) Gate 3 Position Command
        4) Gate 4 Position Command
        5) Gate 5 Position Command
        6) Gate 6 Position Command
        7) Gate 7 Position Command
8. Substituting operator interface devices such as indicator lights, elapsed time meters, pushbuttons, and selector switches with objects on a graphical interface (ie. Touchscreen or computer screen) shall only be allowed when given prior approval by engineer and owner.

1.5 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures.

B. Shop Drawings: Submit complete bill of materials, wiring diagrams and panel layout drawings showing dimensions to devices.

C. Product Data: Submit catalog information and descriptive literature for components.

D. Test Reports: Submit certified factory test report indicating control panel successfully performs functions specified.

E. Manufacturer's Installation Instructions: Submit instructions on installation and field wiring connections.

F. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

G. Manufacturer's Field Reports: Submit certification after installation that control panel has been installed in accordance with manufacturer's instructions and has been successfully field tested.

1.6 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements.

B. Project Record Documents: Record actual locations of control panel and final wiring diagrams and connections.

C. Operation and Maintenance Data: Submit operation and maintenance instructions for components and devices.

1.7 QUALITY ASSURANCE

A. Perform Work in accordance with UL 508.

B. Provide components compatible with functions required to form complete working system.

C. Provide UL 508 label on complete assembly.

D. Perform Work in accordance with all applicable codes and standards.

E. Maintain a minimum of one copy of each document on site.

1.8 QUALIFICATIONS

A. Manufacturer and Fabricator: Company specializing in manufacturing and assembling products specified in this section with minimum three years documented experience.

1.9 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements.

B. Convene minimum one week prior to commencing work of this section.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements.

B. Inspect for damage.

C. Store in areas protected from weather, moisture, or possible damage; do not store directly on ground; handle to prevent damage to wiring and components.

1.11 COORDINATION

A. Section 01 30 00 - Administrative Requirements.

B. Coordinate work and component requirements with controlled pumps.

1.12 EXTRA MATERIALS

A. Section 01 70 00 - Execution and Closeout Requirements.

B. Furnish the following spare parts:
   1. 1 pilot light assembly for each type utilized.
   2. 1 DC power supply for each size and type utilized.
   3. 4 fuses for each type and size utilized.
   4. 1 general purpose relay for each type utilized.

PART 2 - PRODUCTS

2.1 CONTROL PANEL

A. Manufacturers:
   1. Kennedy Industries.
   2. Perceptive Controls.
   3. Commerce Controls.

B. Substitutions: Section 01 60 00 - Product Requirements.

2.2 COMPONENTS

A. Control Panel Enclosure:
   1. Furnish NEMA 250, Type 4X, Stainless Steel enclosure fabricated of 10 gage steel with continuously welded seams.
      a. Enclosure door gasketed with neoprene.
      b. Heavy-duty three-point latching mechanism.
      c. Power: 120/208 volt, 3 phase, 4 wire, WYE service.
   2. Identify control panel components with engraved nameplate mounted on inside of panel.
   3. Mount components, not mounted on front of panel, on removable back panel secured to enclosure with collar studs.
   4. Install wiring in neat, workmanlike manner and group, bundle, support and route horizontally and vertically for neat appearance.
   5. Terminate wires leaving panel at terminal strips inside enclosure.
   6. Identify terminals and wires in accordance with panel wiring diagrams.
   7. Furnish copper grounding plate inside control panel for terminating ground wires.

B. Transient Voltage Surge Suppressor: Furnish three phase transient voltage surge suppressor mounted to exterior of pump control panel to protect panel components from potential damage from transient voltages caused by lightning or surges on incoming power line. Furnish indication light to indicate unit is functioning.

C. Phase Monitor:
   1. Furnish phase monitor in control panel to monitor incoming power and sense loss of any phase(s).
      a. Voltage and Phase Configuration shall match incoming electrical service.
      b. Inhibit pump operation when phase loss occurs.
      c. Surface mounted.

D. Line Filter: Furnish 120 volt, single-phase power line filter to condition incoming control power feed.

E. Circuit Breakers:
   1. Furnish quick-make, quick-break thermal-magnetic molded case type, individually mounted and identified.
   2. Furnish individual circuit breakers as indicated on Drawings.
   3. Furnish individual circuit breakers as required to protect and disconnect each main component within panel.

F. Selector Switches:
   1. NEMA Type 4X, 30.5 mm, heavy-duty, non-illuminated, maintained contact type with double-break silver contacts.
   2. Substituting Selector Switches with objects on a graphical interface (ie. Touchscreen or computer screen) shall only be allowed when given prior approval by engineer and owner.

G. Push Buttons: NEMA Type 4X, 30.5 mm, heavy-duty, non-illuminated, momentary contact type with double-break silver contacts.
   1. Substituting Push Buttons with objects on a graphical interface (ie. Touchscreen or computer screen) shall only be allowed when given prior approval by engineer and owner.

H. Pilot Lights:
   1. NEMA Type 4X, 30.5 mm, heavy-duty, transformer type.
      a. Voltage Rating: 24 volts DC, to match control voltage.
      b. Color Caps: Green for "run" and red for "alarm."
   2. Furnish indicator and alarm pilot lights as indicated on drawings.
   3. Substituting Pilot Lights with objects on a graphical interface (ie. Touchscreen or computer screen) shall only be allowed when given prior approval by engineer and owner.

I. Legend Plates for Pilot Devices:
   1. Furnish 2-1/4 inch (60 mm) square plastic legend plate for each selector switch, push button and pilot light.
   2. Color: White with black lettering.

J. Relays:
   1. Heavy-duty, general purpose type, with 10 amp contacts.
      a. Blade type terminals that plug-in to socket.
      b. DIN rail mounted to inside of panel enclosure.
      c. Contact Configuration: As required for proper operation of control logic.
      d. Operating Power: As required to match voltage of control signals.
      e. Furnish indicator light to indicate relay coil is energized.

K. Terminal Blocks:
   1. Furnish terminal blocks in control panel for field wiring.
      a. NEMA type, rated for 600 volts AC.
      b. Identify with permanent machine printed marking in accordance with terminal numbers shown on panel wiring diagrams.
      c. Furnish twenty five percent spare terminal blocks in control panel for each voltage and configuration utilized.

L. Wiring:
   1. Furnish pump control panel completely wired by manufacturer.
   2. Furnish wiring, workmanship, and schematic wiring diagrams in compliance with UL 508. Isolate wiring and terminal blocks by voltage levels to greatest extent possible.
   3. Wiring: Stranded copper, Type MTW or THW, 600 volts, color coded as follows:
      a. Line and Load Circuits, AC Power: Black.
      b. AC Control Circuit Less than Line Voltage: Red.
      c. DC Control Circuit: Blue.
      d. Interlock Control Circuits from External Source: Yellow.
      e. Equipment Grounding Conductor: Green.
      f. Current Carrying Ground: White.
   4. Minimum Size of Control Wiring: Number 16.
   5. Tag control wiring at both ends in control panel with legible permanent coded wire marking sleeve. Mark with white PVC tubing sleeves or embossed adhesive tape with machine printed black marking. Mark in accordance with wire numbers shown on control wiring diagrams and terminal strip numbers.

M. Nameplates:
   1. Furnish laminated phenolic nameplates on front of pump control panel.
   2. Color: White with black engraved letters.
   3. Minimum Size of Engraving: 1/4 inch (6 mm).

N. Environmental Condition Management:
   1. Furnish anti-condensation heater with adjustable temperature switch to prevent moisture formation and maintain temperature above 35 degrees Fahrenheit within enclosure.
   2. Furnish cooling fan with adjustable temperature switch to maintain safe operational temperatures within enclosure.
   3. Furnish inhibiting measures to prevent rust and corrosion within enclosure.

2.3 LAKE LEVEL CONTROL SYSTEM

A. Furnish lake level control system to monitor lake level and operate gate actuator motors as set forth herein.

B. Gate actuator positions shall be set manually by operators, in accordance to lake level conditions.

C. Programmable Logic Controller (PLC):
   1. See Section 40 63 43 Programmable Logic Controllers.

D. Operator Interface:
   1. Manufacturer: Match PLC manufacturer.
   2. Panel mounted, 10 inch (min), full color, touch screen Human-Machine Interface (HMI).
   3. Communications:
      a. Ethernet/IP.
      b. USB 3.0
      c. MODBUS
   4. Capable of trending and datalogging to local memory and USB flash drive/portable hard-drive.

E. Radar Level Transmitter: Section 40 72 23 Radar Level Meters
   1. Furnish one Free-Air Radar Level Transmitter.
   2. Furnish Transmitter with stainless steel adjustable mounting bracket.

F. Furnish stainless steel bracket for supporting transducer.

2.4 SOURCE QUALITY CONTROL AND TESTS

A. Perform a factory test of completed control panel by demonstrating operation of control functions. Provide certified test results.

B. Factory assemble and test each control and alarm function.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements.

B. Verify correct power supply is available.

C. Verify field equipment is installed.

3.2 INSTALLATION

A. Install control panel at location indicated on Drawings.

B. Install control panel in accordance with manufacturer's instructions.

3.3 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements.

B. Start-up lake level control system by energizing system equipment and testing operation of hardware and process control logic under supervision of manufacturer's representative and in presence of Architect/Engineer.

C. Equipment Acceptance:
   1. Adjust, repair, modify or replace system components that fail to perform as specified and rerun tests. Make final adjustments to equipment under direction of manufacturer's representative.
   2. Document adjustments, repairs and replacements in manufacturer's field services certification.

3.4 MANUFACTURER'S FIELD SERVICES

A. Section 01 40 00 - Quality Requirements.

B. Furnish services of manufacturer's representative experienced in installation of products furnished under this specification for not less than 5 work days on-site for installation inspection and field testing, and instructing Owner's personnel in maintenance of equipment.

C. Certify that equipment has been properly installed and is ready for start-up and testing.

3.5 DEMONSTRATION

A. Section 01 70 00 - Execution and Closeout Requirements.

B. Demonstrate equipment startup, shutdown, routine maintenance, alarm condition responses, and emergency repair procedures to Owner's personnel.

END OF SECTION

SECTION 40 72 23

RADAR LEVEL METERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Radar-level measurement devices.
   2. Transmitters.

B. Related Requirements:
   1. Section 26 05 03 - Equipment Wiring Connections: Control power wiring requirements.

1.2 REFERENCE STANDARDS

A. International Electrotechnical Commission:
   1. IEC 61508 - Functional safety of electrical/electronic/programmable electronic safety-related systems.
   2. IEC 61511 - Corrigendum 1 - Functional safety - Safety instrumented systems for the process industry sector.

B. National Electrical Manufacturers Association:
   1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

C. NSF International:
   1. NSF 61 - Drinking Water System Components - Health Effects.
   2. NSF 372 - Drinking Water System Components - Lead Content.

1.3 UNIT PRICES

A. Refer to Section 01 20 00- Price and Payment Procedures.

1.4 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

B. Coordinate Work of this Section with concrete work.

1.5 SUBMITTALS

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

B. Product Data: Submit manufacturer information for system materials and component equipment, including connection requirements.

C. Shop Drawings:
   1. Indicate system materials and component equipment.
   2. Submit installation requirements and other details.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Source Quality-Control Submittals: Indicate results of shop and factory tests and inspections.

F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

G. Manufacturer Reports: Certify that equipment has been installed according to manufacturer instructions.

H. Qualifications Statement:
   1. Submit qualifications for manufacturer.

1.6 CLOSEOUT SUBMITTALS

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

B. Project Record Documents: Record actual locations and final orientation of equipment and accessories.

1.7 QUALITY ASSURANCE

A. Ensure that materials of construction of wetted parts are compatible with process liquid.

B. Materials in Contact with Potable Water: Certified to NSF 61 and NSF 372.

C. Perform Work according to all applicable codes and standards.

D. Maintain one copy of each standard affecting work of this Section on Site.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Store materials according to manufacturer instructions.

D. Protection:
   1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
   2. Provide additional protection according to manufacturer instructions.

1.10 WARRANTY

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

B. Furnish five-year manufacturer's warranty for radar-level measurement devices.

PART 2 – PRODUCTS

2.1 RADAR-LEVEL MEASUREMENT DEVICES

A. Manufacturers:
   1. Vega.
   2. Substitutions: Not permitted.

B. Description:
   1. Measuring Range: Up to 30 feet (10 m).
   2. Operating Temperature Range: Minus 40 to plus 150 degrees F.
   3. Operating Pressure: Up to 23 psig.
   4. Accuracy: Plus or minus 0.4 inch (10 mm).
   5. Certified according to IEC 61508 and IEC 61511.

C. Communications Protocol: HART.
   1. External communication devices will NOT be required for product setup or configuration.
   2. Configuration via Bluetooth application will be permitted.

D. Operation: Menu guided.
   1. All device settings and functions shall be configurable via local display using pushbuttons and/or turn-dials.

E. Transmitters:
   1. Selected by sensor manufacturer to match sensor.
   2. Visual Display: Alphanumeric.
      a. Four digit, Minimum.
      b. LED or Backlit LCD.
   3. Output Signal: 4 to 20-mA dc.
   4. Location: As indicated on Drawings.
   5. Control Power:
      a. Wiring: As specified in Section 26 05 03 - Equipment Wiring Connections.
      b. 24-Vdc externally or loop powered.
      c. Furnish local transformers as required.
   6. Enclosures: NEMA 250 Type 4 or 4X as required.
   7. Mounting:

a. Remote.
b. Control panel.

8. Furnish cable, field preamplifiers, and signal conditioners as required to maintain accuracy from sensor to terminal device.

2.2 SOURCE QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Requirements for testing, inspection, and analysis.

B. Provide shop inspection and testing of completed assembly.

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. Coordinate location and orientation of level probe assemblies with final equipment installations.

B. Ensure that instruments are located to be easily accessible for maintenance.

C. Installation Standards: Install Work according to all applicable codes and standards.

3.3 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. Manufacturer Services: Furnish services of manufacturer's representative experienced in installation of products furnished under this Section for not less than 4 hours (per Device) on site for installation, inspection, field testing, and instructing Owner's personnel in maintenance of equipment.

D. 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.

E. Furnish installation certificate from equipment manufacturer's representative attesting that equipment has been properly installed and is ready for startup and testing.

3.4 DEMONSTRATION

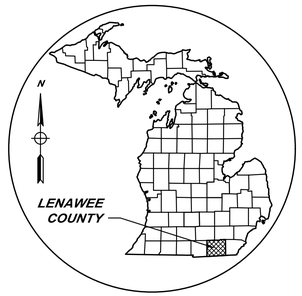
A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for demonstration and training.

B. Demonstrate equipment startup, shutdown, routine maintenance, and emergency repair procedures to Owner's personnel.

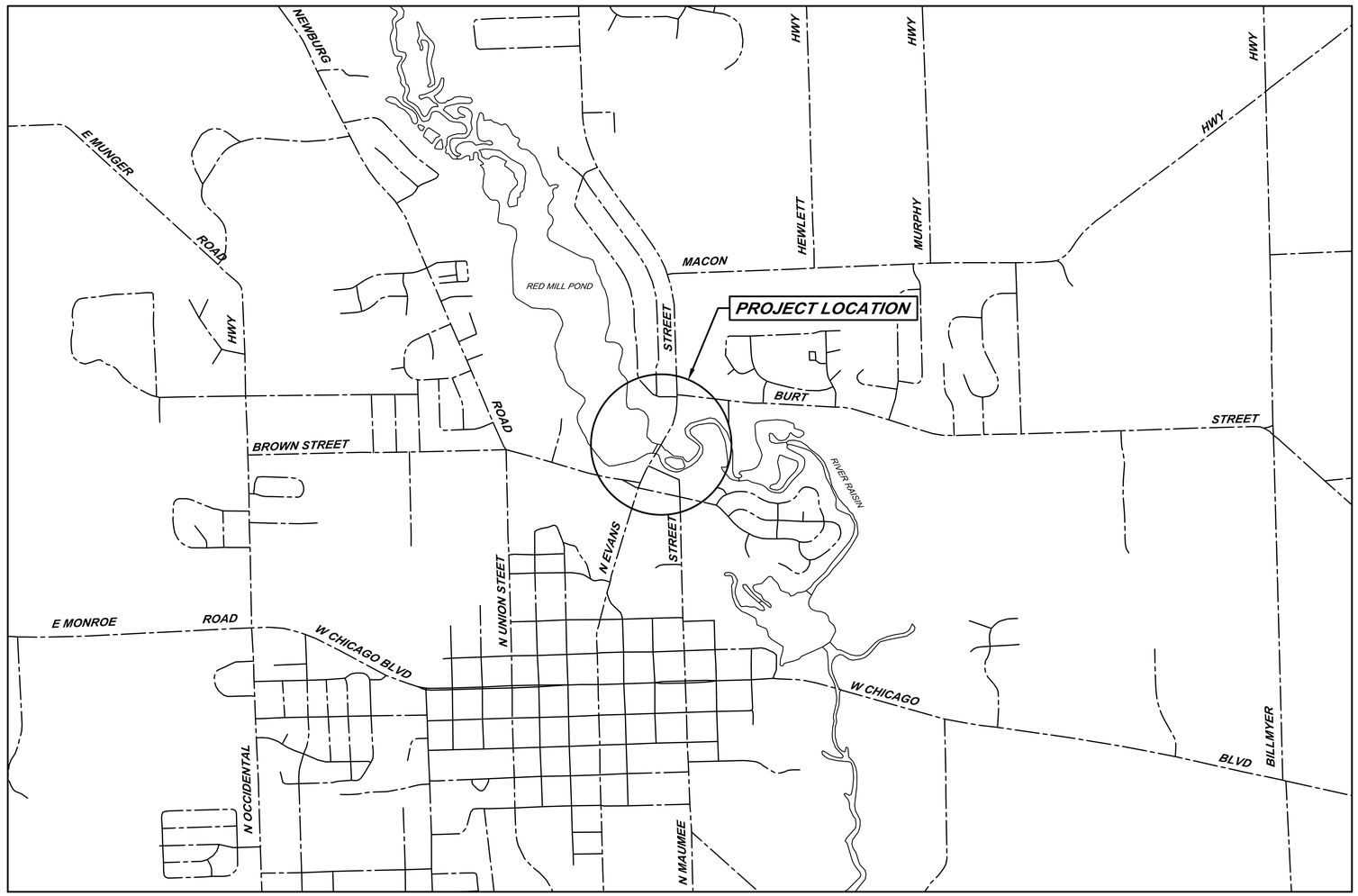
END OF SECTION

TECUMSEH DAM ID NO. 593

LENAWEE COUNTY DRAIN COMMISSIONER - JENNIFER L. ESCOTT



AREA MAP
NOT TO SCALE



LOCATION MAP
NOT TO SCALE

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CITY OF TECUMSEH,
TECUMSEH TOWNSHIP,
LENAWEE COUNTY , MICHIGAN

TECUMSEH DAM ID NO. 593
LENAWEE COUNTY, MICHIGAN

COVER SHEET

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DE. BY: HRG	CH. BY: RVG	PROJECT NO.	
DR. BY: HRG	APP. BY: NDC	129021SG2020	
STDS.	SHEET 01 OF 24	DR 01	
DATE SEPTEMBER, 2024	FILE NO.		
SCALE NOT TO SCALE	DR-4501-01		

GENERAL NOTES

NO WORK SHALL BE PERFORMED BEFORE 7:00 AM OR AFTER 7:00 PM MONDAY THROUGH SATURDAY. NO WORK SHALL HAPPEN ON SUNDAYS OR HOLIDAYS, UNLESS AUTHORIZED BY THE OWNER.

CONTRACTOR SHALL NOTIFY ENGINEER 48 HOURS PRIOR TO START OF CONSTRUCTION, CONSTRUCTION STAKING AND INSPECTION.

CONTRACTOR SHALL MAINTAIN ACCESS FOR MAIL DELIVERY AND GARBAGE PICKUP AT ALL PARCELS. IF THESE SERVICES CANNOT BE PERFORMED, CONTRACTOR IS RESPONSIBLE FOR TAKING THE NECESSARY MEASURES TO CARRY THEM OUT.

COORDINATE DRIVE CLOSURES AND MAIL BOX RELOCATION WITH LANDOWNERS A MINIMUM OF ONE DAY IN ADVANCE.

CONTRACTOR TO PROVIDE DUST CONTROL AND SWEEP ROADS DAILY.

ALL EXCAVATED MATERIAL NOT TO BE REUSED OR DISPOSED OF ON SITE SHALL BE REMOVED FROM SITE. THE CONTRACTOR IS RESPONSIBLE FOR DISPOSING OF MATERIALS ACCORDING TO LOCAL AND STATE REQUIREMENTS.

UNDERGROUND UTILITIES/MISS DIG
FOR PROTECTION OF UNDERGROUND UTILITIES AND IN CONFORMANCE WITH PUBLIC ACT 174, 2013, THE CONTRACTOR SHALL DIAL 1-800-482-7171 OR 811 A MINIMUM OF THREE FULL WORKING DAYS, EXCLUDING SATURDAYS, SUNDAYS, AND HOLIDAYS, PRIOR TO BEGINNING EACH EXCAVATION IN AREAS WHERE PUBLIC UTILITIES HAVE NOT BEEN PREVIOUSLY LOCATED. MEMBERS WILL THUS BE ROUTINELY NOTIFIED. THIS DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY OF NOTIFYING UTILITY OWNERS WHO MAY NOT BE A PART OF THE "MISS DIG" ALERT SYSTEM.

THE EXISTING UTILITIES ON THESE DRAWINGS HAVE BEEN SHOWN ACCORDING TO THE BEST AVAILABLE INFORMATION. CONTRACTOR SHALL FIELD LOCATE ALL UTILITIES PRIOR TO BEGINNING CONSTRUCTION AND SHALL NOTIFY THE ENGINEER AS TO WHERE POSSIBLE CONFLICT EXISTS.

ALL CONSTRUCTION UNDER EXISTING UTILITIES, INCLUDING HOUSE SERVICES, SHALL BE COMPLETELY BACKFILLED WITH SAND, IN 12" LAYERS, AND COMPACTED TO NOT LESS THAN 95% OF THE MAXIMUM UNIT WEIGHT.

ANY UTILITIES ENCOUNTERED DURING CONSTRUCTION SHALL BE SUPPORTED, PER THE SPECIFICATIONS OF THE INDIVIDUAL UTILITY COMPANY CLAIMING OWNERSHIP OF THE UTILITY.

SOIL EROSION AND SEDIMENTATION CONTROL MEASURES
APPROPRIATE SOIL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE IN PLACE PRIOR TO EARTH-DISTURBING ACTIVITIES. PLACE TURF ESTABLISHMENT ITEMS AS SOON AS POSSIBLE ON POTENTIAL ERODABLE SLOPES AS DIRECTED BY OWNER. CRITICAL DITCH GRADES SHALL BE PROTECTED WITH EITHER SOD, SEED/MULCH, OR SEED/MULCH BLANKET AS DIRECTED BY OWNER.

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT SOIL EROSION AND SEDIMENTATION CONTROL MEASURES ARE IN PLACE AND MAINTAINED UNTIL THE CONTRACT HAS BEEN COMPLETED AND ACCEPTED. MEASURES SHALL ONLY BE PAID FOR ONCE.

ALL CATCHBASINS AND SEDIMENTATION TRAPS/BASINS SHALL BE CLEANED OUT UPON COMPLETION OF THE PROJECT.

CONTRACTOR SHALL CONFORM TO SOIL EROSION AND SEDIMENTATION CONTROL ACT, PART 91 OF ACT 451 OF 1994.

PROPERTY OWNERS
PROPERTY OWNERS' NAMES, WHERE SHOWN, ARE FOR INFORMATION ONLY, AND THEIR ACCURACY IS NOT GUARANTEED.

ADJUSTING MONUMENT BOXES
ALL GOVERNMENT CORNERS ON THIS PROJECT SHALL BE PRESERVED, WHETHER SHOWN OR NOT. IT MAY BE NECESSARY TO PLACE OR ADJUST MONUMENT BOXES, AS REQUIRED.

TRAFFIC
THE CONTRACTOR SHALL MAINTAIN LOCAL TRAFFIC AT ALL TIMES. SIGNAGE MUST BE IN ACCORDANCE WITH THE MICHIGAN MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES AND SHALL BE COORDINATED WITH THE ENGINEER AND GOVERNING ROAD AGENCY. PERMITS MAY BE REQUIRED.

PERMITS
PRIOR TO COMMENCING CONSTRUCTION, THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED BY THE APPROPRIATE AGENCIES.

CONSTRUCTION PROCEDURES SHALL CONFORM TO THE REQUIREMENTS OF THE APPROPRIATE AGENCIES.

GENERAL NOTES CONT.

ALL WORK SHALL BE CONFINED TO THE RIGHT-OF-WAY OR CONSTRUCTION LIMITS SHOWN ON THE PLANS. ANY WORK OUTSIDE OF THESE LIMITS SHALL BE AGREED TO BY THE CONTRACTOR AND THE LANDOWNER IN WRITING.

RESTORE ALL LAWN AREAS PER SPECIFICATIONS AND PLANS.

CONTRACTOR TO RESTORE INCIDENTAL DAMAGES ON THE PROJECT AS DIRECTED BY OWNER AND ENGINEER AT THE CONTRACTOR'S EXPENSE.

ALL DRAIN SIDE SLOPES SHALL BE 2H:1V OR FLATTER, UNLESS SPECIFIED OTHERWISE.

THE WORDS "RIGHT SIDE" OR "LEFT SIDE" IMPLY A REFERENCE TO THE DAM FACING DOWNSTREAM.

REMOVE EXISTING FENCES, LANDSCAPING, AND OTHER STRUCTURES IN RIGHT-OF-WAY OR CONSTRUCTION LIMITS AS-NEEDED FOR CONSTRUCTION. COST TO BE INCLUDED IN SITE CLEARING.

REINSTALLATION OF FENCES MUST BE COORDINATED WITH THE LAND OWNER AT THE LAND OWNER'S EXPENSE, UNLESS STATED OTHERWISE IN THE PLANS.

ALL SPRINKLER SYSTEMS DAMAGED SHALL BE REPAIRED BY CONTRACTOR. COST OF THE PAY ITEM BEING INSTALLED, UNLESS OTHERWISE NOTED.

CONTRACTOR TO CLEAR TREES WITHIN THE RIGHT-OF-WAY OR CONSTRUCTION LIMITS AS NECESSARY TO CONSTRUCT PROJECT AND LEVEL SPOILS AS SHOWN IN DETAILS. COORDINATE REMOVALS WITH THE ENGINEER/LANDOWNER.

ROADS, DRIVEWAYS AND SIDEWALKS
ALL JOINTS AT INTERSECTION APPROACHES AND DRIVEWAYS SHALL BE SAW-CUT WITH BUTT-JOINTS.

FOR OPEN CUT PAVEMENT REMOVAL, CONTRACTOR SHALL SAW CUT THE EXISTING PAVEMENT FULL DEPTH PRIOR TO REMOVAL.

ALL DRIVING SURFACES ARE TO BE RESTORED TO IN-KIND DEPTH AND MATERIAL, UNLESS OTHERWISE SPECIFIED ON THE PLANS.

PROTECT ALL ROADS NOT SPECIFIED TO BE REMOVED DURING CONSTRUCTION. REPAIR ANY UNAUTHORIZED DAMAGE AT CONTRACTOR'S EXPENSE.

BROKEN CONCRETE AND DEBRIS SHALL BE CONSIDERED WASTE AND SHALL BE DISPOSED OF BY THE CONTRACTOR OFF-SITE. COST SHALL BE INCLUDED IN THE OTHER PAY ITEMS OF THE PROJECT.

MATCH EXISTING TYPE FOR CONCRETE CURB AND GUTTER RESTORATION.

CONTRACTOR SHALL REMOVE AND REPLACE ALL STREET AND TRAFFIC SIGNAGE AS NECESSARY FOR CONSTRUCTION. ALL COST SHALL BE INCLUDED IN THE BID PRICE FOR SITE CLEARING.

CONTRACTOR SHALL COORDINATE LOCATION OF ANY ACCESS ROADS WITH THE LANDOWNER AND THE ENGINEER. ANY ACCESS ROAD SHALL BE REPAIRED TO THE OWNER'S SATISFACTION.

ALL WORK WITHIN THE ROAD RIGHT-OF-WAY SHALL BE IN ACCORDANCE WITH THE CURRENT STANDARDS AND GENERAL SPECIFICATIONS OF THE AGENCY WITH JURISDICTION OVER THE ROAD.

MAIL BOXES
CONTRACTOR SHALL REMOVE AND TEMPORARILY RELOCATE ALL EXISTING MAIL BOXES AS NEEDED FOR CONSTRUCTION. COSTS TO BE INCLUDED IN THE UNIT PRICE BID FOR SITE CLEARING.

ALL TEMPORARILY RELOCATED MAIL BOXES, STREET AND TRAFFIC SIGNS TO BE REINSTALLED TO ORIGINAL LOCATIONS AS CONSTRUCTION ALLOWS. COSTS TO BE INCLUDED IN THE UNIT PRICE BID FOR CLEANUP AND RESTORATION.

UTILITIES
UTILITIES LOCATED IN THE ROAD AND DAM RIGHTS-OF-WAY WILL BE RELOCATED BY OTHERS, UNLESS OTHERWISE NOTED ON THE PLANS.

THE DRAIN COMMISSIONER'S MINIMUM CLEARANCE STANDARDS SHALL BE MET WHENEVER RELOCATING EXISTING UTILITIES WITHIN THE DAM RIGHT-OF-WAY.

ALL WATER VALVE BOXES SHALL BE ADJUSTED TO FINISHED GRADE. COST SHALL BE INCLUDED IN THE PAY ITEM BEING INSTALLED.

ANY UTILITIES DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

ALL MANHOLE RIMS IN ROADWAYS AND DRIVES SHALL BE ADJUSTED PRIOR TO FINAL PAVING TO BE FLUSH WITH FINISHED GRADE.

GRADING AROUND MANHOLES/CATCHBASINS, FLARED END SECTIONS, AND OTHER INLETS SHALL BE SMOOTH AND SHAPED TO PROVIDE POSITIVE DRAINAGE INTO THE INLETS.

DEMOLISH EXISTING STRUCTURE(S) AND DISPOSE OF IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REQUIREMENTS. COST TO BE INCLUDED WITH THE ITEM BEING INSTALLED AS DIRECTED BY OWNER/ENGINEER.

CONTRACTOR SHALL CONNECT ANY AND ALL FIELD TILE OUTLETS AND OTHER STORM LEADS TO PROPOSED STORM SEWER WITH PREMANUFACTURED TEES, WYES, GASKETS, SEALS, COUPLERS, BOOTS, ETC. PER SPECIFICATIONS.

SOIL EROSION SEDIMENT CONTROL
ALL RIPRAP MATERIAL SHALL BE APPROVED BY THE ENGINEER. OWNER AND ENGINEER RESERVES THE RIGHT TO REJECT ANY AND ALL RIPRAP.

CONTRACTOR SHALL FINISH GRADE, SEED, FERTILIZE, AND MULCH DAILY ON ALL DISTURBED AREAS AS DESCRIBED IN THE SPECIFICATIONS.

CONTACTS

LENAWEE COUNTY DRAIN COMMISSION ATT: JENNIFER L. ESCOTT 320 SPRINGBROOK AVENUE SUITE 102 ADRIAN, MI 49221 PHONE: (517) 264-4696	OWNER
SPICER GROUP ATT: RICHARD GRAHAM, P.E. 125 HELLE BLVD, SUITE 2 DUNDEE, MI 48131 PHONE: (248) 495-2927	PROJECT ENGINEER
SPICER GROUP ATT: HANNAH GARNER 125 HELLE BLVD, SUITE 2 DUNDEE, MI 48131 PHONE: (517) 648-9677	DESIGN ENGINEER
CITY MANAGER ATT: DANIEL SWALLOW 309 E. CHICAGO BLVD TECUMSEH, MI 49286 PHONE: (517) 424-6555	CITY OF TECUMSEH CITY MANAGER
DEPARTMENT OF PUBLIC WORKS ATT: TROY ROYBARCH PHONE: (517) 605-2237	CITY OF TECUMSEH DPW DIRECTOR
CITY OF TECUMSEH PARKS ATT: SARAH GILMORE PHONE: (517) 423-5602	CITY OF TECUMSEH PARKS DIRECTOR
CONSUMERS ENERGY/GAS ATT: TREVIN TREVINO PHONE: (517) 262-1623	GAS
CONSUMERS ENERGY/GAS ATT: DAVID SOUTHWARD PHONE: (517) 788-2400	ELECTRIC

ABBREVIATIONS

BC = BACK OF CURB
BM = BENCH MARK
CB = CATCH BASIN
C/C = CENTER TO CENTER
CJ = CONSTRUCTION JOINT
CL = CENTERLINE
CMP = CORRUGATED METAL PIPE
CONC = CONCRETE
CORR = CORRUGATED
CSP = CORRUGATED STEEL PIPE
DI = DUCTILE IRON PIPE
EF = EACH FACE
ELEC = ELECTRIC
EL OR ELEV = ELEVATION
EOM = EDGE OF METAL
EOP = EDGE OF PAVEMENT
EQ/SP = EQUALLY SPACED
ESMT = EASEMENT
EW = EACH WAY
EX OR EXIST = EXISTING
FES = FLARED END SECTION
FF = FINISH FLOOR
FG = FINISH GROUND
FL = FLOW LINE
FS = FINISH SURFACE
FT = FEET
GALV = GALVANIZED
G = GUTTER
GA = GAUGE
HDG = HOT DIP GALVANIZED
HDPE = HIGH DENSITY POLYETHYLENE
HMA = HOT MIX ASPHALT
HOR = HORIZONTAL
HP = HIGH POINT
HYD = HYDRANT
INV = INVERT
LP = LOW POINT
OC = ON CENTER
OH = OVERHEAD
MH = MANHOLE
MIN = MINIMUM
MON = MONUMENT
NFL = NOT FIELD LOCATED
NTS = NOT TO SCALE
PROP = PROPOSED
PVC = POLYVINYL CHLORIDE
RCP = REINFORCED CONCRETE PIPE
ROW = RIGHT OF WAY
SAN = SANITARY
SB = SOIL BORING
SS = STAINLESS STEEL
STA = STATION
STM = STORM
SWR = SEWER
T/B = TOP AND BOTTOM
TC = TOP OF CURB
TOB = TOP OF BANK
TOS = TOE OF SLOPE
TELE = TELEPHONE
TRW = TOP OF RETAINING WALL
TW = TOP OF WALK
UG = UNDERGROUND
UNO = UNLESS NOTED OTHERWISE
VERT = VERTICAL
WM = WATER MAIN
WSEL = WATER SURFACE ELEVATION

LINE TYPE LEGEND

- EXISTING ROAD CENTERLINE
- EXISTING WATER MAIN
- EXISTING SANITARY SEWER OR FORCEMAIN
- EXISTING STORM SEWER
- EXISTING TELEPHONE CABLE
- EXISTING GAS MAIN
- EXISTING ELECTRIC
- EXISTING DRAINS (OTHER)
- PROPOSED UTILITY
- EXISTING CURB & GUTTER
- PROPOSED CURB & GUTTER
- FENCE LINE
- OVERHEAD UTILITY
- RAILROAD TRACKS
- STATION LINE
- LIMITS OF RIGHT OF WAY
- EASEMENT
- SILT FENCE
- REVERSE PAN CURB & GUTTER
- TREE LINE
- EXISTING CONTOURS
- PROPOSED CONTOURS

SYMBOL LEGEND
EXISTING SYMBOLS

- MANHOLE
- CATCH BASIN
- CURB CATCH BASIN
- FIRE HYDRANT
- GAS VALVE
- WATER VALVE
- TELEPHONE PEDESTAL
- POWER POLE
- TELEPHONE POLE
- POWER AND TELEPHONE POLE
- LIGHT POLE
- GUY ANCHOR AND POLE
- MAIL BOX
- WATER METER
- TELEPHONE MANHOLE
- ELECTRIC MANHOLE
- M.W. - MONITORING WELL
- HAND HOLE
- TRANSFORMER
- ELECTRICAL PEDESTAL
- BARRIER FREE PARKING
- SPRINKLER
- RAILROAD SIGNAL
- ANTENNA
- SATELLITE DISH
- AC - AIR CONDITIONING UNIT
- SB# - SOIL BORING
- CONTROL POINT
- BENCH MARK
- FOUND SURVEY CORNER
- SET 1/2" IRON ROD
- 1/4 SECTION CORNER
- BREAK IN LINE
- EXISTING SIGN-1 POST
- EXISTING SIGN-2 POST
- STUMP
- WETLANDS
- PINE
- BUSH
- TREE

PROPOSED SYMBOLS

- MANHOLE
- CATCHBASIN
- FIRE HYDRANT
- WATER VALVE
- BARRIER FREE PARKING
- LIGHT POLES
- DRAINAGE FLOW
- 600.00 LABEL - SPOT ELEVATION LABELS
  - G = GUTTER
  - TW = WALK
  - TC = TOP OF CURB
  - FS = FINISH SURFACE

PROJECT DATUM

HORIZONTAL:	STATE PLANE SOUTH MI '83 2113
VERTICAL:	NORTH AMERICAN VERTICAL DATUM '88

BY	MARK	REVISIONS	DATE

TECUMSEH DAM ID NO. 593
LENAWEE COUNTY, MICHIGAN

CONTACTS, GENERAL NOTES, AND LINE TYPE LEGEND

DUNDEE OFFICE
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DE. BY: HRG	CH. BY: RVG	PROJECT NO.	
DR. BY: HRG	APP. BY: NDC	129021SG2020	
STDS.		SHEET 02 OF 24	DR 02
DATE SEPTEMBER, 2024		FILE NO.	
SCALE NOT TO SCALE		DR-4501-02	

EROSION CONTROL MEASURES

KEY	SESC MEASURE	SYMBOL	WHERE USED
1	Seeding		When bare soil is exposed, temporarily or permanently, to erosive forces from wind and or water on flat areas, mild slopes, grassed waterways and spillways, diversion ditches and dikes, borrow and stockpile areas, and spoil piles.
2	Mulch		On flat areas, slopes, grassed waterways and spillways, diversion ditches and dikes, borrow and stockpile areas, and spoil piles when areas are subject to raindrop impact, and erosive forces from wind or water.
15	Riprap		Along drain banks, shorelines, or where concentrated flows occur. Slows velocity, reduces erosion and sediment load.
16	Riprap Toe of Slope		Riprap toe of slope protection is used in areas where velocities are causing drain bank erosion and are too high to stabilize using other methods.
23	Outfall Stabilization		In the stream or drain bank usually above the ordinary high water mark where an enclosed drain or tile discharges to an open drain.
26	Dust Control		As a temporary measure on exposed and unstabilized areas that must be protected from wind or water erosion.
27	Stabilized Surface Cover		in any area to stabilize raw areas where seeding does not occur.
38	Coffer Dam		As a temporary isolation measure during construction

DETAILED DRAWINGS AND SPECIFICATIONS ARE LOCATED IN THE MICHIGAN ASSOCIATION OF COUNTY DRAIN COMMISSIONERS SOIL EROSION AND SEDIMENTATION CONTROL AUTHORIZED PUBLIC AGENCY PROCEDURES MANUAL

SYMBOLOGY FOR INSERTION INTO CONSTRUCTION DRAWINGS:

= PERMANENT MEASURE

= TEMPORARY MEASURE

LENAWEE COUNTY	
SOIL CLASS	SOIL COMPOSITION
FaA	Fox cobbly gravelly loam, 0 to 3 percent slopes
FcB	Fox sandy loam, till plain, 6 to 12 percent slopes, eroded
GfA	Griffin and Genesee loams, 0 to 3 percent slopes
W	Water

GENERAL TIMING & SEQUENCE

1. INSTALL TEMPORARY SESC CONTROL MEASURES.
2. SAW CUTTING AND REMOVAL OF EXISTING CONCRETE WALLS AND FLOOR FROM AUXILIARY SPILLWAY AND RETAINING WALL AS SHOWN ON PLANS.
3. RECONSTRUCTION OF AUXILIARY SPILLWAY.
4. CONSTRUCTION OF UPSTREAM ACCESS.
5. CONSTRUCTION OF KAYAK PORTAGE.
6. SEEPAGE REPAIRS.
7. FINAL REGRADING AND EROSION CONTROL.
8. INSTALL PERMANENT SESC MEASURES
9. REMOVE TEMPORARY SESC CONTROL MEASURES.
10. CONTRACTOR IS RESPONSIBLE FOR INSTALLING AND MAINTAINING SOIL EROSION AND SEDIMENT CONTROL MEASURES THROUGHOUT THE ENTIRE PROJECT.
11. FINAL PAYMENT WILL BE MADE ONCE ALL DRAIN BANKS, SPOILS, AND DISTURBED AREAS HAVE ESTABLISHED VEGETATION GROWING. ALL LAWN AREAS MUST BE RESTORED TO IN KIND CONDITIONS PRIOR TO FINAL PAYMENT.

MAINTENANCE PROGRAM FOR SESC MEASURES

GENERAL MAINTENANCE

- CONTRACTOR SHALL MAINTAIN ALL PERMANENT SESC MEASURES FOR A PERIOD OF 1 YEAR FOLLOWING THEIR INSTALLATION.
- TEMPORARY SESC MEASURES MUST BE INSTALLED, MAINTAINED, AND REMOVED BY THE CONTRACTOR.
- TEMPORARY MEASURES MUST BE MAINTAINED AND IN PLACE UNTIL AREAS ARE PERMANENTLY STABILIZED.
- PERMANENT MEASURES MUST BE INSTALLED AND MAINTAINED BY THE CONTRACTOR UNTIL FINAL COMPLETION.
- DAILY MAINTENANCE IS THE CONTRACTOR'S RESPONSIBILITY.
- TEMPORARY SESC MEASURES MUST BE REMOVED AT THE END OF THE PROJECT ONCE PERMANENT MEASURES ARE ESTABLISHED.
- TEMPORARY SESC MEASURES MUST BE INSTALLED PRIOR TO OR AT THE TIME OF EARTH DISTURBANCE.
- INSPECT WEEKLY AND AFTER EACH RAIN EVENT UNTIL VEGETATION HAS BEEN ESTABLISHED.
- IF NECESSARY, REPAIR AND RE-SEED OR REPLANT ERODED AREAS IMMEDIATELY.

SEEDING AND MULCHING

- SEEDING PRACTICES INCLUDE TOPSOIL (AS DIRECTED BY ENGINEER), SEED, POLYMER, AND MULCH OR MULCH MATTING (AS DIRECTED BY ENGINEER OR WHERE SHOWN ON PLANS).
- WHERE NECESSARY, APPROPRIATE MULCH MUST BE APPLIED BASED ON SLOPE AND GROWING CONDITIONS AS APPROVED BY THE PROJECT ENGINEER.
- ALL SLOPES AND HIGHLY EROSIVE AREAS MUST BE SEEDED, POLYMER APPLIED AND MULCHED AS NEEDED WHEN CONSTRUCTION ACTIVITY IS NOT TAKING PLACE.
- SEED AND MULCH IS TO BE INSPECTED DAILY FOLLOWING EACH RAIN EVENT TO DETERMINE IF CONCENTRATED FLOWS ARE PRESENT.
- IN THE EVENT THAT SEED AND MULCH ARE REMOVED BY EROSIVE RUNOFF, REPAIRS ARE TO BE MADE IMMEDIATELY.
- ALL AREAS DURING CONSTRUCTION MUST BE PERMANENTLY STABILIZED WITHIN 5 CALENDAR DAYS OF FINAL GRADE (GRADE LISTED ON PLAN).

STORM DRAIN INLET PROTECTION

- INSPECT ROUTINELY AND FOLLOWING A PRECIPITATION EVEN THAT RESULTS IN RUNOFF UNTIL SEDIMENT FILTER IS REMOVED.
- ROUTINELY REMOVE SEDIMENT ACCUMULATION.
- REPAIR AND/OR REPLACE CONTROL MEASURES AS NEEDED.

SILT FENCE

- SILT FENCE IS TO BE TRENCHED IN NO LESS THAN 6 INCHES BELOW THE GROUND SURFACE.
- INSPECT SILT FENCE DAILY AND IMMEDIATELY FOLLOWING EACH RAINFALL.
- REPAIR WHEN SILT FENCE IS SAGGING OR HAS BEEN REMOVED/TORN DOWN.
- WHEN SILT COLLECTS TO HALF THE HEIGHT OF THE FENCE ALL SILT IS TO BE REMOVED AND FENCE REPAIRED.
- REMOVE SILT FENCE WHEN PERMANENT SESC MEASURES ARE IN PLACE AND VEGETATION IS ESTABLISHED.

STABILIZED CONSTRUCTION ACCESS

- INSPECT WEEKLY AND AFTER EACH RAINFALL.
- WHEN CONSTRUCTION ACCESS IS NO LONGER EFFECTIVE, SCRAPE THE TOP LAYER AND ADD 2" OF AGGREGATE.

COMPLIANCE WITH PART 91 OF PA 451

- RESPOND IMMEDIATELY TO STORMWATER OPERATOR AND/OR SOIL EROSION AND SEDIMENTATION CONTROL INSPECTOR CONCERNS. MAKE CORRECTIVE MEASURES AS REQUIRED IMMEDIATELY AS DETAILED BY THE APPROVED APA MANUAL(S).

SOIL EROSION AND SEDIMENTATION CONTROL NOTES

1. INSTALL AND MAINTAIN ALL TEMPORARY SOIL EROSION AND SEDIMENTATION CONTROL MEASURES IN ACCORDANCE WITH THE APPROVED PLAN PRIOR TO COMMENCEMENT OF CONSTRUCTION OR MASS GRADING. ALL SESC MEASURES MUST BE CONSTRUCTED AND MAINTAINED IN ACCORDANCE WITH THE SESC PLAN AND PROJECT SPECIFICATIONS.
2. SOIL EROSION CONTROL MEASURES MUST BE INSPECTED BY A STATE CERTIFIED INSPECTOR PRIOR TO COMMENCEMENT OF CONSTRUCTION OR MASS GRADING.
3. DAILY INSPECTION AND MAINTENANCE MUST BE MADE TO ENSURE ALL EROSION CONTROL MEASURES ARE FUNCTIONING PROPERLY AND INTACT. NECESSARY REPAIRS MUST BE PERFORMED WITHIN 24 HOURS.
4. ADDITIONAL SOIL EROSION CONTROL MEASURES MUST BE PROVIDED THROUGHOUT CONSTRUCTION ACTIVITY AS NEEDED AND DETERMINED BY THE APA/ENGINEER. THE SOIL EROSION AND SEDIMENTATION CONTROL PLAN IS TO BE AMENDED TO INCLUDE ADDITIONAL EROSION CONTROL MEASURES IMPLEMENTED ON-SITE.
5. SEDIMENT FROM WORK ON THIS SITE IS TO BE CONTAINED ON THE SITE AND IS NOT TO BE ALLOWED TO COLLECT ON ANY OFF-SITE AREAS OR IN WATERWAYS. WATERWAYS INCLUDE BOTH NATURAL AND MANMADE OPEN DITCHES, STREAMS, STORM DRAINS, LAKES, PONDS, AND WETLANDS.
6. ALL VISUAL TRACKING INCLUDING MUD, DIRT, AND DEBRIS TRACKED ONTO EXISTING ROADWAYS MUST BE IMMEDIATELY REMOVED NO LESS THAN ON A DAILY BASIS BY SCRAPING AND SWEEPING AND/OR AS DIRECTED BY THE ENGINEER OR APA.
7. DUST CONTROL MUST BE EXERCISED AT ALL TIMES DURING THE PROJECT AND AS DIRECTED BY THE ENGINEER OR APA. APPLY DUST SUPPRESSANT TO SURFACES USING A PRESSURE TYPE WATER DISTRIBUTOR TRUCK EQUIPPED WITH A SPRAY SYSTEM.
8. ALL PERMANENT SOIL EROSION CONTROL MEASURES MUST BE IN PLACE WITHIN 24 HOURS OF FINAL GRADING (GRADE LISTED ON PLANS), THIS INCLUDES ALL VEGETATIVE STABILIZATION. VEGETATIVE STABILIZATION WILL BE ONGOING. TOPSOIL, FERTILIZER, SEED, POLYMER, SILT STOP (OR EQUAL), MULCH AND/OR RIPRAP MUST BE IN PLACE BEFORE PROCEEDING TO THE NEXT WORK AREA. ALL TEMPORARY MEASURES SUCH AS SILT FENCE AND INLET PROTECTION BAGS ARE TO BE REMOVED ONCE PERMANENT SESC MEASURES ARE IN PLACE AND VEGETATION IS ESTABLISHED. REMOVAL OF TEMPORARY MEASURES, FOLLOWING ACCEPTANCE OF THE PROJECT IS THE RESPONSIBILITY OF THE CONTRACTOR.
9. PRIOR TO WINTER CONSTRUCTION, ALL EXPOSED SOILS MUST BE STABILIZED WITH A COMBINATION OF SILT STOP 705 POLYMER BLEND, NORTH AMERICAN GREEN EROSION CONTROL BLANKETS, MULCH, OR OTHER APPROVED METHOD IF VEGETATION COULD NOT BE ESTABLISHED DURING THE GROWING SEASON AS DETERMINED BY THE APA OR ENGINEER.
10. WORK AREAS MUST BE STABILIZED WITH TOPSOIL, SEED, FERTILIZER, AND MULCH WITHIN 24 HOURS FOLLOWING CONSTRUCTION. VEGETATIVE STABILIZATION IS ONGOING THROUGHOUT THE PROJECT.
11. ALL SOIL EROSION CONTROL MEASURES MUST BE INSPECTED DAILY, THE STORM WATER OPERATOR IS TO MAKE A WEEKLY INSPECTION OR INSPECT AFTER EACH RAIN EVENT THAT RESULTED IN A DISCHARGE TO ENSURE PROPER MAINTENANCE OF THE SOIL EROSION CONTROL MEASURES. ANY DEFICIENCIES OR REPAIRS TO SOIL EROSION CONTROL MEASURES MUST BE CORRECTED IMMEDIATELY. INLET PROTECTION MEASURES, DANDY BAG II (OR EQUAL), FLEX STORM (OR EQUAL), MUST BE INSTALLED IN CATCHBASINS BEFORE ANY STORMWATER RUNOFF IS ALLOWED TO ENTER THE TOP OF THE STRUCTURES. THE SILT AND SEDIMENT MUST BE REMOVED FROM INLET PROTECTION MEASURES AS NEEDED TO ENSURE PROPER FUNCTION OF THE BAGS.
12. THE NEED FOR TEMPORARY MEASURES SUCH AS SILT FENCE AND DANDY BAG II (OR EQUAL), FLEX STORM (OR EQUAL) FOR EXISTING OR NEW CATCHBASINS MUST BE ASSESSED ON A DAILY BASIS. PIPES ARE TO BE CAPPED AT THE END OF EACH WORKDAY. AT NO TIME SHOULD SEDIMENT COLLECT IN A CATCHBASIN OR AN OFF-SITE AREA. TEMPORARY MEASURES MUST BE REMOVED ONCE PERMANENT MEASURES ARE IN PLACE AND VEGETATION IS ESTABLISHED.
13. IF DEWATERING IS NECESSARY, CONTRACTOR SHALL SUBMIT A DEWATERING PLAN TO THE APA OR ENGINEER FOR APPROVAL.
14. THE NOTICE OF COVERAGE (IF REQUIRED), SOIL EROSION AND SEDIMENTATION CONTROL PLAN, AND STORMWATER OPERATOR LOGS MUST BE LOCATED ON SITE AT ALL TIMES.
15. ALL RESTORATION TO OCCUR WITHIN 5 CALENDAR DAYS OF FINAL GRADING.

CONTINUED MAINTENANCE PROGRAM FOR PERMANENT SESC MEASURES	
RESPONSIBLE PARTY:	LENAWEE COUNTY DRAIN COMMISSIONER
PERMANENT SESC MEASURE	MAINTENANCE PROCEDURE
SEEDING:	REPAIR BARE AREAS, APPLYING SUPPLEMENTAL SEED, MULCH, AND WATER AS NEEDED. MOWING CAN BE USED PERIODICALLY TO DISCOURAGE WEEDS.
RIPRAP:	REPAIR AREAS WHERE ROCK HAS BEEN DISPLACED. EXPAND RIPRAP AREA IF NEEDED.

SOIL EROSION & SEDIMENTATION CONTROL PLAN

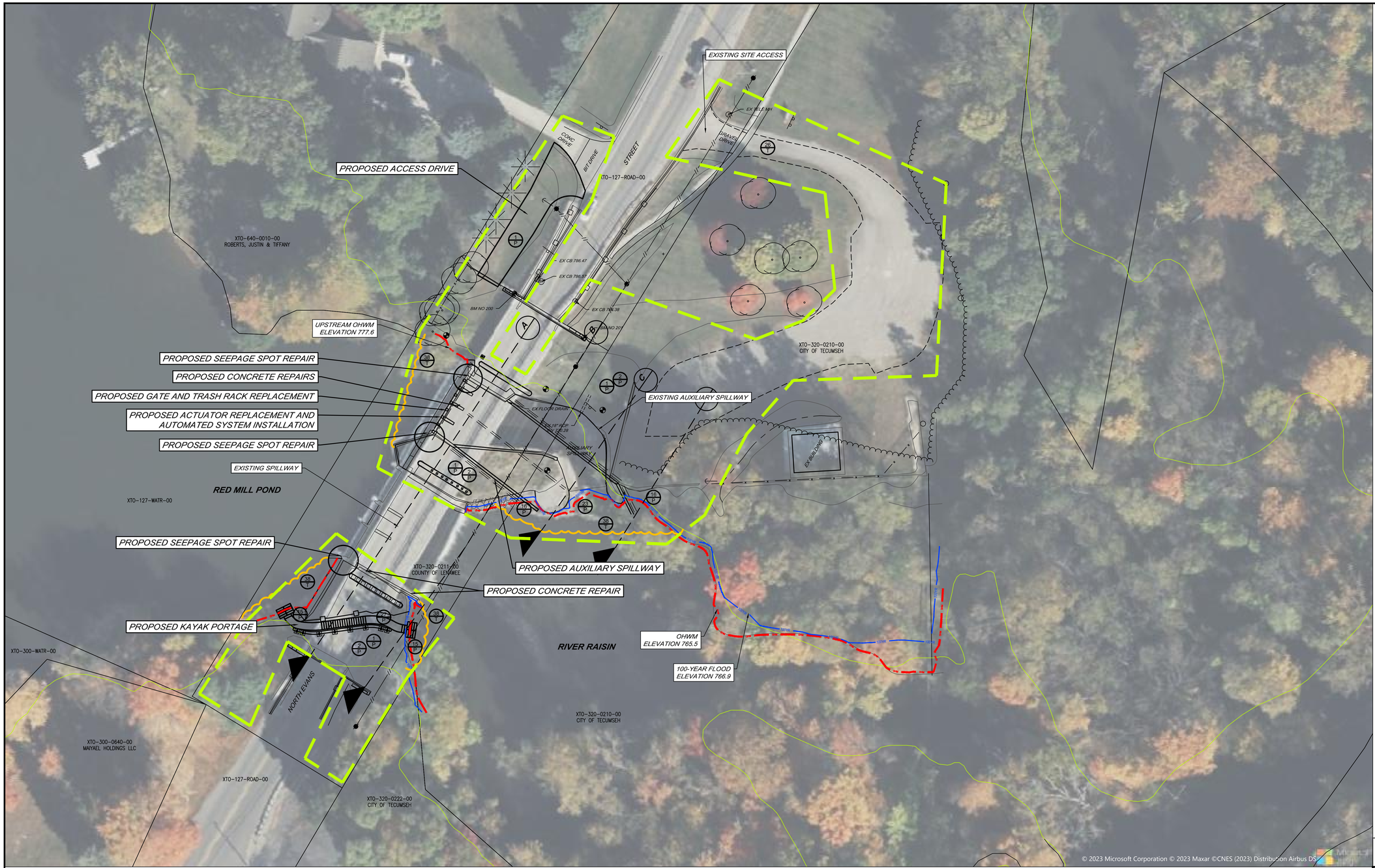
IN COMPLIANCE WITH SECTION 323.1703 OF PART 91, SOIL EROSION AND SEDIMENTATION CONTROL, OF THE NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION ACT, 1994 PA 451, AS AMENDED.

TECUMSEH DAM ID NO. 593
LENAWEE COUNTY, MICHIGAN

SOIL EROSION AND SEDIMENTATION CONTROL PLAN

DUNDEE OFFICE
125 Helle Blvd, Suite 2
Dundee, MI 48131
Tel. 734-823-3308
www.SpicerGroup.com

DE. BY: HRG	CH. BY: RVG	PROJECT NO.	
DR. BY: HRG	APP. BY: NDC	129021SG2020	
STDS.	SHEET 03 OF 24		DR 03
DATE SEPTEMBER, 2024	FILE NO.		
SCALE NOT TO SCALE	DR-4501-03		



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SCALE: 1" = 30'

SECTION 27 AND 28, T05SN-R04E,
CITY OF TECUMSEH,
TECUMSEH TOWNSHIP,
LENAWEE COUNTY, MICHIGAN

LEGEND

- ORDINARY HIGH WATER MARK (OHWM)
- 100-YR FLOOD ELEVATION
- EXISTING RIPRAP
- EXISTING GRAVEL DRIVE
- EXISTING TREE LINE
- COFFERDAM/WATER CONTROL LIMITS
- PARCEL LINE
- FEMA BASE FLOOD BOUNDARY
- LIMITS OF DISTURBANCE

EARTH DISTURBANCE: 1.5 ACRES OR LESS

BENCHMARKS

BM 200 - CUT SQUARE IN NORTHWEST BRIDGE ABUTMENT WALL.

EL 631.89

BM 201 - CUT SQUARE WITH MAGNAIL IN NORTHEAST BRIDGE ABUTMENT WALL.

EL 631.89

TECUMSEH DAM ID NO. 593
LENAWEE COUNTY, MICHIGAN

SITE OVERVIEW

DUNDEE OFFICE
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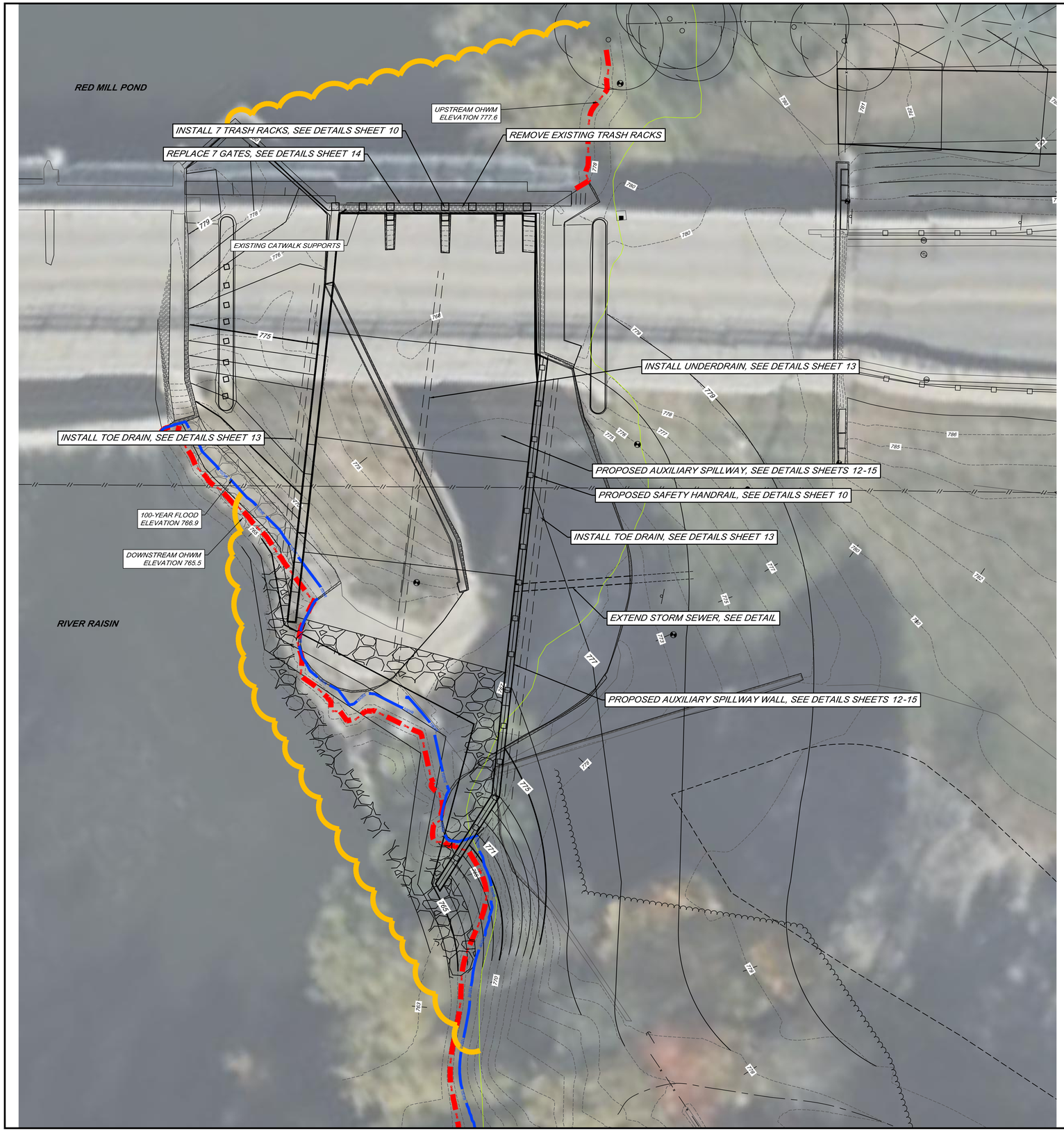
SCALE 1" = 30'		DR-4501-04	

* HANNAH GARNER



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SCALE: 1" = 10'

SECTION 27 AND 28, T05SN-R04E,
CITY OF TECUMSEH,
TECUMSEH TOWNSHIP,
LENAWEE COUNTY , MICHIGAN

LEGEND

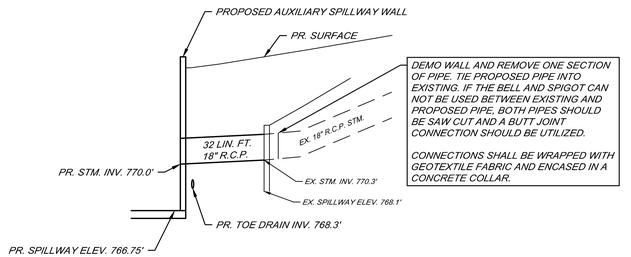
- 100YR — 100YR — 100-YR FLOOD ELEVATION
- OHM OHM OHM — OHWM ELEVATION
- EXISTING RIPRAP
- PROPOSED RIPRAP
- EXISTING GRAVEL DRIVE
- EXISTING TREE LINE
- COFFERDAM/WATER CONTROL LIMITS
- PARCEL LINE
- FEMA BASE FLOOD BOUNDARY
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR

CONSTRUCTION SEQUENCING

1. TIE-IN NEW SPILLWAY WALLS TO EXISTING WALLS
2. CONSTRUCT NEW SPILLWAY FLOOR
3. REPAIR EROSION NEAR BRIDGE PIERS
4. REGRADE PARK AREA AFTER REMOVAL OF RETAINING WALL

QUANTITIES TABLE

ITEM	QUANTITY	UNIT
AUXILIARY SPILLWAY RECONSTRUCTION	1	LUMP SUM
RIPRAP BANK PROTECTION	120	LIN. FT.
HEAVY RIPRAP	105	CU. YDS.
REGRADING (APPROX. 200 CU. YD. NET FILL)	1	LUMP SUM
18" R.C.P.	32	LIN. FT.
TOE DRAIN/UNDERDRAIN	250	LIN. FT.
12" F.E.S.	1	EACH
RETAINING WALL, REM	1	LUMP SUM



STORM SEWER EXTENSION DETAIL

SCALE: 1" = 20'H, 1"=5'V

BENCHMARKS

BM 200 - CUT SQUARE IN NORTHWEST BRIDGE ABUTMENT WALL.

EL 631.89

BM 201 - CUT SQUARE WITH MAGNAIL IN NORTHEAST BRIDGE ABUTMENT WALL.

EL 631.89

BY	MARK	REVISIONS	DATE

TECUMSEH DAM ID NO. 593
LENAWEE COUNTY, MICHIGAN

AUXILIARY SPILLWAY

DUNDEE OFFICE
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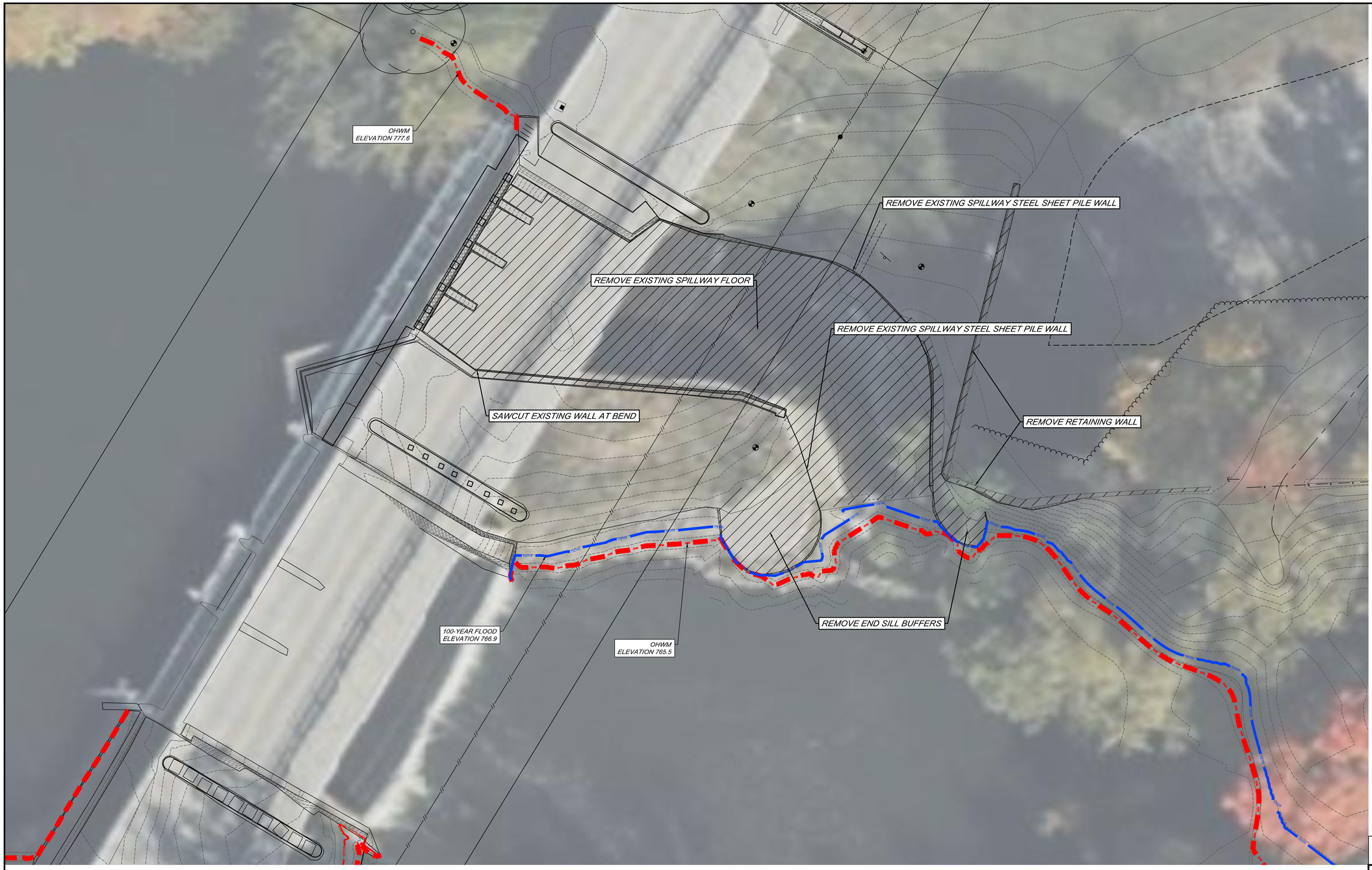

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SCALE: 1" = 10'

SECTION 27 AND 28, T05SN-R04E,
CITY OF TECUMSEH,
TECUMSEH TOWNSHIP,
LENAWEE COUNTY , MICHIGAN

LEGEND

- LIMITS OF EXISTING CONCRETE PAVING REMOVAL
- 100YR — 100-YR FLOOD ELEVATION
- OHW — OHWM ELEVATION

GENERAL NOTES

1. ALL WORK AREAS TO BE IDENTIFIED AND PROTECTED WITH SAFETY BARRIERS. ISOLATE WITH TEMPORARY ENCLOSURES FOR DUST AND DEBRIS CONTAINMENT AS REQUIRED.
2. EXTENTS OF THE DEPICTED SAW-CUT LINES ARE APPROXIMATE. ACTUAL LOCATIONS AND EXTENTS WILL BE ADJUSTED ON SITE BASED ON AMOUNT SUBGRADE REQUIRED TO BE REMOVED AND REPLACED WITH COMPACTED STRUCTURAL FILL AT EACH LOCATION.
3. EXTENTS AND ELEVATIONS OF EXISTING FOUNDATIONS ARE UNKNOWN. CONTRACTOR TO VERIFY BOTTOM OF EXISTING FOUNDATIONS PRIOR TO EXCAVATING BELOW THAT ELEVATION, SHORE AS REQUIRED.

BENCHMARKS

BM 200 - CUT SQUARE IN NORTHWEST BRIDGE ABUTMENT WALL.

EL 631.89

BM 201 - CUT SQUARE WITH MAGNAIL IN NORTHEAST BRIDGE ABUTMENT WALL.

EL 631.89

TECUMSEH DAM ID NO. 593
LENAWEE COUNTY, MICHIGAN

DEMOLITION PLAN

DUNDEE OFFICE
125 Helle Blvd, Suite 2
Dundee, MI 48131
Tel. 734-823-3308
www.SpicerGroup.com

DE. BY: HRG	CH. BY: RVG	PROJECT NO.	
DR. BY: HRG	APP. BY: NDC	129021SG2020	
STDS.	SHEET 06 OF 24		DR 06
DATE SEPTEMBER, 2024	FILE NO.		
SCALE NOT TO SCALE	DR-4501-06		

"HANNAH GARNER

RED MILL POND

HEAVY RIPRAP TOE OF SLOPE PROTECTION

INSTALL STONE STEPS, SEE DETAIL SHEET 10

UPSTREAM OHWM ELEVATION 777.6

PRIMARY SPILLWAY

BRIDGE ABUTMENT

INSTALL STONE STEPS, SEE DETAIL SHEET 10

STEPPED 12'

FLAT 6'

STEPPED 12'

INSTALL CHAIN LINK SAFETY FENCE

INSTALL SLIDE RAIL SEE DETAIL SHEET 11

INSTALL 8' GATE

REPAIR EROSION

HEAVY RIPRAP TOE OF SLOPE PROTECTION

INSTALL STONE STEPS, SEE DETAIL SHEET 10

100-YEAR FLOOD ELEVATION 766.9

10 CU. YD. HEAVY RIPRAP BARRIER

DOWNSTREAM OHWM ELEVATION 765.5

RIVER RAISIN

LEGEND

- 100-YR FLOOD ELEVATION
- OHWM ELEVATION
- EXISTING RIPRAP
- PROPOSED RIPRAP
- EXISTING GRAVEL DRIVE
- EXISTING TREE LINE
- COFFERDAM/WATER CONTROL LIMITS
- PARCEL LINE
- FEMA BASE FLOOD BOUNDARY
- PROPOSED MINOR CONTOUR ELEVATION
- PROPOSED MAJOR CONTOUR ELEVATION
- EXISTING MINOR CONTOUR ELEVATION
- EXISTING MAJOR CONTOUR ELEVATION
- PROPOSED FENCE

CONSTRUCTION SEQUENCING

1. EXCAVATE AS NECESSARY FOR STEP INSTALLATION.
2. INSTALL GEOTEXTILE AND AGGREGATE.
3. INSTALL ROSETTA STONE STEPS.
4. REGRADE TO REPAIR ERODED AREAS.
5. INSTALL GRAVEL PATH

QUANTITIES TABLE

ITEM	QUANTITY	UNIT
ROSETTA STONE BLOCK	39	EACH
GRAVEL PATH	1	LUMP SUM
HEAVY RIPRAP BARRIER	10	CUBIC YARD
HEAVY RIPRAP TOE OF SLOPE PROTECTION	57	LINEAR FEET
REGRADING (APPROX. 35 CU. YD. NET FILL)	1	LUMP SUM
CHAIN LINK SAFETY FENCE	50	LIN. FEET
8 FOOT CHAIN LINK FENCE GATE	1	EACH
KAYAK SLIDE RAIL	1	LUMP SUM

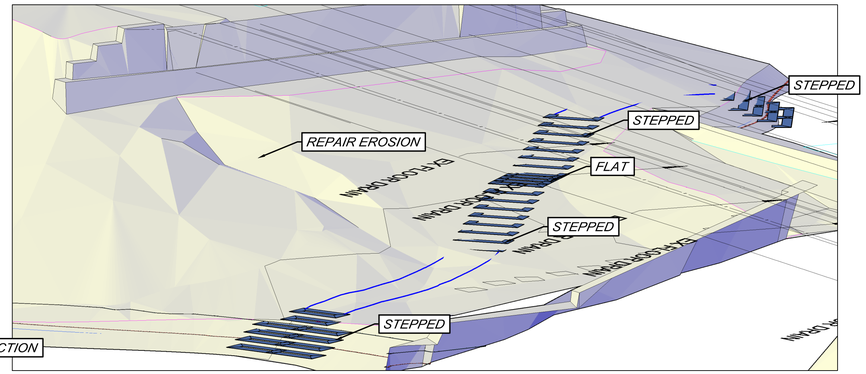
N

0 2.5 5 10

SCALE: 1" = 5'

SECTION 27 AND 28, T05SN-R04E,
CITY OF TECUMSEH,
TECUMSEH TOWNSHIP,
LENAWEE COUNTY, MICHIGAN

STONE STEPS INTO WATER EXAMPLE



PROPOSED STEP LAYOUT

https://www.hrwc.org/elegant-and-innovative-solution-at-a-tricky-portage/

SLIDE RAIL EXAMPLE

BY	MARK	REVISIONS	DATE

THE WORK REPRESENTED BY THIS DRAWING WAS DESIGNED BY THE ENGINEER FOR THIS SPECIFIC APPLICATION AND SPECIFIC LOCATION DESCRIBED HEREON IN ACCORDANCE WITH THE CONDITIONS PREVALENT AT THE TIME THE DESIGN WAS DONE. THE ENGINEER DOES NOT GUARANTEE AND WILL NOT BE LIABLE FOR ANY OTHER LOCATION, CONDITION, DESIGN OR PURPOSE.

TECUMSEH DAM ID NO. 593
LENAWEE COUNTY, MICHIGAN

KAYAK PORTAGE

DUNDEE OFFICE
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PROJECT NO. 129021SG2020

STDS.

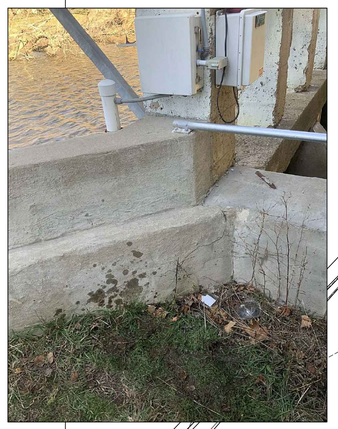
SHEET 07 OF 24

DR 07

DATE SEPTEMBER, 2024
SCALE NOT TO SCALE

FILE NO. DR-4501-07

* HANNAH GARNER



RED MILL POND

RIVER RAISIN

CONCRETE/SEEPAGE REPAIR AREA
SEE RETAINING WALL REPAIR
DETAIL SHEET 10

INJECT EPOXY INTO SEVERE CRACKING
HAND CHIP AND PATCH AS NECESSARY

INJECT EPOXY INTO SEVERE CRACKING
HAND CHIP AND PATCH AS NECESSARY

INJECT EPOXY INTO SEVER CRACKING
HAND CHIP AND PATCH AS NECESSARY

SAW CUT AND REPLACE
DETIORATED ABUTMENT WALL
SEE DETAIL SHEET 10

REPAIR DELAMINATED CONCRETE
SEE PATCHING DETAIL SHEET 10

N EVANS RD

TECUMSEH DAM

SECTION 27 AND 28, T05SN-R04E,
CITY OF TECUMSEH,
TECUMSEH TOWNSHIP,
LENAWEE COUNTY , MICHIGAN

LEGEND

- 100YR — 100-YR FLOOD ELEVATION
- OHW — OHWM ELEVATION
- EXISTING GRAVEL DRIVE
- EXISTING MINOR CONTOUR ELEVATION
- EXISTING MAJOR CONTOUR ELEVATION

TECUMSEH DAM ID NO. 593
LENAWEE COUNTY, MICHIGAN

SEEPAGE REPAIR

Spicer group 2024
DUNDEE OFFICE
125 Helle Blvd, Suite 2
Dundee, MI 48131
Tel. 734-823-3308
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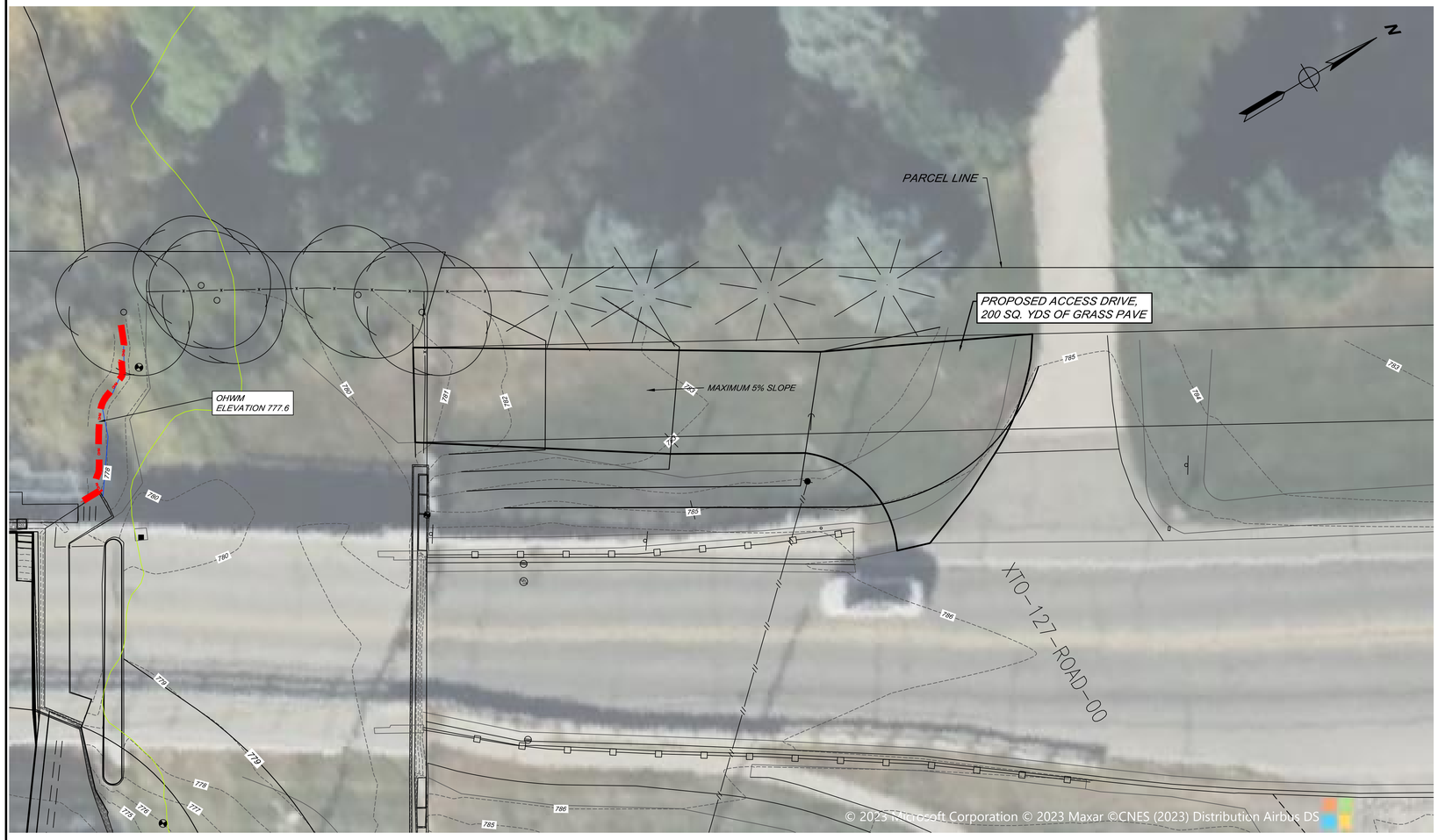
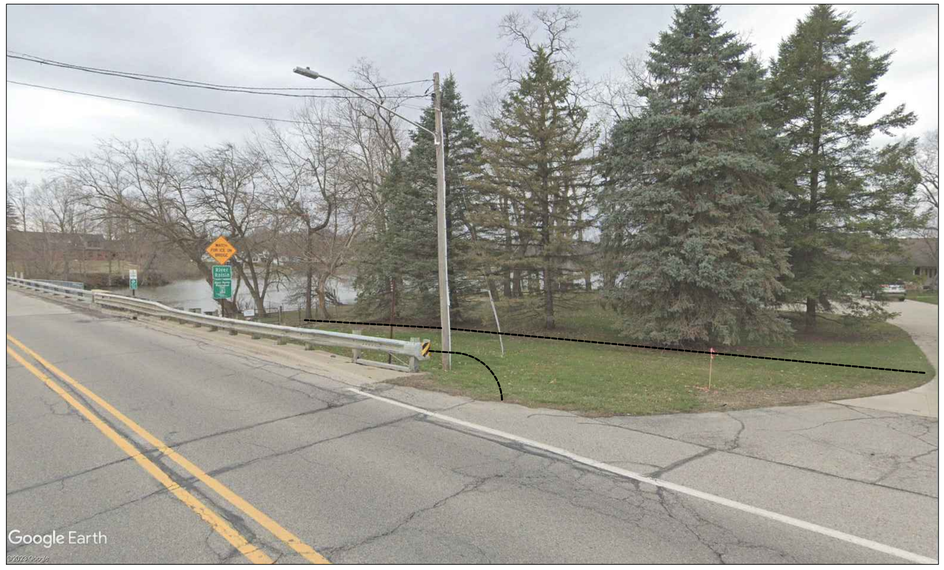
DR. BY: HRG	APP. BY: NDC	129021SG2020	
STDS.	SHEET 08 OF 24	DR 08	
DATE SEPTEMBER, 2024	FILE NO.		
SCALE NOT TO SCALE	DR-4501-08		

HANNAH GARNER



PROPOSED ACCESS DRIVE PLAN VIEW



PROPOSED ACCESS DRIVE STREET VIEW

SCALE: 1" = 10'

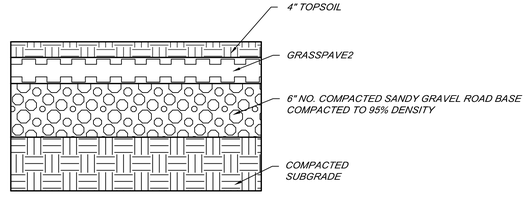
SECTION 27 AND 28, T05SN-R04E,
CITY OF TECUMSEH,
TECUMSEH TOWNSHIP,
LENAWEE COUNTY , MICHIGAN

CONSTRUCTION SEQUENCING:

1. STRIP AND STOCKPILE TOPSOIL
2. EXCAVATE ACCESS DRIVE AREA
3. INSTALL BASE
4. INSTALL GRASSPAVE WITH SAND AND GROW MIX
5. REPLACE TOPSOIL
6. FINAL SEEDING

QUANTITIES TABLE

ITEM	QUANTITY	UNIT
GRASSPAVE ACCESS DRIVE	200	SQUARE YARD



GRASSPAVE2 DETAIL

NOT TO SCALE

TECUMSEH DAM ID NO. 593
LENAWEE COUNTY, MICHIGAN

ACCESS DRIVE

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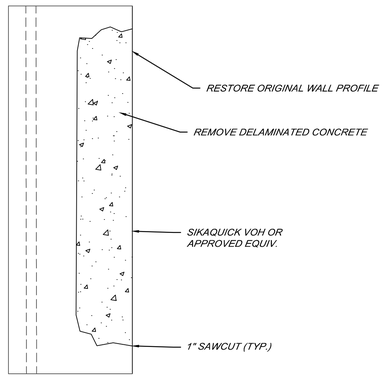
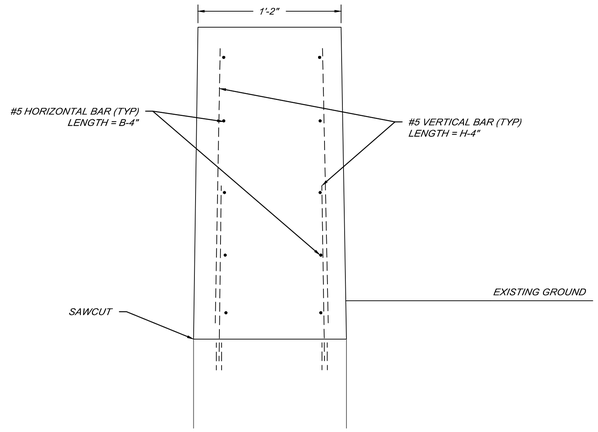
DR. BY: HRG	APP. BY: NDC	129021SG2020	
STDS.		SHEET 09 OF 24	DR 09
DATE SEPTEMBER, 2024		FILE NO.	
SCALE NOT TO SCALE		DR-4501-09	

HANNAH GARNER



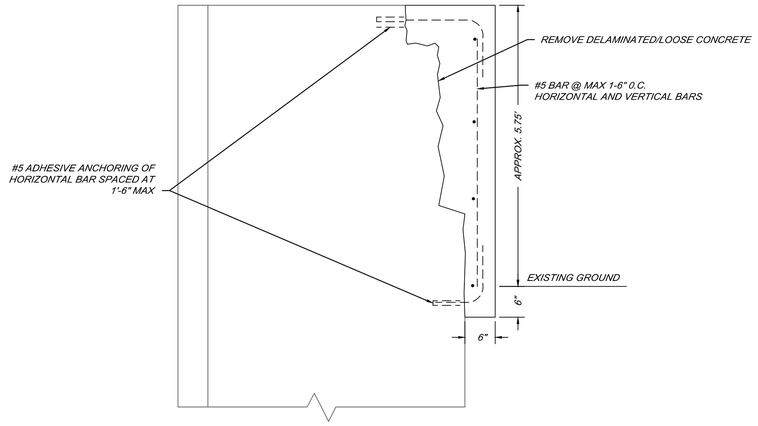
CONCRETE PATCHING DETAIL: AUXILIARY SPILLWAY

NOT TO SCALE



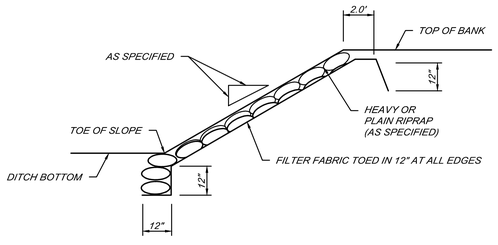
CONCRETE REPAIR DETAIL: SOUTH ABUTMENT WALL - MAIN SPILLWAY

NOT TO SCALE



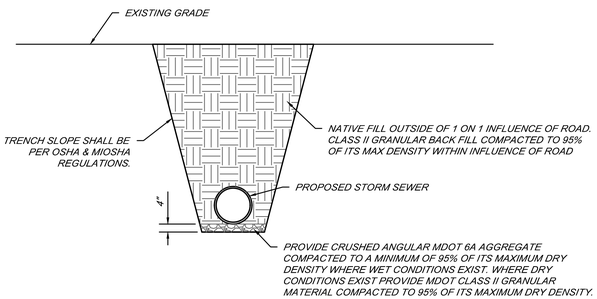
CONCRETE REPAIR DETAIL: SOUTH RETAINING WALL - MAIN SPILLWAY

NOT TO SCALE



(7P) RIPRAP BANK PROTECTION

NOT TO SCALE

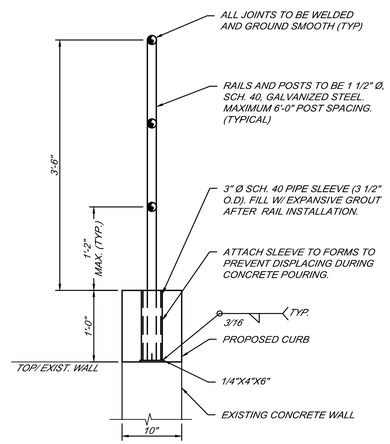


TYPICAL RCP STORM SEWER TRENCH DETAIL

NOT TO SCALE

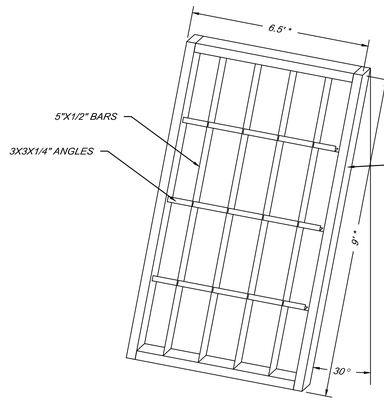
TRENCH WIDTH CHART

PIPE SIZE	MINIMUM	MAXIMUM
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"



SAFETY HANDRAIL CONCRETE MOUNTING DETAIL

NOT TO SCALE



TRASH RACK DETAIL TYPICAL

NOT TO SCALE

NOTES:

USE HEAVY DUTY FULL SURFACE MOUNT HINGES.

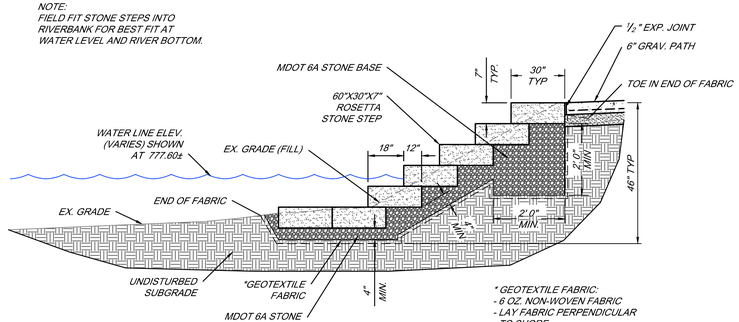
(2) 1/2" ADHESIVE ANCHOR BOLTS PER HINGE, 6" MIN. EMBED.

COMPLETE TRASH TRACK SHALL BE HOT DIPPED GALVANIZED FOLLOWING FABRICATION.

CONTRACTOR TO VERIFY ALL CRITICAL MOUNTING DIMENSIONS AND CLEARANCES WITH SLIDE GATE AS PART OF SHOP DRAWING PROCESS PRIOR TO FABRICATION.

*CONTRACTOR TO FIELD VERIFY TRASH RACK DIMENSIONS, LENGTH, AND WIDTH AS PART OF THE SHOP DRAWING PROCESS PRIOR TO FABRICATION OF THE TRASH RACKS.

NOTE:
FIELD FIT STONE STEPS INTO RIVERBANK FOR BEST FIT AT WATER LEVEL AND RIVER BOTTOM.



KAYAK PORTAGE STEPS TYPICAL SECTION

NOT TO SCALE

* GEOTEXTILE FABRIC:
- 6 OZ. NON-WOVEN FABRIC
- LAY FABRIC PERPENDICULAR TO SHORE
- OVERLAP SEAMS 18"
- SECURE TO SOIL W/ 12" PINS 16" O.C. AT SEAMS & 24" BOTH DIRECTIONS ELSEWHERE

BY	MARK	REVISIONS	DATE
HRG		REVISED FOR BIDDING	9/20/2024
HRG	1	REVISED FOR PERMIT REVISION SUBMITTAL	6/23/2024
HRG	2	REVISED FOR PERMIT REVISION SUBMITTAL	6/20/2024

TECUMSEH DAM ID NO. 593
LENAWEE COUNTY, MICHIGAN

DETAILS - 1

DUNDEE OFFICE
125 Helle Blvd. Suite 2
Dundee, MI 48131
Tel. 734-823-3308
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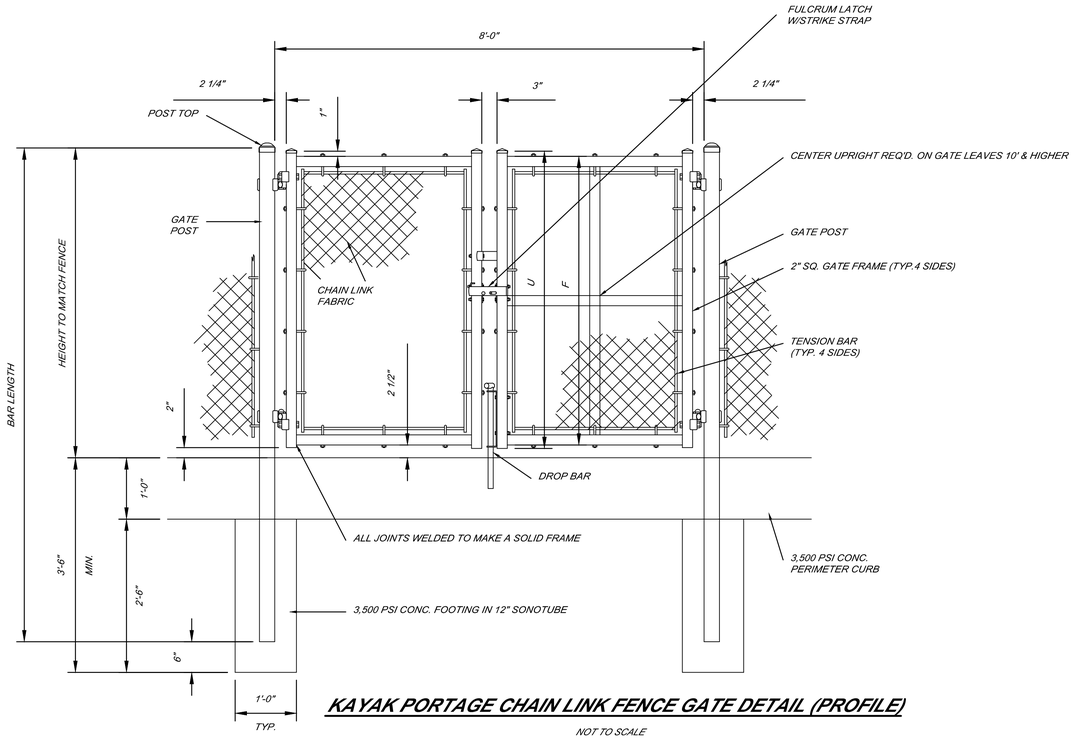
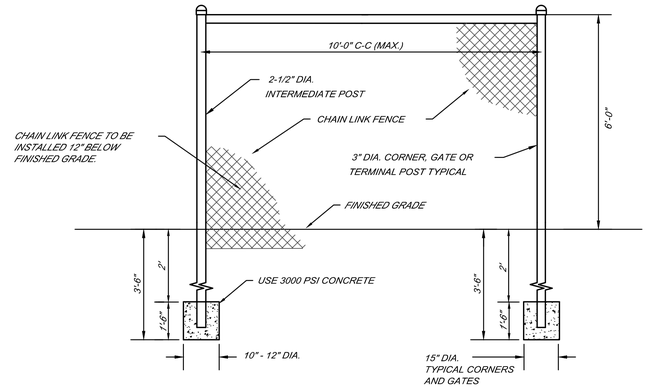
DE. BY: HRG	CH. BY: RVG	PROJECT NO.	
DR. BY: HRG	APP. BY: NDC	129021SG2020	
STDS.		SHEET 10 OF 24	DR 10
DATE SEPTEMBER, 2024		FILE NO.	
SCALE NOT TO SCALE	AS NOTED	DR-4501-10	



KAYAK PORTAGE CHAIN LINK FENCE GATE DETAIL (PROFILE)

NOT TO SCALE



KAYAK PORTAGE CHAIN LINK FENCE DETAIL (PROFILE)

NOT TO SCALE

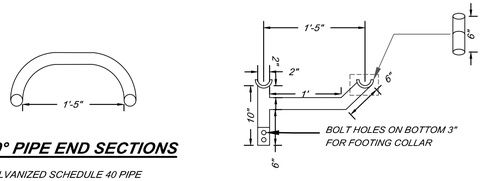
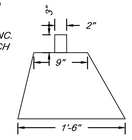


PLATE PIPE SUPPORTS

MUST OVERLAP PIPE CONNECTION
IN THE MIDDLE OF THE PLATE

FOOTING WITH BOLTED COLLAR

BUSH CONCRETE PRODUCTS INC.
FOOTING LOCATED UNDER EACH
JOINT



180° PIPE END SECTIONS

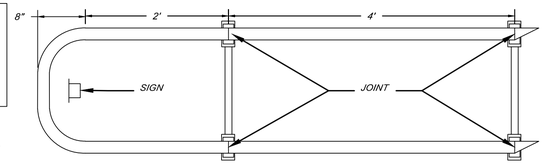
2" GALVANIZED SCHEDULE 40 PIPE
CORROSION RESISTANT

PIPE SUPPORTS

2" GALVANIZED SQUARE TUBING
CORROSION RESISTANT.

BOAT SLIDE INSTRUCTIONS

LIFT AND CENTER CANOE OR KAYAK LENGTHWISE BETWEEN THE RAILS. WALK ALONG SIDE THE BOAT GUIDING IT TO THE OTHER END OF THE SLIDE.
DO NOT RIDE IN THE KAYAK WHEN USING THE SLIDE.

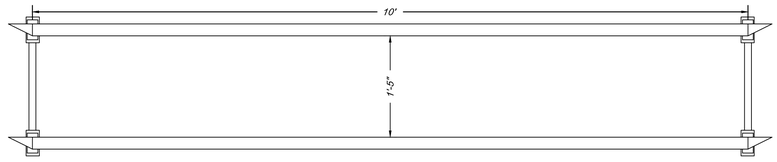


INSTRUCTION SIGN

TO BE PLACED INSIDE OF PIPE
END SECTION

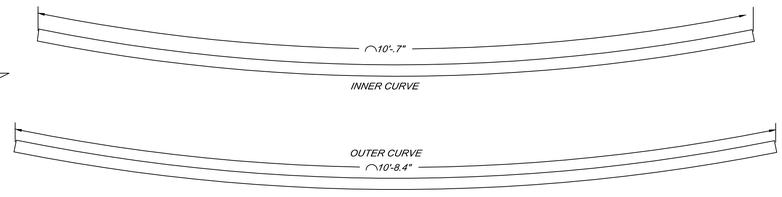
TOP VIEW OF PIPE END SECTIONS

INDICATES JOINT AND SIGN LOCATIONS



TOP VIEW OF STRAIGHT PIPE SECTIONS

INDICATES STRAIGHT SECTIONS OF RAIL



TOP VIEW OF CURVED PIPE SECTIONS

INDICATES CURVED SECTIONS OF RAIL

TYPICAL KAYAK PORTAGE RAIL SLIDE DETAIL

NOT TO SCALE

BY	MARK	REVISIONS	DATE
HRG	1	REVISED FOR PERMIT REVISION SUBMITTAL	6/20/2024

TECUMSEH DAM ID NO. 593
LENAWEE COUNTY, MICHIGAN

DETAILS - 2

DUNDEE OFFICE
125 Helle Blvd, Suite 2
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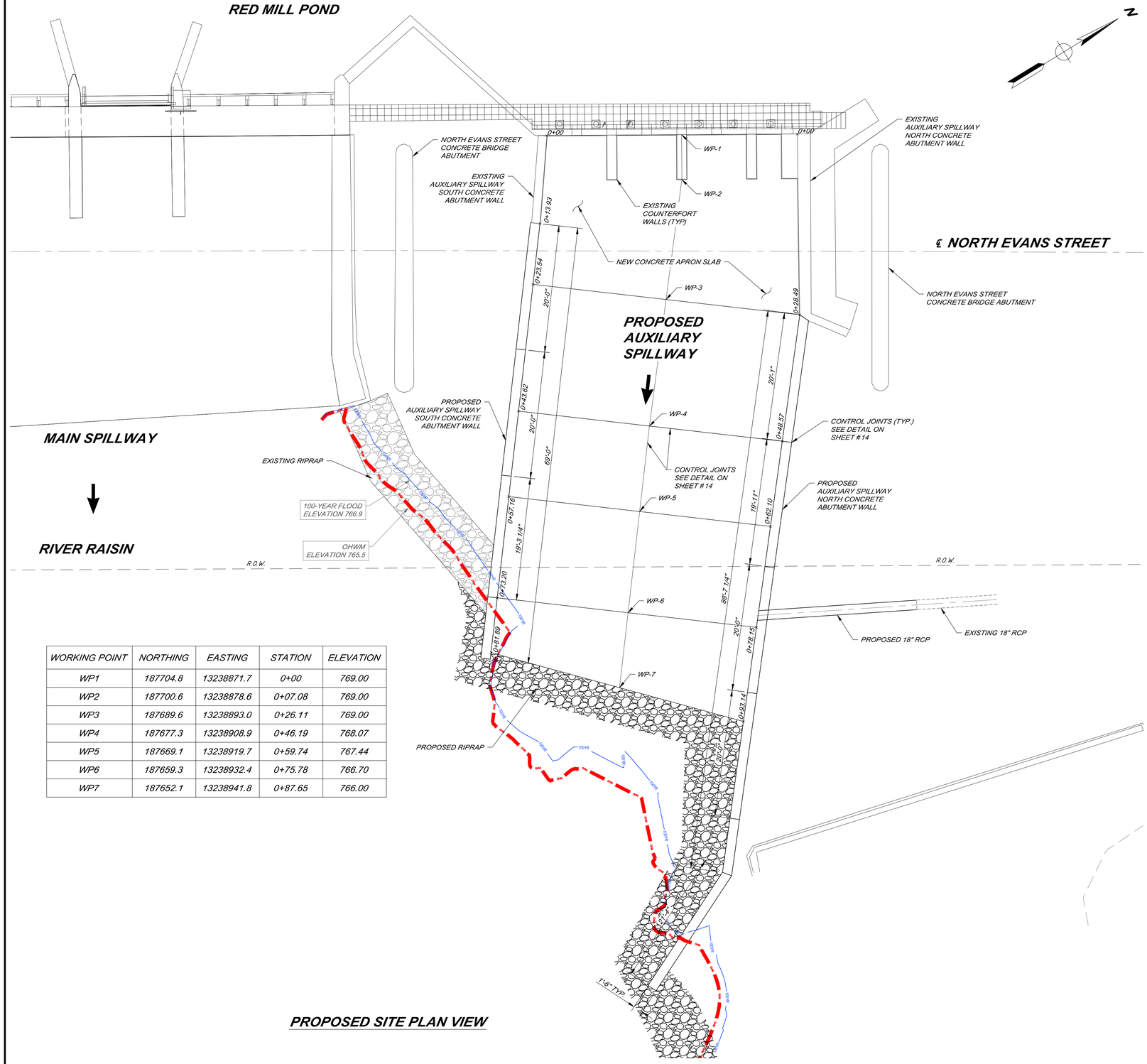
DR. BY: HRG	APP. BY: NDC	129021SG2020	
STDS.	SHEET 11 OF 24	DR 11	
DATE SEPTEMBER, 2024	FILE NO. DR-4501-11		
SCALE NOT TO SCALE			



WORKING POINT	NORTHING	EASTING	STATION	ELEVATION
WP1	187704.8	13238871.7	0+00	769.00
WP2	187700.6	13238878.6	0+07.08	769.00
WP3	187689.6	13238893.0	0+26.11	769.00
WP4	187677.3	13238908.9	0+46.19	768.07
WP5	187669.1	13238919.7	0+59.74	767.44
WP6	187659.3	13238932.4	0+75.78	766.70
WP7	187652.1	13238941.8	0+87.65	766.00

PROPOSED SITE PLAN VIEW

BY	MARK	REVISIONS	DATE
		ERMIT REVISION SUBMITTAL	8/23/2024

TECUMSEH DAM ID NO. 593
LENAWEE COUNTY, MICHIGAN

PROPOSED SITE PLAN VIEW OF AUXILIARY SPILLWAY

SAGINAW OFFICE
230 S. Washington Ave.
Saginaw, MI 48607
Tel. 989-754-4717
Fax. 989-754-4440
www.SpicerGroup.com

DE. BY: HRG CH. BY: RVG
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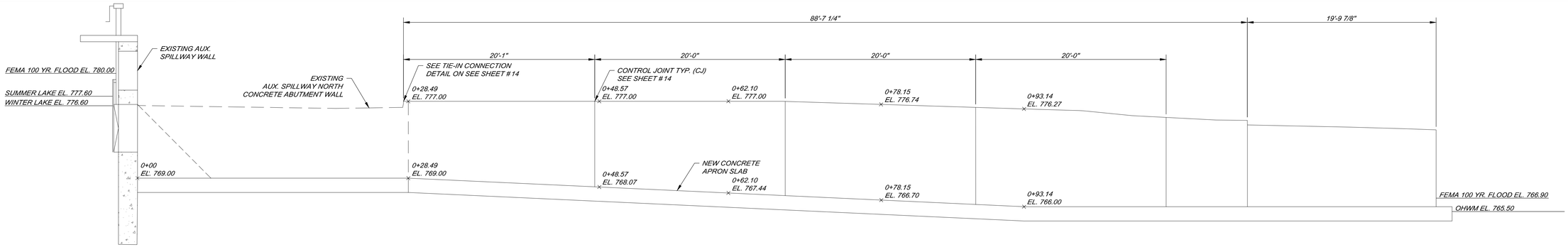
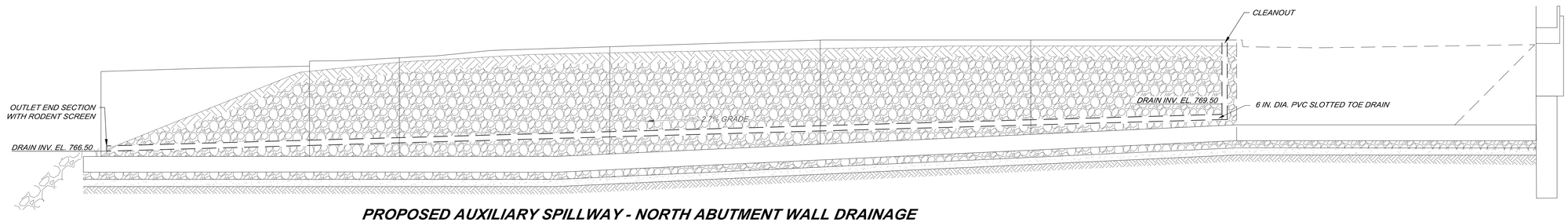
PROJECT NO. 129021SG2020
STDS.
SHEET 12 OF 24
DR 12
DATE SEPTEMBER, 2024
SCALE NOT TO SCALE
FILE NO. DR-4501-12

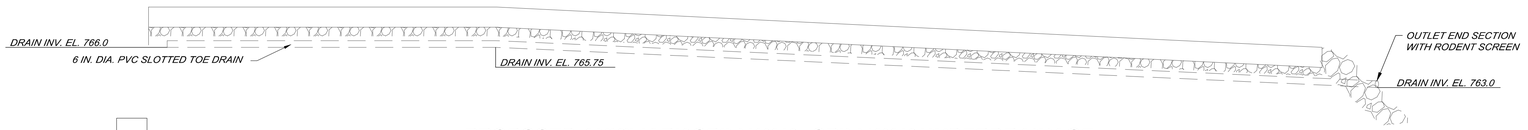
HANNAH GARNER



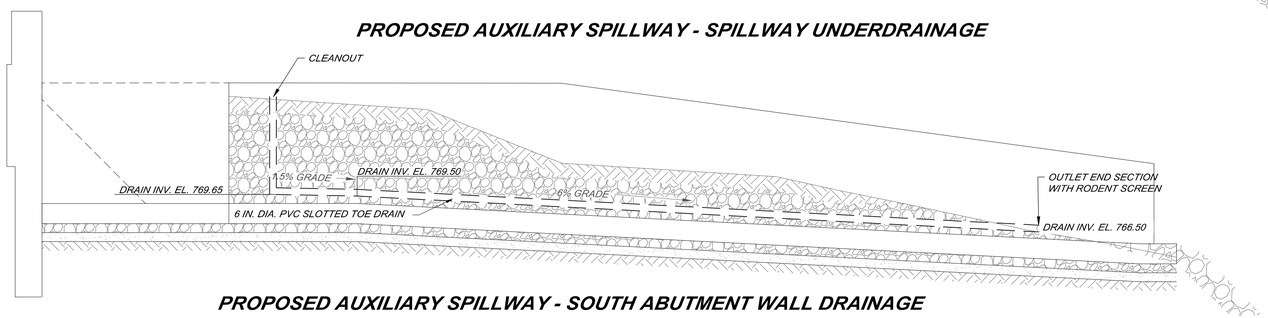
PROPOSED AUXILIARY SPILLWAY - NORTH CONCRETE ABUTMENT WALL



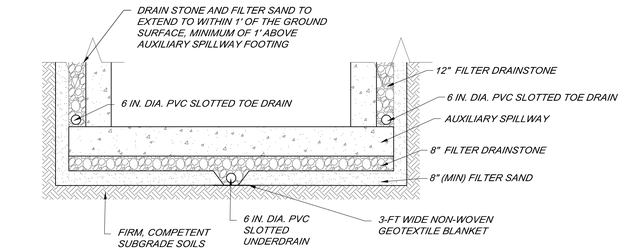
PROPOSED AUXILIARY SPILLWAY - NORTH ABUTMENT WALL DRAINAGE



PROPOSED AUXILIARY SPILLWAY - SPILLWAY UNDERDRAINAGE

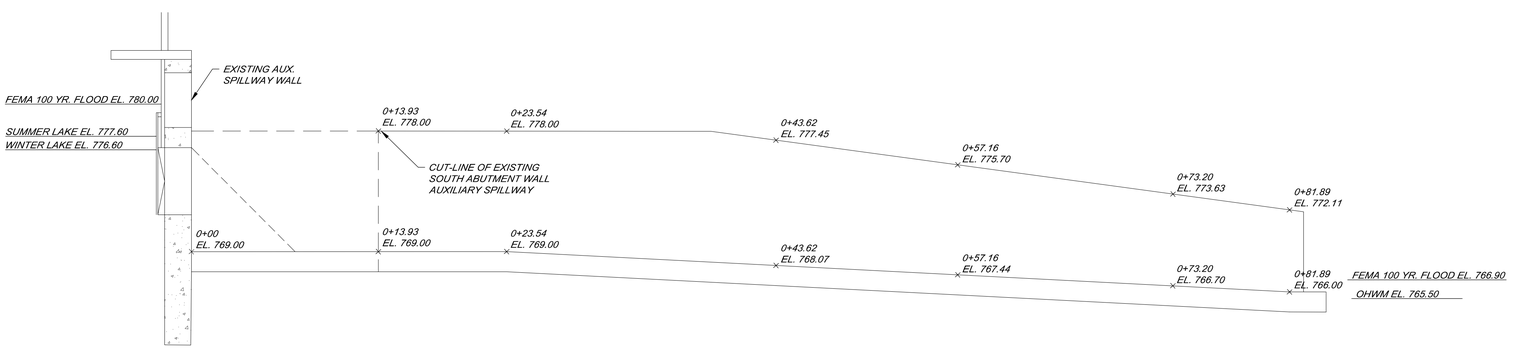


PROPOSED AUXILIARY SPILLWAY - SOUTH ABUTMENT WALL DRAINAGE



AUXILIARY SPILLWAY SUBSURFACE DRAINAGE

NOT TO SCALE



PROPOSED AUXILIARY SPILLWAY - SOUTH CONCRETE ABUTMENT WALL

BY	MARK	REVISIONS	DATE
HRG		REVISED FOR PERMIT REVISION SUBMITTAL	8/23/2024

TECUMSEH DAM ID NO. 593
LENAWEE COUNTY, MICHIGAN

PROPOSED AUX. SPILLWAY ABUTMENTS NORTH & SOUTH WALLS

SAGINAW OFFICE
230 S. Washington Ave.
Saginaw, MI 48607
Tel. 989-754-4717
Fax. 989-754-4440
www.SpicerGroup.com

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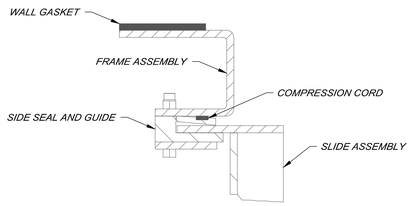
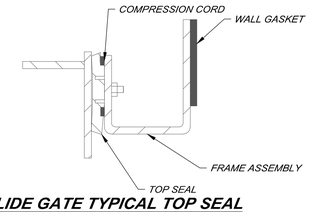
DR. BY: MTS	APP. BY: NDC	129021SG2020	
STDS.	SHEET 13 OF 24	DR 13	
DATE SEPTEMBER, 2023	FILE NO.		
SCALE NOT TO SCALE	DR-4501-13		

HANNAH GARNER



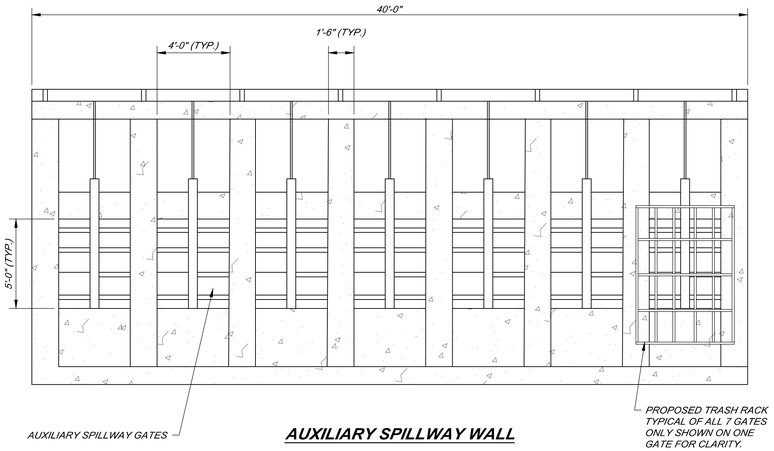
SLIDE GATE TYPICAL SIDE SEAL CROSS SECTION

SCALE: NOT TO SCALE



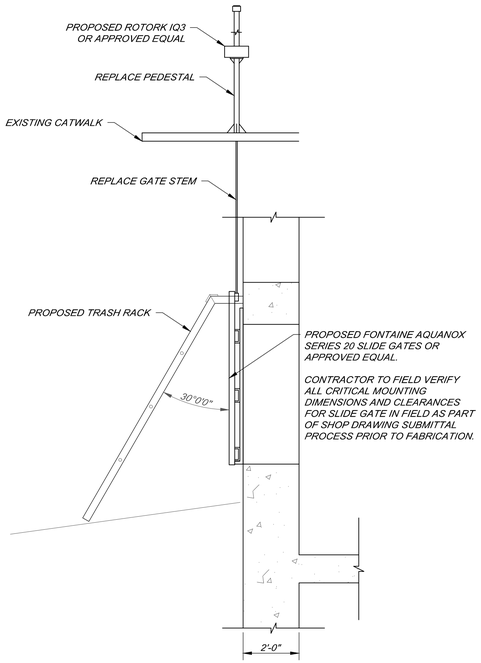
SLIDE GATE TYPICAL TOP SEAL CROSS SECTION

SCALE: NOT TO SCALE



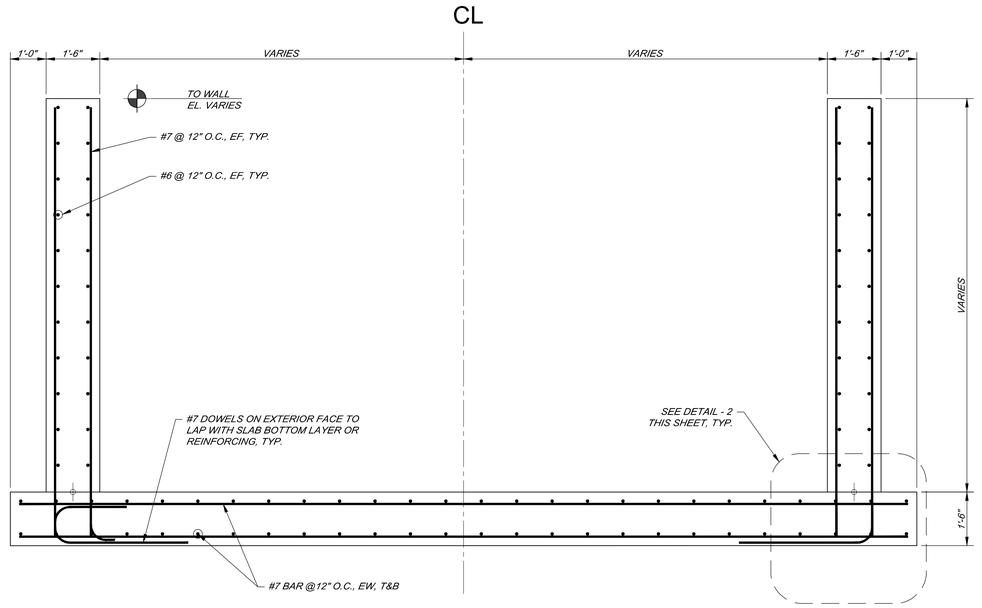
AUXILIARY SPILLWAY WALL

SCALE: NOT TO SCALE



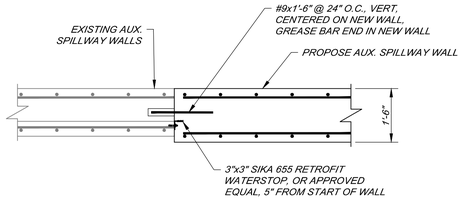
SLIDE GATE AT AUXILIARY SPILLWAY

SCALE: NOT TO SCALE



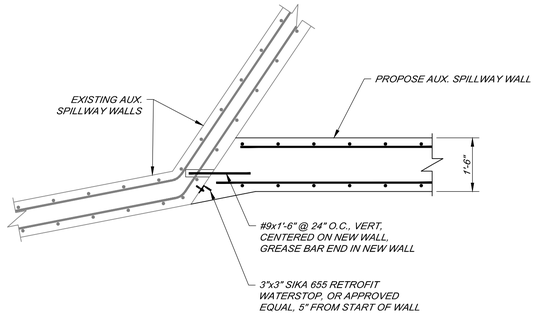
TYPICAL SECTION THRU AUX. SPILLWAY

SCALE: NOT TO SCALE



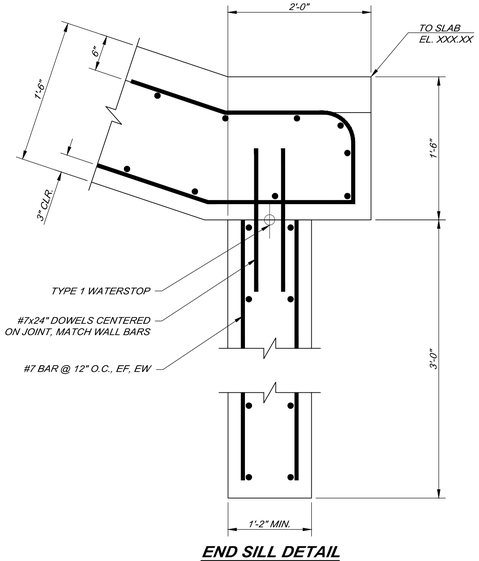
TIE-IN CONNECTION TO PROPOSE AUX. SPILLWAY SOUTH CONCRETE ABUTMENT WALL

SCALE: NOT TO SCALE



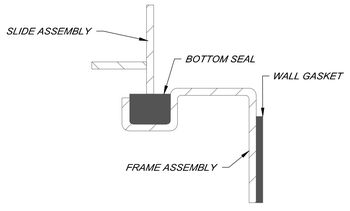
TIE-IN CONNECTION TO PROPOSE AUX. SPILLWAY NORTH CONCRETE ABUTMENT WALL

SCALE: NOT TO SCALE



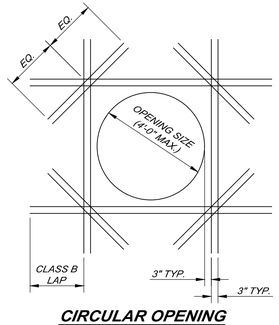
END SILL DETAIL

SCALE: NOT TO SCALE



SLIDE GATE TYPICAL BOTTOM SEAL CROSS SECTION

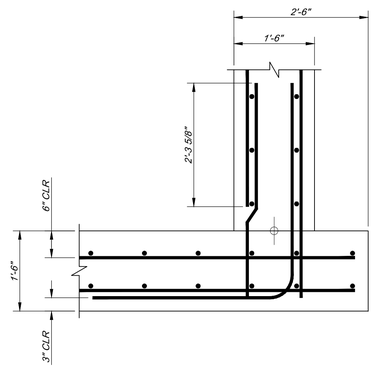
SCALE: NOT TO SCALE



CIRCULAR OPENING

TYP. REINFORCING AT OPENINGS

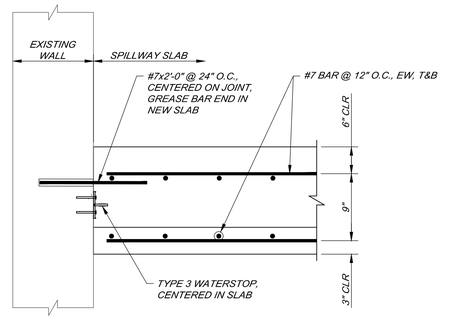
SCALE: NOT TO SCALE



2 / S11

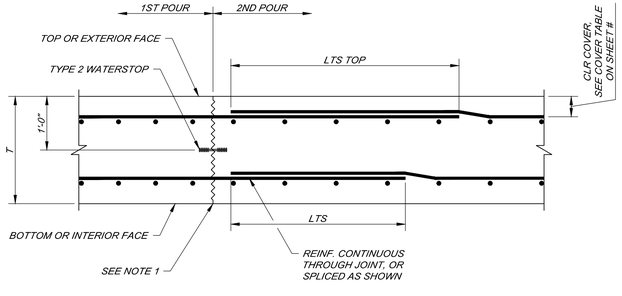
DETAIL - 2
REINFORCING AT SLAB/WALL INTERFACE

SCALE: 3/4" = 1'-0"



DETAIL - 6
TRANSITION CHANNEL TO CULVERT SLAB DOWELS

SCALE: NOT TO SCALE



TYP. CONTROL / CONSTRUCTION JOINTS (CJ)

SCALE: NOT TO SCALE

NOTES:
1. EDGE OF 1ST POUR TO HAVE ROUGHENED SUFACE WITH 1/4" AMPLITUDE OR 1 1/2"x5 1/2" KEY AT 24" O.C..
2. "T" = THICKNESS OF SLAB OR WALL.

BY	MARK	REVISIONS	DATE

TECUMSEH DAM ID NO. 593
LENAWEE COUNTY, MICHIGAN

STRUCTURAL DETAILS

SAGINAW OFFICE
230 S. Washington Ave.
Saginaw, MI 48607
Tel. 989-754-4717
Fax. 989-754-4440
www.SpicerGroup.com

DE. BY: MTS	CH. BY: RVG	PROJECT NO.	
DR. BY: MTS	APP. BY: NDC	129021SG2020	
STDS.	SHEET 14 OF 24	DR 14	
DATE SEPTEMBER, 2024	FILE NO.		
SCALE NOT TO SCALE	DR-4501-14		

HANNAH GARNER

CONCRETE NOTES

1. GENERAL:
   - 1.1. STRUCTURAL CONCRETE WORK ON THIS PROJECT SHALL CONFORM TO ALL REQUIREMENTS OF THE ACI-301 STANDARD SPECIFICATION FOR STRUCTURAL CONCRETE, EXCEPT AS MODIFIED BY THE CONTRACT DOCUMENTS, AND SHALL ALSO MEET THE REQUIREMENTS OF STATE AND LOCAL BUILDING CODE.
   - 1.2. DETAIL BARS IN ACCORDANCE WITH THE LATEST EDITIONS OF PUBLICATION SP-66: "ACI DETAILING MANUAL" WITH ADDED REQUIREMENTS OF THE PROJECT SPECIFICATION AND ACI 318: "BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE."
   - 1.3. CONCRETE SHALL COMPLY WITH ADDITIONAL REQUIREMENTS PROVIDED IN SPECIFICATION 03 31 00.
2. DIMENSIONS:
   - 2.1. DIMENSIONS ARE TO THE CENTERLINES OF THE BARS UNLESS OTHERWISE SHOWN. CLEAR COVER DIMENSIONS ARE MARKED "CLR". ALL DIMENSIONS TO A JOINT ARE TO THE CENTERLINE OF THE JOINT. BEAMS, COLUMNS, AND WALLS ARE CENTERED ON REFERENCED LINES UNLESS SHOWN OTHERWISE.
   - 2.2. THICKNESS SHOWN FOR WALLS AND SLABS ADJACENT TO UNDISTURBED SOIL OR ROCK ARE MINIMUM DIMENSIONS.
3. SUBMITTALS:
   - 3.1. SEE SPECIFICATION 03 31 00 FOR REQUIREMENTS FOR SHOP AND AS-BUILT DRAWINGS.
   - 3.2. NO CONCRETE WORK SHALL COMMENCE WITHOUT APPROVED SHOP DRAWINGS.
4. STRUCTURAL CONCRETE MIX REQUIREMENTS:
   - 4.1. CONCRETE SHALL BE IN ACCORDANCE WITH MDOT SPECIFICATION UNLESS OTHERWISE INDICATED BELOW. MATERIALS SHALL BE IN ACCORDANCE WITH MDOT SPECIFICATION 701, PORTLAND CEMENT CONCRETE FOR STRUCTURE. PLACEMENT AND TESTING SHALL BE IN ACCORDANCE WITH MDOT SPECIFICATION 706, STRUCTURAL CONCRETE CONSTRUCTION, AND 601, PORTLAND CEMENT CONCRETE FOR PAVEMENT.
   - 4.2. CONCRETE MIXES: SEE SPECIFICATION 03 31 00 FOR ADDITIONAL REQUIREMENTS.
     - 4.2.1. CLASS A1 STRUCTURAL CONCRETE (MDOT 4500HP) - GENERAL USE IN STRUCTURAL REINFORCED CONCRETE ELEMENTS FOR SPILLWAYS, WALLS, SLABS, AND ELEMENTS NOT SPECIFIED OTHERWISE.
     - 4.2.2. CLASS E "MUD MAT" - USED IN NON-REINFORCED APPLICATIONS FOR PROTECTIVE COATING FOR FOUNDATIONS OR SPILLWAY UNDERDRAIN MATERIALS. ALSO USED AS LEVELING CONCRETE TO SUPPORT EPS GEOFOAM.
5. REINFORCING:
   - 5.1. REINFORCING STEEL SHALL BE DEFORMED BARS CONFORMING TO ASTM A615, GRADE 60, UNCOATED. REINFORCING STEEL SHALL BE DETAILED ACCORDING TO ACI "DETAILS AND DETAILING OF REINFORCEMENT" (ACI 315).
   - 5.2. ALL REINFORCING BARS SHALL USE CLASS "B" LAP SPLICES PER ACI 318-14. DEVELOPMENT LENGTHS SHALL BE IN ACCORDANCE WITH FOLLOWING TABLE BELOW UNLESS NOTED OTHERWISE IN DRAWINGS.
   - 5.3. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL THE NECESSARY CHAIRS, REARS, TIES, SPACERS, ETC. TO SECURE AND SUPPORT THE REINFORCING WHILE PLACING THE CONCRETE.
6. QUALITY ASSURANCE: SEE SPECIFICATION 03 31 00.
7. PLACEMENT:
   - 7.1. CLEAN AND ROUGHEN TO 1/4" AMPLITUDE EXISTING CONCRETE SURFACES TO RECEIVE NEW CONCRETE PRIOR TO PLACEMENT.
   - 7.2. REINFORCING DOWELS, WATER STOPS, AND OTHER EMBED ITEMS SHALL BE INSTALLED AND SECURED PRIOR TO CONCRETE PLACEMENT. "WET-SETTING" OF EMBEDDED ITEMS IS NOT PERMITTED.
8. FINISHING AND CURING:
   - 8.1. PROTECT CONCRETE FROM PREMATURE DRYING, EXCESSIVELY HOT OR COLD TEMPERATURES, AND MECHANICAL DAMAGE.
   - 8.2. DO NOT ALLOW CONSTRUCTION VEHICLES OR EQUIPMENT ON CONCRETE UNTIL IT HAS ATTAINED ITS SPECIFIED DESIGN STRENGTH.
   - 8.3. EXPOSED CONCRETE EDGES TO HAVE 1" CHAMFER.
9. JOINTS:
   - 9.1. SUGGESTED JOINTS ARE PROVIDED IN DRAWINGS. CONTRACTOR SHALL INCLUDE JOINT LOCATIONS AS PART OF CONCRETE PLACEMENT PLAN PER SPECIFICATION 03 31 00.
   - 9.2. CJ (CONTROL OR CONSTRUCTION JOINT): LAYOUT SHALL BE DETERMINED BY THE CONTRACTOR, ASPECT RATIO OF JOINTS SHALL BE 1V:1H TO 1.2V:1H. LIFT HEIGHTS AND CONCRETE PRESSURES ON FORMS SHALL MEET ACI 347 REQUIREMENTS.
   - 9.3. CnJ (CONTRACTION JOINT): LAYOUT SHALL BE INSTALLED AT LOCATION SHOWN ON DRAWINGS.
   - 9.4. EJ (EXPANSION JOINT): LAYOUT SHALL BE INSTALLED AT LOCATION SHOWN ON DRAWINGS.
10. WALL AND SLAB DOWELS:
    - 10.1. DOWELS SHALL BE REINFORCING STEEL, ASTM A615, GRADE 60, DEFORMED BAR, UNCOATED. BARS SHALL HAVE A MINIMUM EMBEDMENT LENGTH INDICATED IN THE DRAWINGS OR SCHEDULE.
    - 10.2. ANCHORING ADHESIVE SHALL BE HIT-RE 500V3 OR HIT-HY 200-R V3 EPOXY ADHESIVE MANUFACTURED BY HILITI OR APPROVED EQUAL.
    - 10.3. DRILLING AND CLEANING OF HOLES SHALL BE PERFORMED USING SELF-CLEANING METHOD. FOLLOW MANUFACTURER'S RECOMMENDATIONS.

SCHEDULE OF DEVELOPEMNENT & LAP SPLICE LENGTHS

BAR SIZE		3	4	5	6	7	8	9	10	11	14	18
BARS OTHER THAN TOP BARS *	DEVELOPMENT LENGTH (Ld)	1'-0"	1'-0"	1'-1"	1'-4"	1'-11"	2'-3"	2'-6"	3'-0"	3'-8"	5'4"	9'-6"
	CLASS B LAP SPLICE (Lts)	1'-4"	1'-4"	1'-5"	1'-9"	2'-7"	2'-11"	3'-3"	3'-11"	4'-10"	-	-
TOP BARS *	DEVELOPMENT LENGTH (Ld)	1'-0"	1'-2"	1'-5"	1'-9"	2'-7"	2'-11"	3'-3"	3-11"	4'-10	6'-11	12'-4
	CLASS B LAP SPLICE (Lts)	1'-4"	1'-6"	1'-11"	2'-3"	3'-4"	3'-9"	4'-3"	5'-1"	6'-3"	-	-
STANDARD HOOKS IN TENSION		0'-7"	0'-9"	0'-11"	1'-1"	1'-4"	1'-6"	1'-8"	1'-11"	2'-1"	2'-6"	3'-4"
STRAIGHT BARS IN COMPRESSION		0'-8"	0'-9"	0'-11"	1'-2"	1'-4"	1'-6"	1'-8"	1'-11"	2'-1"	2'-6"	3'-5"

* NOTE: "TOP BARS" ARE HORIZONTAL BARS PLACES SUCH THAT MORE THAN 12 INCHES OF FRESH CONCRETE IS CAST BELOW.

SCHEDULES IS VALID FOR THE FOLLOWING CONDITIONS:

COMPRESSIVE STRENGTH OF CONCRETE:	f'c =	4,500	psi	YIELD STRENGTH OF REINFORCEMENT:	fy =	60	KSI
CLEAR COVER ON BARS:	CLR =	3	IN.	MINIMUM BAR SPACING (O.C.):	SP =	6.00	IN.

NON-EPOXY-COATED BARS.

NORMAL-WEIGHT CONCRETE.

STEEL REINFORCING COVER REQUIREMENTS

CONCRETE SECTION	MINIMUM CLEAR COVER
UNIFORM SURFACE IN CONTACT WITH FOUNDATION	4 INCHES
FORMED OR SCREENED SURFACES SUBJECT TO CAVITATION OR ABRASION EROSION: BAFFLE BLOCKS, TRANSITION CHANNEL AND CHUTE	6 INCHES
FORMED OR SCREENED SURFACES NOT SUBJECT TO CAVITATION OR ABRASION EROSION	
EQUAL TO OR GREATER THAN 24 INCHES THICK	4 INCHES
GREATER THAN 12 INCHES AND LESS THAN 24 INCHES THICK	3 INCHES
LESS THAN 12 INCHES CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH	3 INCHES
LESS THAN 12 INCHES EXPOSED TO EARTH OR WEATHER	2 INCHES

STEEL NOTES

1. GENERAL:
   - 1.1. ALL STRUCTURAL STEEL SHALL BE FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST AISC CODE.
   - 1.2. ALL ALUMINUM AND STEEL MEMBERS SHALL BE TREATED OR PROPERLY SEPARATED TO PREVENT GALVANIC AND CORROSIVE EFFECTS.
   - 1.3. ORIENT ALL MILL CAMBER UPWARD DURING FABRICATION AND ERECTION.
   - 1.4. SEE SPECIFICATIONS 05 12 00 FOR ADDITIONAL REQUIREMENTS.
2. MATERIALS:
   - 2.1. UNLESS NOTED OTHERWISE ON DRAWINGS, ALL STRUCTURAL STEEL SHALL COMPLY WITH MATERIAL ASTMS IN SPECIFICATIONS 05 12 00.
3. BOLTED CONNECTIONS:
   - 3.1. UNLESS SHOWN OTHERWISE ON DRAWINGS, ALL CONNECTIONS SHALL BE BOLTED WITH A MINIMUM 3/4" DIAMETER A325 HIGH STRENGTH BOLTS OR WELDED. USE FULL DEPTH DOUBLE ANGLE CONNECTIONS ON ALL GIRDER AND BEAM CONNECTIONS TO COLUMNS, UNLESS OTHERWISE NOTED. INFILL BEAM CONNECTIONS SHALL BE FULL DEPTH DOUBLE ANGLE CONNECTIONS, UNLESS NOTED OTHERWISE. BOLTS SHALL BE SPACED AT 3" ON CENTER VERTICALLY OR STANDARD GAGE AS APPROPRIATE.
   - 3.2. ANCHORS AND STRUCTURAL BOLTS SHALL BE STRUCTURAL STEEL, ASTM A 325, STRUCTURAL NUTS SHALL BE STRUCTURAL STEEL ASTM A563. ALL BOLTED STRUCTURAL CONNECTIONS SHALL CONFORM TO THE AISC SPECIFICATION FOR STRUCTURAL JOINTS. ALL STRUCTURAL BOLTED CONNECTIONS SHALL BE BEARING-TYP CONNECTIONS.
   - 3.3. ALL BEARING TYPE BOLTED CONNECTIONS SHALL BE TIGHTENED TO A "SNUG-TIGHT" CONDITION IN WHICH ALL PILES ARE IN FULL CONTACT RESULTING FROM A FEW IMPACTS FROM AN IMPACT WRENCH OR THE FULL EFFORT OF A MAN USING AN ORDINARY SPUD WRENCH.
4. WELDING:
   - 4.1. CONFORM TO AWS D1.1. WELDING ELECTRODES FOR PLAIN STRUCTURAL STEEL SHALL BE AWS SERIES E-70. WELDING ELECTRODES FOR GALVANIZED STEEL SHALL BE AWS SERIES E6010 OR E6011.
   - 4.2. ALL SHOP AND FIELD WELDING SHALL BE PERFORMED BY CERTIFIED WELDERS, AS DESCRIBED IN "AMERICAN WELDING SOCIETY'S STANDARD QUALIFICATION PROCEDURE." AWS D1.1, TO PERFORM THE TYPE OF WORK REQUIRED.
5. COATINGS:
   - 5.1. ALL EXPOSED STEEL SHALL BE HOT DIP GALVANIZED UNLESS NOTED OTHERWISE ON DRAWINGS. ANY POINTS OF WELDING SHALL BE TOUCHED UP IN THE FIELD WITH A ZINC-RCH PAINT BY THE STEEL ERECTOR.
   - 5.2. ALL STEEL SHALL HAVE A SHOP COAT OF RUST INHIBITIVE PAINT IF NOT GALVANIZED.
     - 5.2.1. STEEL TO BE THOROUGHLY CLEANED IN ACCORDANCE WITH SSPC-SP3 PRIOR TO PAINTING.

GENERAL DEMOLITION NOTES

1. DEMOLITION PLAN AND DRAWINGS PROVIDE FOR INFORMATION ONLY. THE CONTRACTOR SHALL SUBMIT A DEMOLITION PLAN IN ACCORDANCE WITH SPECIFICATION 02 41 16 - STRUCTURAL DEMOLITION AND REMOVALS.
2. REMOVE SEDIMENTS ACCUMULATED ON SPILLWAY STRUCTURE AND CLEAN TO REMOVE DELETERIOUS MATERIAL AND ALL LOOSE CONCRETE.
3. THE EXISTING SPILLWAY STRUCTURES AND INLET LIP ARE TO DEMOLISHED TO THE LIMITS SHOWN IN THE DRAWINGS AND AS ORDERED BY THE ENGINEER.
4. DEMOLITION SHALL BE PERFORMED IN A MANNER TO PROTECT THE EXISTING STRUCTURES TO REMAIN IN PLACE. PROVIDE SAFETY SHIELDING AS NEEDED TO PROTECT THE EXISTING STRUCTURE.
5. LEAVE NO REBAR EXPOSED UNLESS NOTED OTHERWISE.

BY	MARK	REVISIONS	DATE

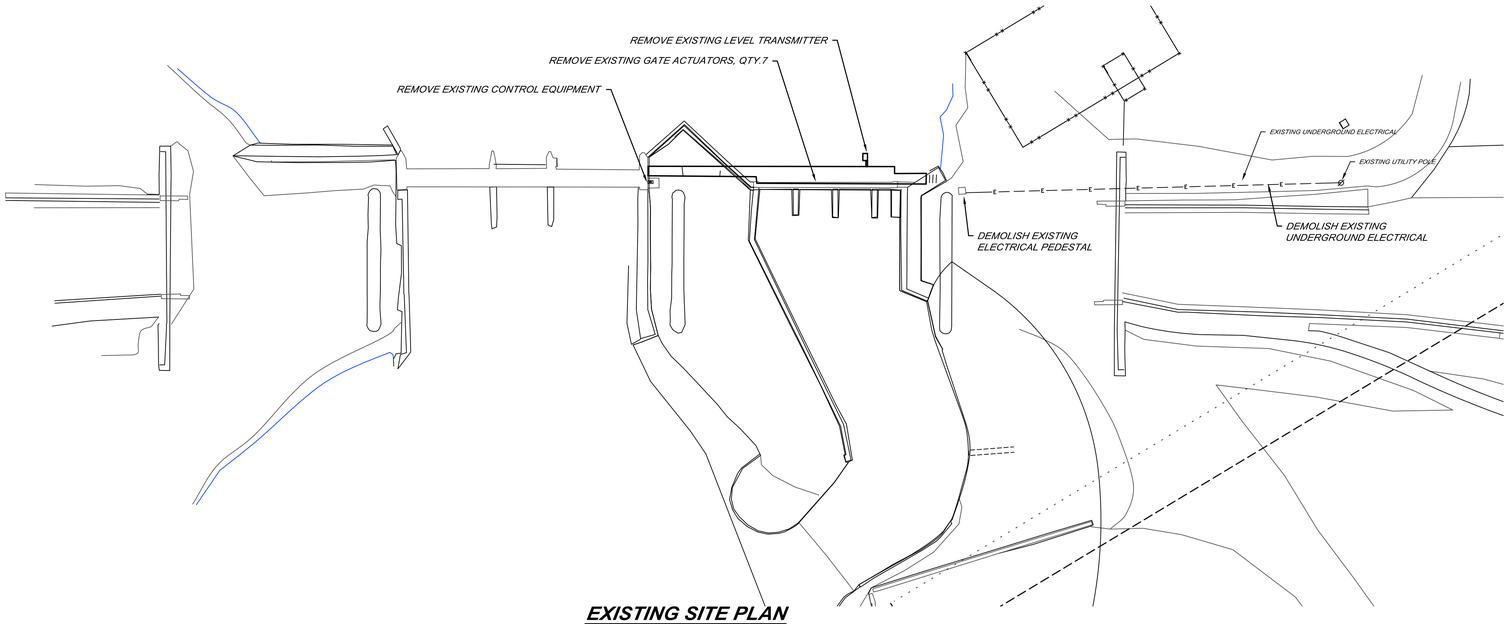
TECUMSEH DAM ID NO. 593
LENAWEE COUNTY, MICHIGAN

STRUCTURAL NOTES SHEET

SAGINAW OFFICE
230 S. Washington Ave.
Saginaw, MI 48607
Tel. 989-754-4717
Fax. 989-754-4440
www.SpicerGroup.com

DE. BY: MTS	CH. BY: RVG	PROJECT NO. 129021SG2020
DR. BY: MTS	APP. BY: NDC	
STDS.	SHEET 15 OF 24	DR 15
DATE SEPTEMBER, 2024	FILE NO. DR-4501-15	
SCALE NOT TO SCALE		

HANNAH GARNER



EXISTING SITE PLAN

SCALE: 1" = 20'-0"

KEY:

Ω	RECEPTACLE 120V, 20A GFCI-TYPE WITH METALLIC, LOCKABLE, WEATHERPROOF WHILE-IN-USE COVER
$	TOGGLE SWITCH 120V, 20A WITH METALLIC, LOCKABLE, WEATHERPROOF "WHILE-IN-USE" COVER
⌑	LIGHT FIXTURE 120V, 100W (MAX), LED, TYPE II DISTRIBUTION FULL CUTOFF WITH ADJUSTABLE SLIPFITTER MOUNT, ADJUSTABLE LIGHT OUTPUT, AND DUSK-TO-DAWN PHOTOCELL
M	MIXER KASCO, DE-ICE SERIES (OR EQUAL) 120V, 3/4 HP
LE	LEVEL ELEMENT FREE-AIR RADAR TRANSMITTER VEGA PULS, C21 W/ ADJUSTABLE MOUNTING BRACKET

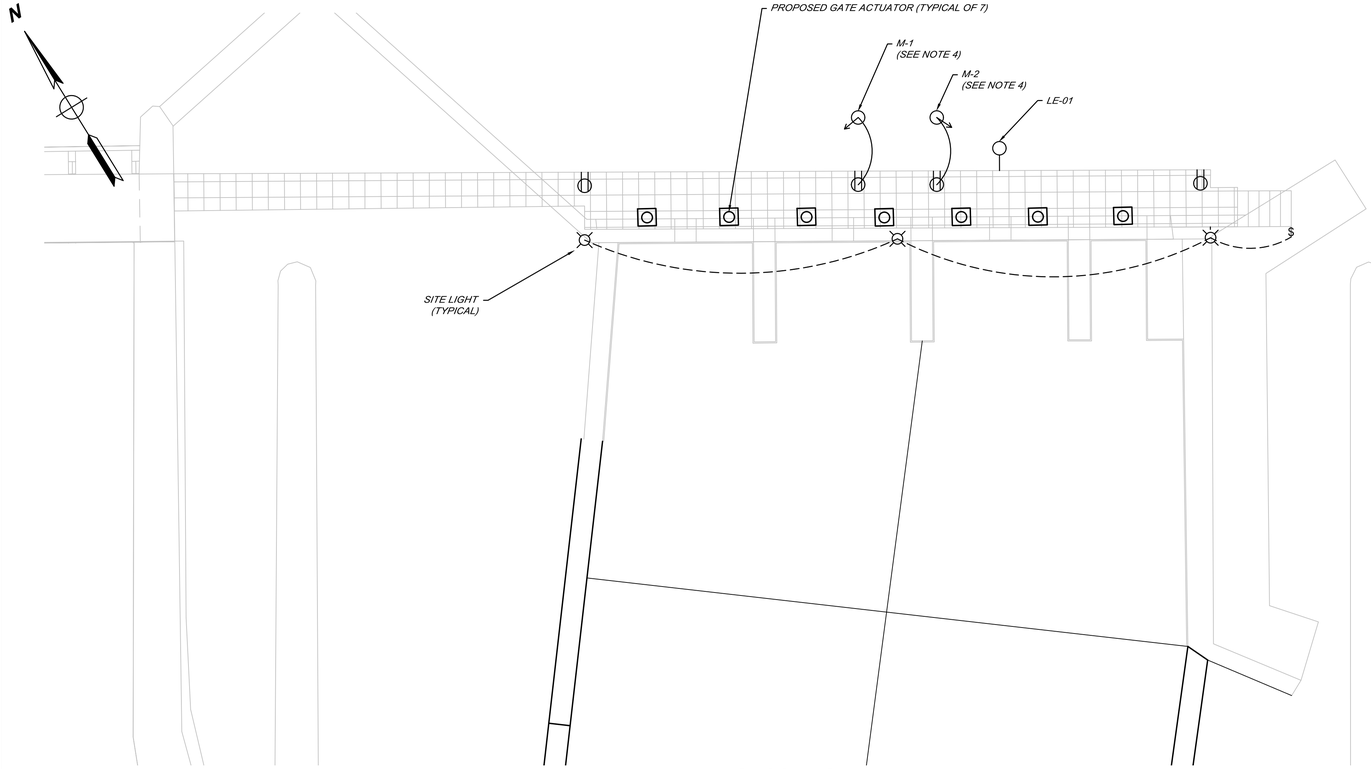
0 15 30 60

SCALE: 1" = 30'

SECTION 27 AND 28, T05SN-R04E,
CITY OF TECUMSEH,
TECUMSEH TOWNSHIP,
LENAWEE COUNTY , MICHIGAN

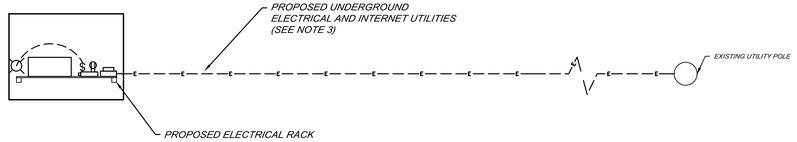
NOTES:

1. ALL CONDUCTORS SHALL BE STRANDED COPPER, THHN TYPE, UNLESS OTHERWISE INDICATED.
2. SEE E-03 AND E-05 FOR INSTALLATION DETAILS.
3. DISTANCE FROM UTILITY POWER POLE TO PROPOSED ELECTRIC UTILITY METER IS APPROXIMATELY 105 FEET.
4. KASCO DE-ICE MIXERS SHALL BE CONTROLLED VIA SWITCHED RECEPTACLE AND AIMED AS INDICATED. MIXERS' DIRECTION OF AIM SHALL BE ADJUSTED AS REQUIRED FOR IDEAL FREEZE PREVENTION.



PROPOSED SITE PLAN

SCALE: 1" = 5'-0"



BY	MARK	REVISIONS	DATE

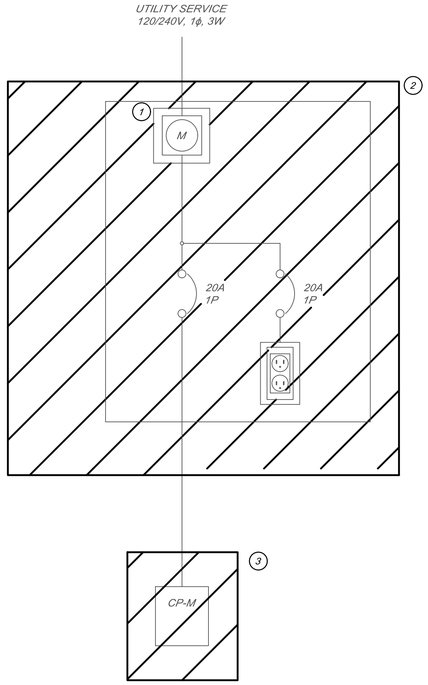
TECUMSEH DAM ID NO. 593
LENAWEE COUNTY, MICHIGAN

ELECTRICAL SITE PLANS

DUNDEE OFFICE
125 Helle Blvd, Suite 2
Dundee, MI 48131
Tel. 734-823-3308
www.SpicerGroup.com

DE. BY: LAM	CH. BY: DWH	PROJECT NO.	
DR. BY: JDS	APP. BY: RVG	129021SG2020	
STDS.	SHEET 16 OF 24	E	
DATE September , 2024	FILE NO.	01	
SCALE AS SHOWN	DE-1199-01		

"LAWRENCEMC



EXISTING/DEMO ONE-LINE DIAGRAM

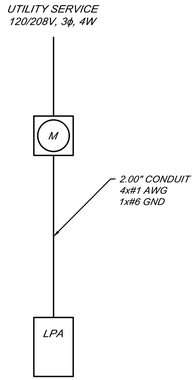
SCALE: N/A

KEY:

M	EXISTING, UTILITY METER
CP-M	EXISTING, MIXER CONTROL PANEL

DEMOLITION NOTES:

1. CONTRACTOR SHALL COORDINATE METER REMOVAL AND SERVICE SHUTDOWN WITH OWNER AND UTILITY COMPANY.
2. DEMOLISH EXISTING SERVICE EQUIPMENT AND CONNECTED CONDUIT AND WIRE.
3. REMOVE AND SALVAGE EXISTING MIXER CONTROL PANEL (CP-M) AND DELIVER TO OWNER.



PROPOSED ONE-LINE DIAGRAM

SCALE: N/A

KEY:

M	PROPOSED, METER UTILITY
LPA	PROPOSED, LIGHTING PANEL A 120/208V, 3ϕ, 100A MAIN (MIN), 100A MCB (SERVICE RATED) 42 SPACES, NEMA 3R LOCKABLE ENCLOSURE

NOTES:

1. ALL CONDUCTORS SHALL BE STRANDED COPPER, THHN TYPE, UNLESS OTHERWISE INDICATED.
2. CONDUIT AND CONDUCTOR SIZES LISTED ARE MINIMUM ACCEPTABLE SIZES. ANY CHANGES FROM DESIGN MUST BE APPROVED BY ENGINEER, IN WRITING, PRIOR TO SUBSTITUTION.
3. ALL BRANCH CIRCUIT BREAKERS SHALL BE SUPPLIED AND INSTALLED, EVEN WHERE DEVICES AND/OR EQUIPMENT IS NOT PRESENT.
4. ALL WIRING SHALL BE CLEARLY LABELED BY BRANCH CIRCUIT NUMBER. THIS INCLUDES "NEUTRAL" CONDUCTORS.
   4.1. EXAMPLE: LPA-02 & LPA-02N
5. TANDEM BREAKERS SHALL NOT BE ALLOWED ANYWHERE ON PROJECT.
6. ALL BRANCH CIRCUIT BREAKER AMPERE RATINGS SHALL BE FIELD VERIFIED AND SHALL BE CONSISTENT WITH WIRE SIZING PER CODE.

PANEL BOARD SCHEDULE

PANEL:	LPA: LIGHTING PANEL
LOCATION:	UTILITYRACK
FED FROM:	UTILITY
VOLTAGE:	120/208V, 3-PH, 4-WIRE
RATINGS:	100A MAIN, 100A MAIN CB
SPACES:	42

LOAD DESCRIPTION	LOAD (W)	CB (A)	CKT #	100A MAIN CB A	B	C	CKT #	CB (A)	LOAD (W)	LOAD DESCRIPTION
G-1 : GATE ACTUATOR 1	816		1				2		5	TVSS-1
	816	15	3				4	15	5	
	816		5				6		5	
G-2 : GATE ACTUATOR 2	816		7				8		4	PMR-1
	816	15	9				10	15	4	
	816		11				12		4	
G-3 : GATE ACTUATOR 3	816		13				14	20	1,200	CP-1 : CONTROL PANEL
	816	15	15				16	20	400	LIGHTS
	816		17				18	20	720	RECS
G-4 : GATE ACTUATOR 4	816		19				20	20	1,500	M-1 : MIXER 1
	816	15	21				22	20	1,500	M-2 : MIXER 2
	816		23				24	20	0	SPARE
G-5 : GATE ACTUATOR 5	816		25				26	20	0	SPARE
	816	15	27				28	20	0	SPARE
	816		29				30	20	0	SPARE
G-6 : GATE ACTUATOR 6	816		31				32	20	0	SPARE
	816	15	33				34	20	0	SPARE
	816		35				36	20	0	SPARE
G-7 : GATE ACTUATOR 7	816		37				38	20	0	SPARE
	816	15	39				40	20	0	SPARE
	816		41				42	20	0	SPARE
TOTALS	17,136			8,421	7,621	6,441			5,347	

CONNECTED AMPS PER PHASE	70.18	63.51	53.68
CONNECTED LOAD	22,483 WATTS		
	62.41 AMPS		
TOTAL SERVICE DEMAND	28,104 WATTS		
(CONNECTED LOAD * 125%)	78.01 AMPS		

PROPOSED PANEL SCHEDULE

SCALE: N/A

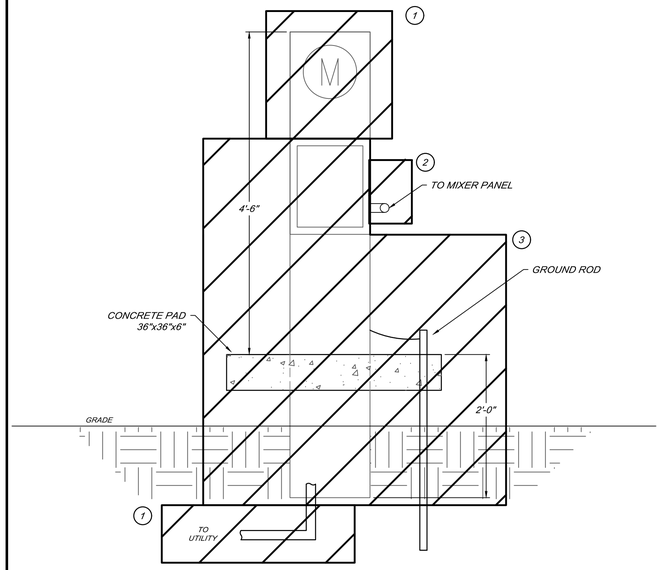
BY	MARK	REVISIONS	DATE

TECUMSEH DAM ID NO. 593
LENAWEE COUNTY, MICHIGAN

ELECTRICAL POWER DISTRIBUTION

DUNDEE OFFICE
125 Helle Blvd, Suite 2
Dundee, MI 48131
Tel. 734-823-3308
www.SpicerGroup.com

DE. BY: LAM	CH. BY: DWH	PROJECT NO.	
DR. BY: JDS	APP. BY: RVG	129021SG2020	
STDS.	SHEET 17 OF 24	E	
DATE September, 2024	FILE NO.	02	
SCALE AS SHOWN	DE-1199-02		

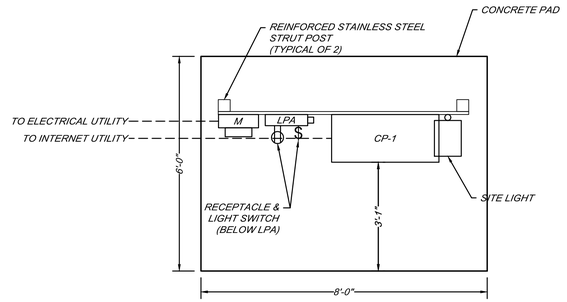


EXISTING ELECTRICAL PEDESTAL

SCALE: 1"=2'-0"

DEMOLITION NOTES:

1. CONTRACTOR SHALL COORDINATE METER AND SERVICE REMOVAL WITH UTILITY COMPANY.
2. DEMOLISH EXISTING CONDUIT AND WIRE.
3. DEMOLISH EXISTING ELECTRICAL EQUIPMENT, CONCRETE PAD, AND GROUND ROD.

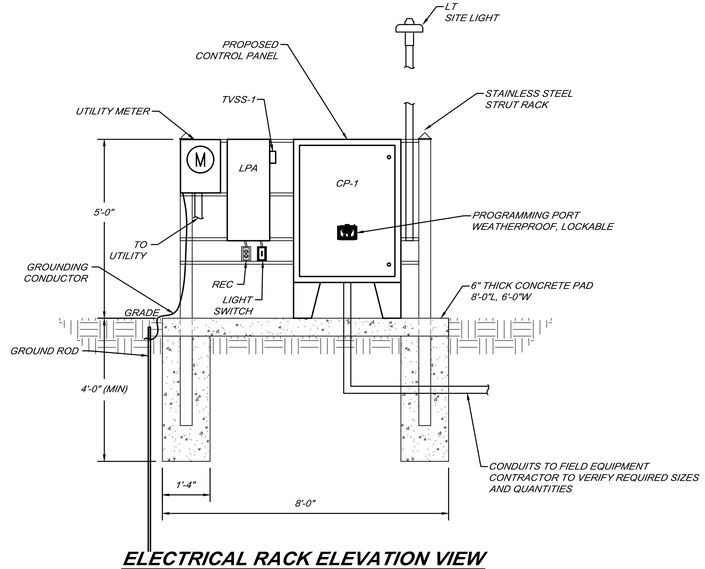


ELECTRICAL RACK PLAN VIEW

SCALE: 1/2"=1'-0"

KEY:

M	PROPOSED, UTILITY METER
LPA	PROPOSED, LIGHTING PANEL A 120/208V, 3ϕ, 100A MAIN (MIN). 100A MCB (SERVICE RATED) 42 SPACES, NEMA 3R LOCKABLE ENCLOSURE
TVSS-1	PROPOSED, TRANSIENT VOLTAGE SURGE SUPPRESSOR
CP-1	PROPOSED, CONTROL PANEL 1
REC	120V, 20A GFCI-TYPE WITH METALLIC, LOCKABLE, WEATHERPROOF WHILE-IN-USE COVER
$	TOGGLE SWITCH 120V, 20A WITH METALLIC, LOCKABLE, WEATHERPROOF "WHILE-IN-USE" COVER
LT	LIGHT FIXTURE 120V, 100W (MAX), LED, TYPE II DISTRIBUTION FULL CUTOFF WITH ADJUSTABLE SLIPFITTER MOUNT, ADJUSTABLE LIGHT OUTPUT, AND DUSK-TO-DAWN PHOTOCELL



ELECTRICAL RACK ELEVATION VIEW

SCALE: 1/2"=1'-0"

NOTES:

1. ALL CONDUCTORS SHALL BE STRANDED COPPER, THHN TYPE, UNLESS OTHERWISE INDICATED.
2. INSULATED BUSHINGS SHALL BE INSTALLED WHERE REQUIRED TO PREVENT CORROSION DUE TO DISSIMILAR METALS..
3. SITE LIGHT SHALL BE AIMED AS DIRECTED BY OWNER.
4. CP-1 ENCLOSURE SHALL BE ANCHORED TO CONCRETE PAD AND STRUT RACK.
5. GROUND ROD SHALL BE 0.75 INCHES IN DIAMETER AND A MINIMUM OF 8'-0" LONG.
6. CP-1'S PROGRAMMING PORT SHALL INCLUDE 120VAC RECEPTACLE (5A MIN.), 1 X RJ45 PORT, AND 2 X USB 3.0 PORTS IN LOCKABLE, METALLIC, WEATHERPROOF ENCLOSURE.

BY	MARK	REVISIONS	DATE

TECUMSEH DAM ID NO. 593
LENAWEE COUNTY, MICHIGAN

ELECTRICAL POWER DETAILS

DUNDEE OFFICE
125 Helle Blvd, Suite 2
Dundee, MI 48131
Tel. 734-823-3308
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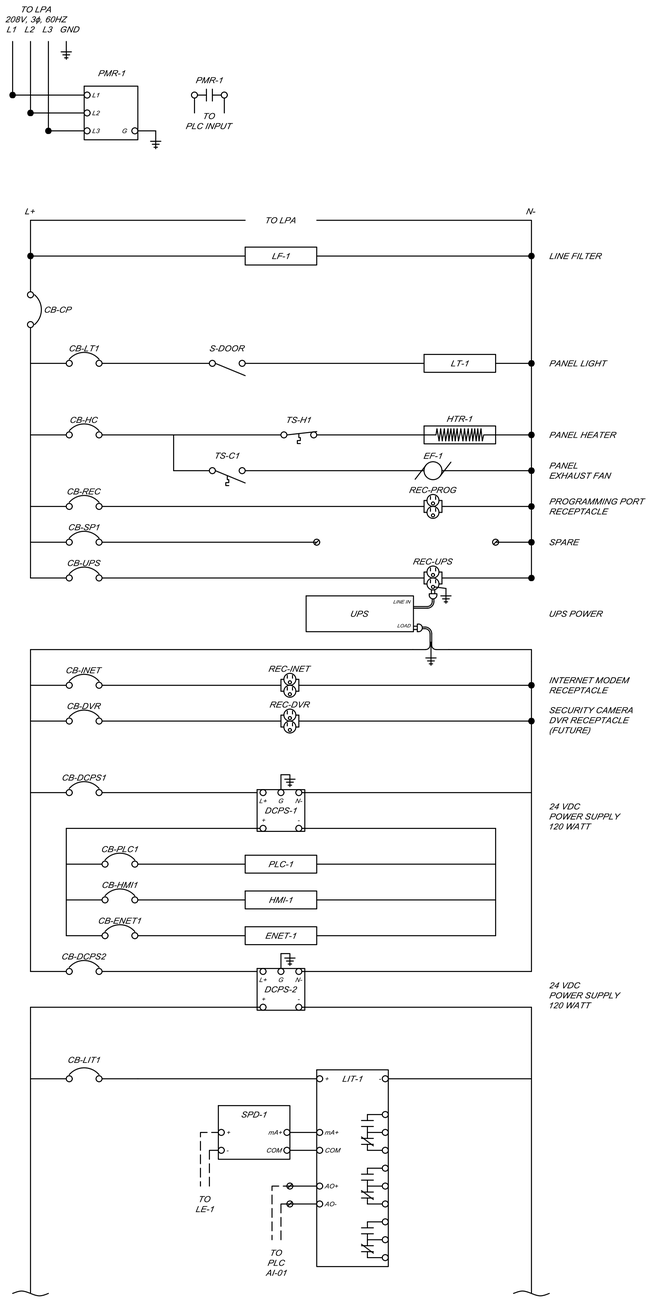
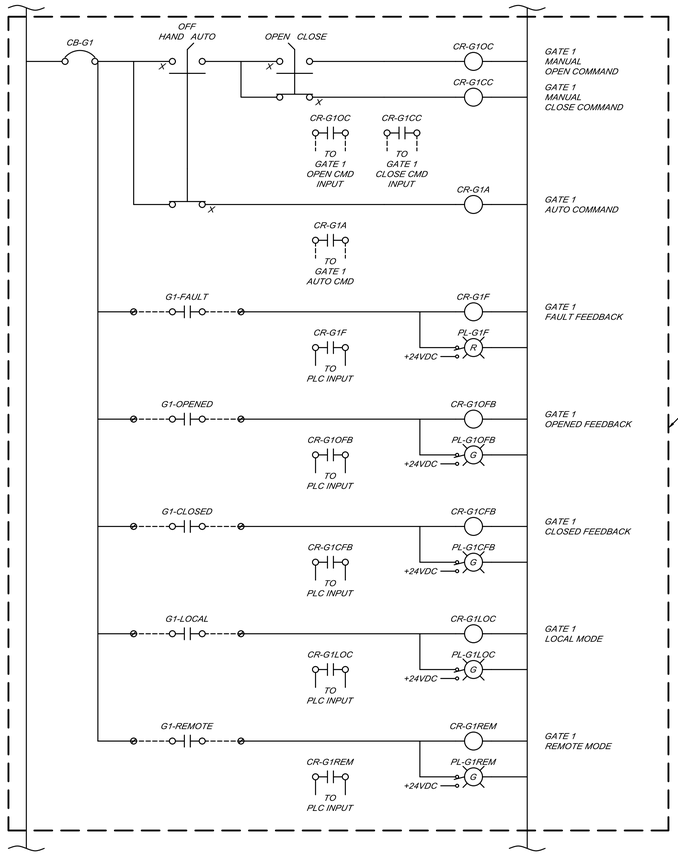
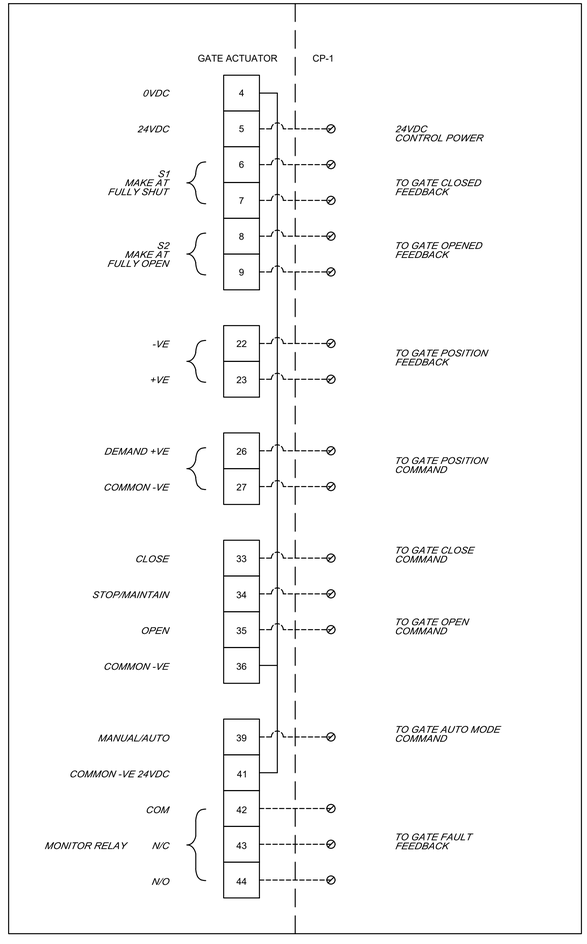
DE. BY: LAM	CH. BY: DWH	PROJECT NO.	
DR. BY: JDS	APP. BY: RVG	129021SG2020	
STDS.	SHEET 18 OF 24	E 03	
DATE September, 2024	FILE NO.		
SCALE AS SHOWN	DE-1199-03		

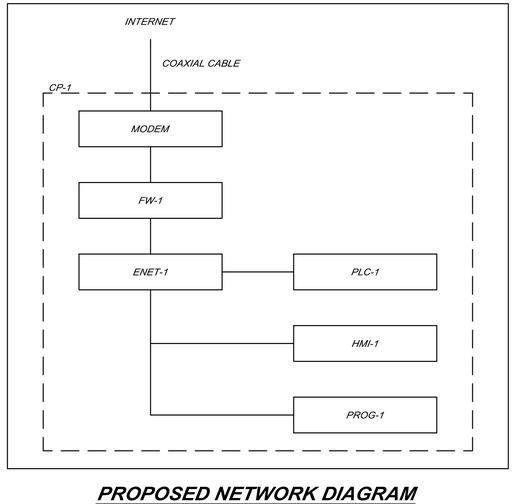






GATE ACTUATOR WIRING DETAIL (TYPICAL OF 7)

SCALE: N/A



PROPOSED NETWORK DIAGRAM

SCALE: N/A

NOTES:
1. ALL NETWORKING CABLES SHALL BE CAT-6A (MINIMUM) UNLESS OTHERWISE STATED.

KEY:

MTS	MANUAL TRANSFER SWITCH
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSOR
LPA	LIGHTING PANEL A
PMR	PHASE MONITORING RELAY
LF	LINE FILTER
CB	CIRCUIT BREAKER
CP	CONTROL PANEL
LT	LIGHT
S	SWITCH
TS	TEMPERATURE SWITCH
	H HEATING
	C COOLING
REC	RECEPTACLE
SCADA	SUPERVISORY CONTROL ALARMING & DATA ACQUISITION
DVR	DIGITAL VIDEO RECORDER
T	TRANSFORMER
UPS	UNINTERRUPTIBLE POWER SUPPLY
DCPS	DC POWER SUPPLY
LIT	LEVEL INDICATING TRANSMITTER
LE	LEVEL ELEMENT
SPD	SURGE PROTECTION DEVICE
CR	CONTROL RELAY
G	GATE
PL	PILOT LIGHT
AUX	AUXILIARY CONTACT
AI	ANALOG INPUT
AO	ANALOG OUTPUT
INET	INTERNET
ENET	ETHERNET
FW	FIREWALL
PLC	PROGRAMMABLE LOGIC CONTROLLER
HMI	HUMAN MACHINE INTERFACE
PROG	PROGRAMMING PORT

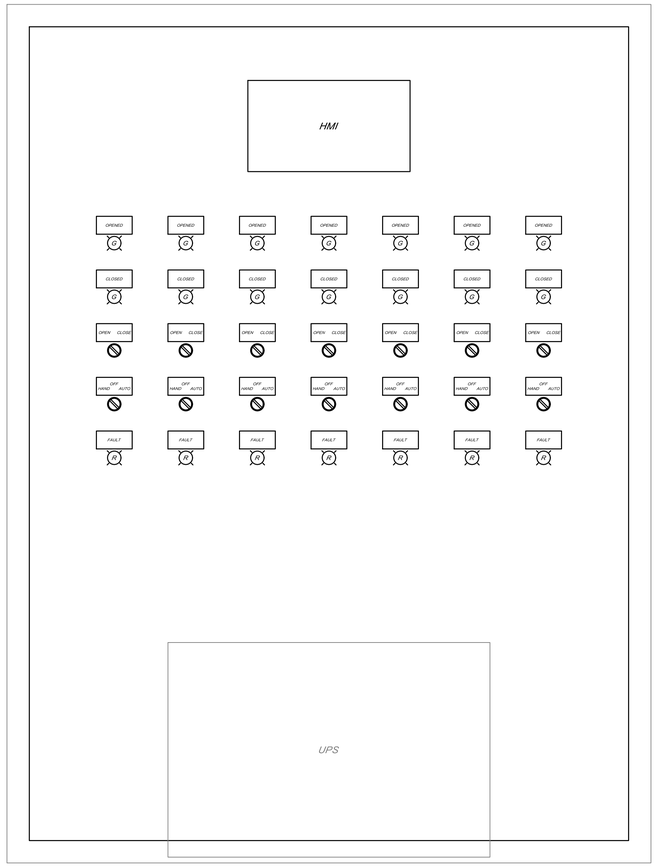
BY	MARK	REVISIONS	DATE

TECUMSEH DAM ID NO. 593
LENAWEE COUNTY, MICHIGAN

CONTROL SYSTEM WIRING DIAGRAM

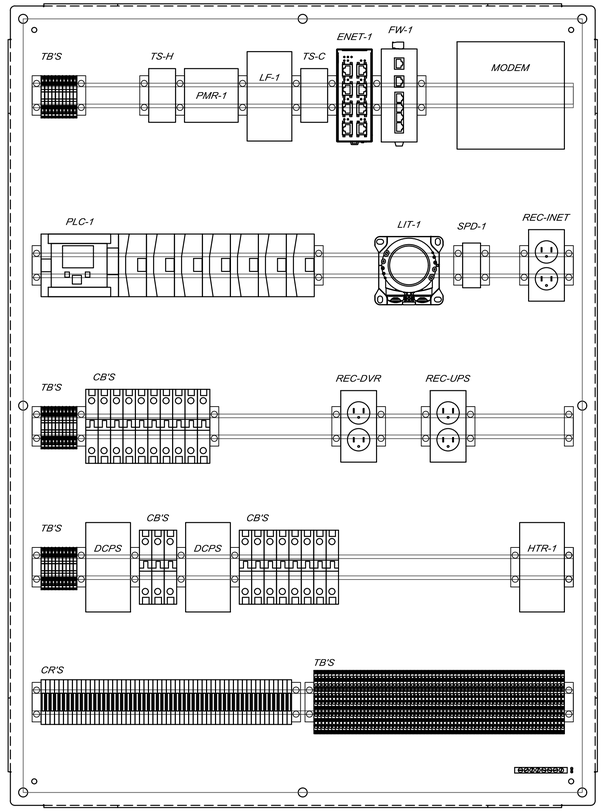
Spicer group
DUNDEE OFFICE
125 Helle Blvd, Suite 2
Dundee, MI 48131
Tel. 734-823-3308
www.SpicerGroup.com

DE. BY: LAM	CH. BY: DWH	PROJECT NO.	
DR. BY: LAM	APP. BY: RVG	129021SG2020	
STDS.	SHEET 19 OF 24	E	
DATE September, 2024	FILE NO.	04	
SCALE AS SHOWN	DE-1199-04		



CONTROL PANEL
DEAD-FRONT PANEL LAYOUT

SCALE: 1/4" = 1'-0"



CONTROL PANEL
INTERIOR LAYOUT

SCALE: 1/4" = 1'-0"

KEY:

CP	CONTROL PANEL
PMR	PHASE MONITORING RELAY
LF	LINE FILTER
CB	CIRCUIT BREAKER
LT	LIGHT
S	SWITCH
TS	TEMPERATURE SWITCH
	H HEATING
	C COOLING
REC	RECEPTACLE
SCADA	SUPERVISORY CONTROL ALARMING & DATA ACQUISITION
DVR	DIGITAL VIDEO RECORDER
UPS	UNINTERRUPTIBLE POWER SUPPLY
DCPS	DC POWER SUPPLY
LIT	LEVEL INDICATING TRANSMITTER
LE	LEVEL ELEMENT
SPD	SURGE PROTECTION DEVICE
CR	CONTROL RELAY
G	GATE
PL	PILOT LIGHT
AUX	AUXILIARY CONTACT
INET	INTERNET
ENET	ETHERNET
FW	FIREWALL
MODEM	INTERNET MODEM
PLC	PROGRAMMABLE LOGIC CONTROLLER
HMI	HUMAN MACHINE INTERFACE
PROG	PROGRAMMING PORT
HTR	HEATER
EF	EXHAUST FAN
TB	TERMINAL BLOCK
CR	CONTROL RELAY

NOTES:

1. STAINLESS STEEL HARDWARE TO BE USED ON ALL STRUCTURAL CONNECTIONS.
   1.1. INSULATED FITTING SHALL BE USED TO PREVENT CORROSION DUE TO DISSIMILAR METALS.
2. PANEL LAYOUTS ARE FOR REFERENCE ONLY. FINAL PANEL DESIGNS SHALL BE DETERMINED BY FINAL SHOP DRAWING APPROVALS.
3. PANEL LIGHT AND DOOR SWITCH SHALL BE MOUNTED TO INTERIOR OF ENCLOSURE.
4. EXHAUST FAN AND INTAKE GRILLE SHALL BE MOUNTED THROUGH SIDE WALL OF ENCLOSURE.
5. OPERATOR DEVICES SUCH AS INDICATOR LIGHTS AND SELECTOR SWITCHES SHALL BE REPLACED BY GRAPHICAL ITEMS ON THE HMI ONLY UPON APPROVAL BY OWNER AND ENGINEER.

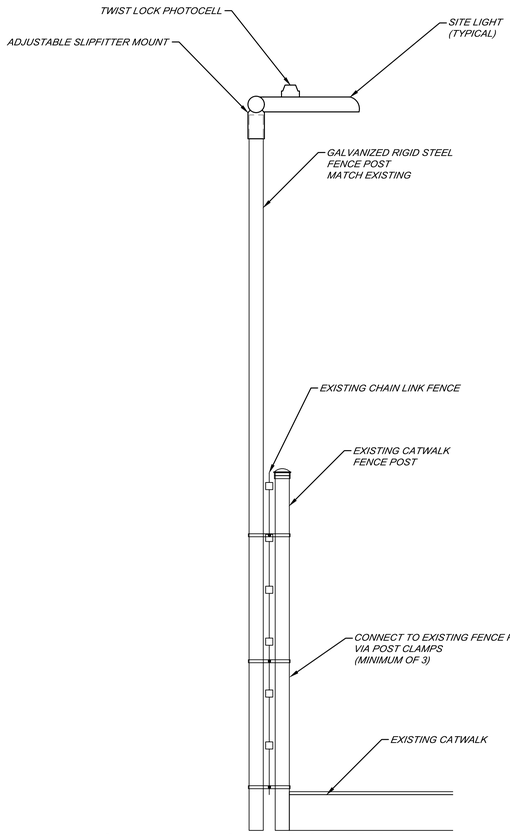
BY	MARK	REVISIONS	DATE

TECUMSEH DAM ID NO. 593
LENAWEE COUNTY, MICHIGAN

ELECTRICAL CONTROL PANEL DETAILS

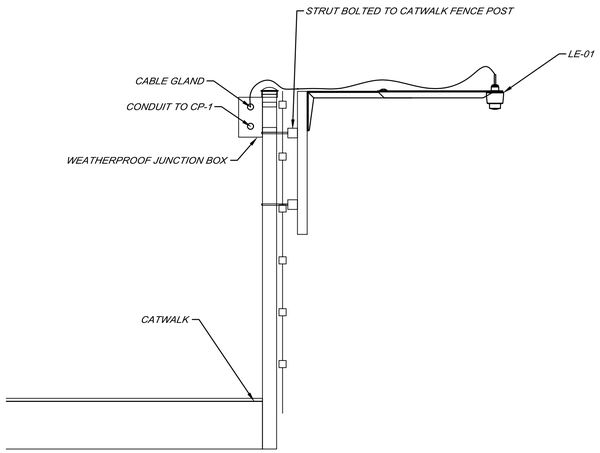
DUNDEE OFFICE
125 Helle Blvd, Suite 2
Dundee, MI 48131
Tel. 734-823-3308
www.SpicerGroup.com

DE. BY: LAM	CH. BY: DWH	PROJECT NO.	
DR. BY: LAM	APP. BY: RVG	129021SG2020	
STDS.		SHEET 20 OF 24	E 05
DATE September, 2024		FILE NO.	
SCALE AS SHOWN		DE-1199-05	



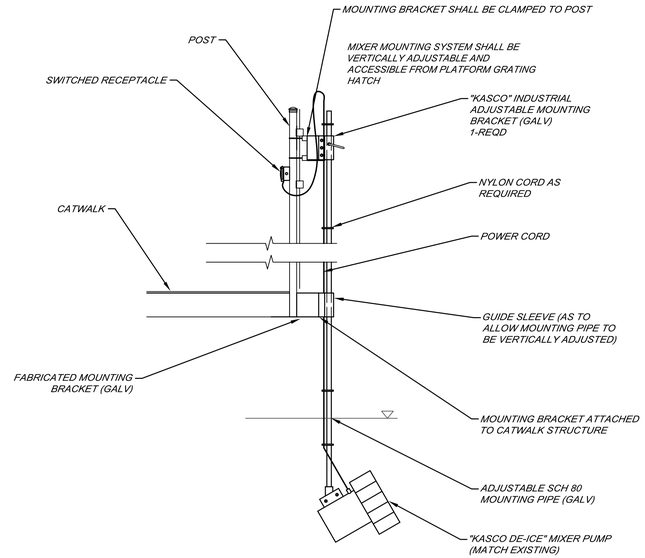
CATWALK LIGHTING ASSEMBLY DETAIL (TYPICAL)

SCALE: 1/2" = 1'-0"



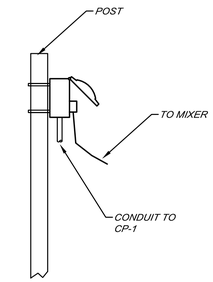
LEVEL ELEMENT INSTALLATION DETAIL ELEVATION VIEW

SCALE: 1/2" = 1'-0"



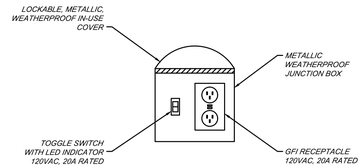
MIXER MOUNTING DETAIL

SCALE: 1/2" = 1'-0"



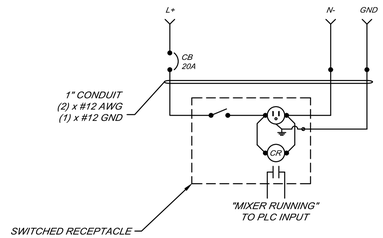
SWITCH RECEPTACLE ASSEMBLY

SCALE: NO SCALE



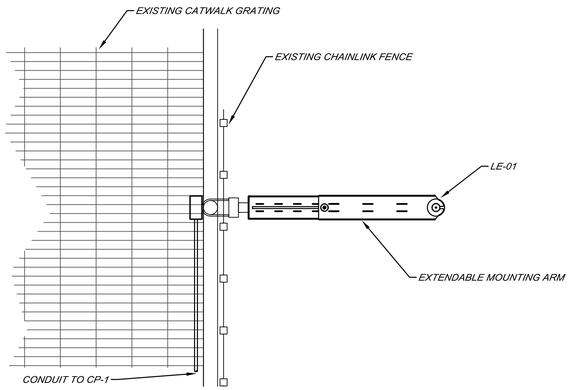
SWITCH RECEPTACLE DETAIL

SCALE: NO SCALE



MIXER WIRING DETAIL

SCALE: N/A



LEVEL ELEMENT INSTALLATION DETAIL PLAN VIEW

SCALE: 1/2" = 1'-0"

NOTES:
1. STAINLESS STEEL HARDWARE TO BE USED ON ALL STRUCTURAL CONNECTIONS.
   1.1. INSULATED FITTINGS SHALL BE USED TO PREVENT CORROSION DUE TO DISSIMILAR METALS.
2. AREA LIGHTS SHALL BE MOUNTED AT 9 FEET ABOVE WALKING SURFACE.
3. SEE E-01 FOR SITE PLANS.

BY	MARK	REVISIONS	DATE

TECUMSEH DAM ID NO. 593
LENAWEE COUNTY, MICHIGAN

ELECTRICAL INSTALLATION DETAILS

DUNDEE OFFICE
125 Helle Blvd, Suite 2
Dundee, MI 48131
Tel. 734-823-3308
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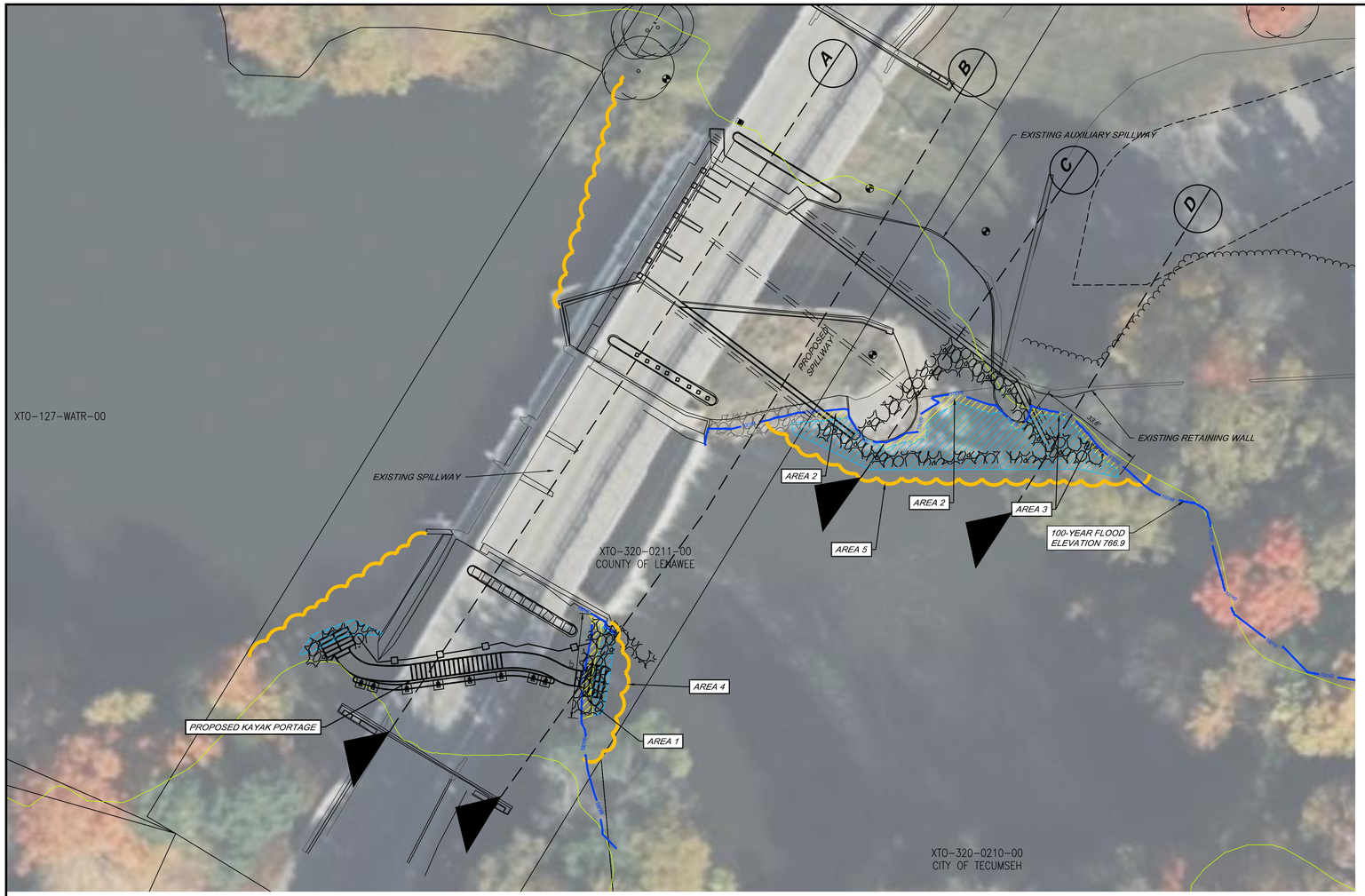
DE. BY: LAM	CH. BY: DWH	PROJECT NO.	
DR. BY: LAM	APP. BY: RVG	129021SG2020	
STDS.		SHEET 21 OF 24	E 06
DATE September, 2024		FILE NO.	
SCALE AS SHOWN		DE-1199-06	



LEGEND

- 100-YR FLOOD ELEVATION
- 100-YR FLOODPLAIN IMPACTS
- PART 301 IMPACTS
- EXISTING RIPRAP
- PROPOSED RIPRAP
- EXISTING GRAVEL DRIVE
- EXISTING TREE LINE
- COFFERDAM/WATER CONTROL LIMITS
- PARCEL LINE
- FEMA BASE FLOOD BOUNDARY

N

0 10 20 40

SCALE: 1" = 20'

SECTION 27 AND 28, T05SN-R04E,
CITY OF TECUMSEH,
TECUMSEH TOWNSHIP,
LENAWEE COUNTY, MICHIGAN

PROPOSED IMPACTS BELOW 100 YR FLOODPLAIN									
			CUT AREA			FILL AREA			NET FILL
IMPACT AREA	IMPACT TYPE (P/T)	MATERIAL TYPE	AVERAGE LENGTH (FT) X WIDTH (FT) x DEPTH (FT)	CUBIC FEET (FT^3)	CUBIC YARDS (YD^3)	AVERAGE LENGTH (FT) X WIDTH (FT) x DEPTH (FT)	CUBIC FEET (FT^3)	CUBIC YARDS (YD^3)	CUBIC YARDS (YD^3)
1	P	BEDDING STONE/HEAVY RIPRAP	33 x 3 x 1	99	4	33 x 3 x 1	99	4	0
1	P	STONE STEPS	10 x 3 x 1	30	1	10 x 3 x 1	30	1	0
2	P	NATIVE CUT	55 x 3 x 1	165	6			0	-6
3	P	HEAVY RIPRAP				10 x 3 x 2	60	2	2
3	P	FILL			0	35 x 3 x 2	210	8	8
TOTAL PERMANENT IMPACT			TOTAL CUT	294	11	TOTAL FILL	399	15	4
4	T	TEMPORARY COFFERDAM				50 x 1 x 2	100	4	4
5	T	TEMPORARY COFFERDAM				121 x 1 x 2	242	9	9
TOTAL TEMPORARY IMPACT			TOTAL CUT	0	0	TOTAL FILL	342	13	13

CUT/FILL AREA DESCRIPTIONS

- AREA 1 - RIPRAP FILL AND STONE BASE FOR PORTAGE STEPS AND EROSION REPAIR DOWNSTREAM RIGHT BANK
- AREA 1 - HEAVY RIPRAP WAVE BREAK FILL FOR PORTAGE PROTECTION DOWNSTREAM RIGHT EMBANKMENT
- AREA 2 - NATIVE CUT OF EXISTING AUXILIARY SPILLWAY END STRUCTURE DOWNSTREAM LEFT EMBANKMENT
- AREA 3 - FILL AND RIPRAP FOR RETAINING WALL REMOVAL AREA
- AREA 4 - TEMPORARY COFFER DAM DOWNSTREAM RIGHT EMBANKMENT
- AREA 5 - TEMPORARY COFFER DAM DOWNSTREAM LEFT EMBANKMENT

BENCHMARKS

BM 200 - CUT SQUARE IN NORTHWEST BRIDGE ABUTMENT WALL.

EL 631.89

BM 201 - CUT SQUARE WITH MAGNAIL IN NORTHEAST BRIDGE ABUTMENT WALL.

EL 631.89

BY	MARK	REVISIONS	DATE

TECUMSEH DAM ID NO. 593
LENAWEE COUNTY, MICHIGAN

PART 31 IMPACTS

DUNDEE OFFICE
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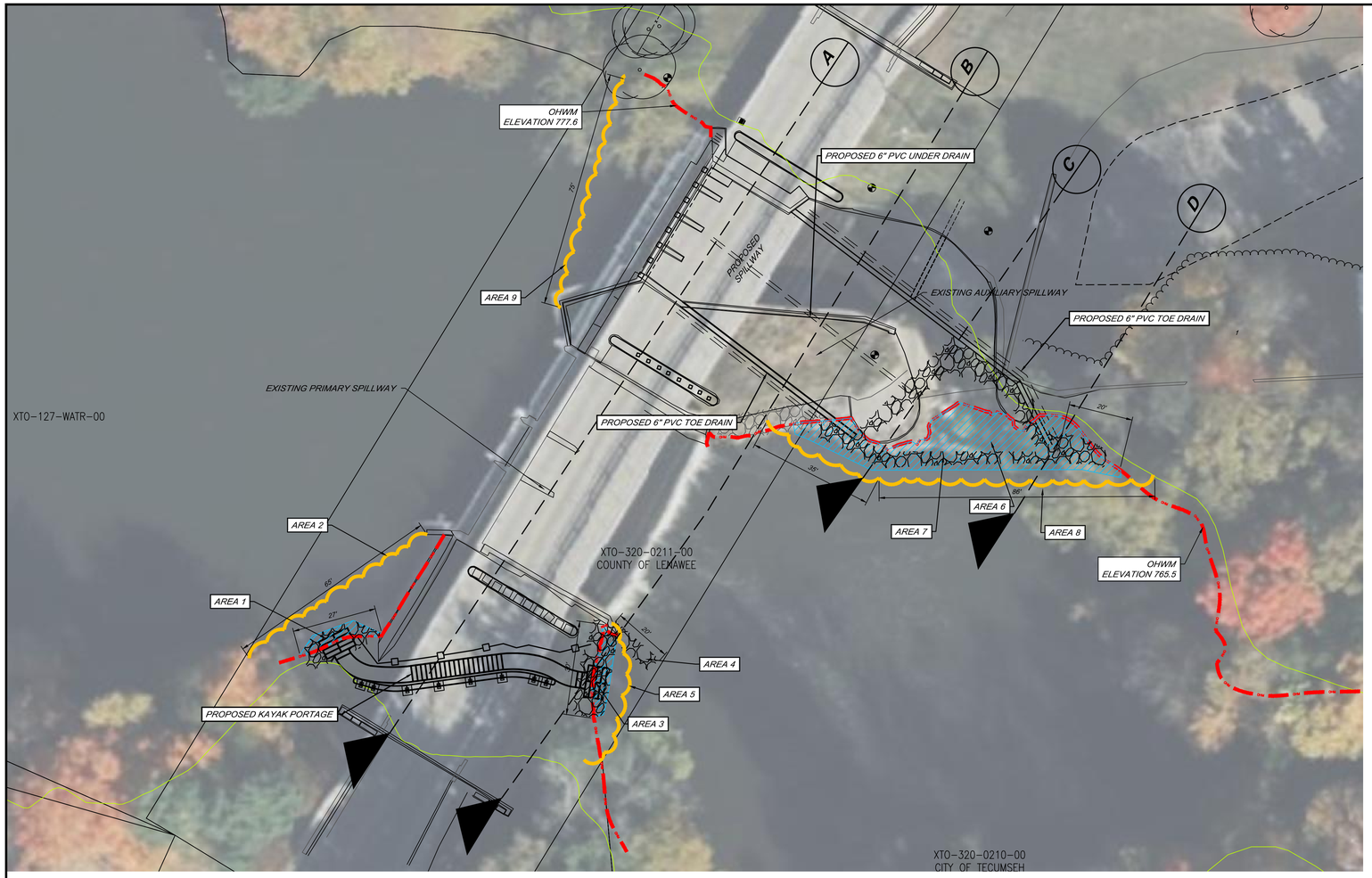
DE. BY: HRG	CH. BY: RVG	PROJECT NO.	
DR. BY: HRG	APP. BY: NDC	129021SG2020	
STDS.		SHEET 22 OF 24	DR 22
DATE SEPTEMBER, 2024		FILE NO.	
SCALE NOT TO SCALE		DR-4501-22	



LEGEND

- ORDINARY HIGH WATER MARK (OHWM)
- STREAMS AND LAKES IMPACTS
- EXISTING RIPRAP
- PROPOSED RIPRAP
- EXISTING GRAVEL DRIVE
- EXISTING TREE LINE
- COFFERDAM/WATER CONTROL LIMITS
- PARCEL LINE
- FEMA BASE FLOOD BOUNDARY

N

0 10 20 40

SCALE: 1" = 20'

SECTION 27 AND 28, T05SN-R04E,
CITY OF TECUMSEH,
TECUMSEH TOWNSHIP,
LENAWEE COUNTY, MICHIGAN

PROPOSED IMPACTS BELOW OHWM									
			CUT AREA			FILL AREA			NET FILL
IMPACT AREA	IMPACT TYPE/ (P/T)	MATERIAL TYPE	AVERAGE LENGTH (FT) X WIDTH (FT) x DEPTH (FT)	CUBIC FEET (FT^3)	CUBIC YARDS (YD^3)	AVERAGE LENGTH (FT) X WIDTH (FT) x DEPTH (FT)	CUBIC FEET (FT^3)	CUBIC YARDS (YD^3)	CUBIC YARDS (YD^3)
RED MILL POND									
1	P	BEDDING STONE/HEAVY RIPRAP	27 x 5 x 1	135	5	27 x 5 x 1	135	5	0
1	P	STONE STEPS	10 x 3 x 1	30	1	10 x 3 x 1	30	1	0
TOTAL PERMANENT IMPACT			TOTAL CUT	165	6	TOTAL FILL	165	6	0
2	T	COFFERDAM				65 x 1 x 10	650	24	24
9	T	COFFERDAM				75 x 1 x 12	900	33	33
TOTAL TEMPORARY IMPACT			TOTAL CUT	0	0	TOTAL FILL	1550	57	57
RIVER RAISIN - SOUTH EMBANKMENT									
3	P	BEDDING STONE/HEAVY RIPRAP	30 x 5 x 1	150	6	30 x 5 x 1	150	6	0
3	P	STONE STEPS	10 x 4 x 1	40	1	10 x 4 x 1	40	1	0
4	P	HEAVY RIPRAP				20 x 5 x 3	300	11	11
TOTAL PERMANENT IMPACT			TOTAL CUT	190	7	TOTAL FILL	490	18	11
5	T	TEMPORARY COFFERDAM				50 x 1 x 5	250	9	9
TOTAL TEMPORARY IMPACT			TOTAL CUT	0	0	TOTAL FILL	250	9	9
RIVER RAISIN - NORTH EMBANKMENT									
6	P	HEAVY RIPRAP				20 x 9 x 1	180	7	7
6	P	NATIVE CUT	58 x 8 x 1	464	17				-17
7	P	HEAVY RIPRAP				82 x 5 x 5	2050	76	76
6	P	AUXILIARY SPILLWAY WALLS				20 x 2 x 8	320	12	12
6	P	FILL				20 x 13 x 4	1040	39	39
6	P	PROPOSED PVC PIPE				10 x 1 x 1	5	0	0
TOTAL PERMANENT IMPACT			TOTAL CUT	464	17	TOTAL FILL	3595	133	116
8	T	TEMPORARY COFFERDAM				121 x 1 x 7	847	31	31
TOTAL TEMPORARY IMPACT			TOTAL CUT	0	0	TOTAL FILL	847	31	31

CUT/FILL AREA DESCRIPTIONS

- *AREA 1 - RIPRAP FILL AND STONE BASE FOR PORTAGE STEPS AND EROSION REPAIR UPSTREAM RIGHT BANK*
- *AREA 2 - TEMPORARY COFFERDAM FILL UPSTREAM RIGHT EMBANKMENT*
- *AREA 3 - RIPRAP FILL FOR PORTAGE STEPS AND EROSION REPAIR DOWNSTREAM RIGHT EMBANKMENT*
- *AREA 4 - RIPRAP WAVE BREAK FILL FOR PORTAGE PROTECTION DOWNSTREAM RIGHT EMBANKMENT*
- *AREA 5 - TEMPORARY COFFERDAM FILL DOWNSTREAM RIGHT EMBANKMENT*
- *AREA 6 - RIPRAP FILL, NATIVE CUT (EXISTING AUXILIARY SPILLWAY STRUCTURE), AND FILL (REGRADE RETAINING WALL REMOVAL AREA) ALONG AUXILIARY SPILLWAY DOWNSTREAM LEFT EMBANKMENT*
- *AREA 7 - HEAVY RIPRAP FILL FOR ENERGY DISSIPATOR DOWNSTREAM LEFT EMBANKMENT*
- *AREA 8 - TEMPORARY COFFERDAM FILL DOWNSTREAM LEFT EMBANKMENT*
- *AREA 9 - TEMPORARY COFFERDAM FILL UPSTREAM LEFT EMBANKMENT*

BENCHMARKS

BM 200 - CUT SQUARE IN NORTHWEST BRIDGE ABUTMENT WALL.

EL 631.89

BM 201 - CUT SQUARE WITH MAGNAIL IN NORTHEAST BRIDGE ABUTMENT WALL.

EL 631.89

BY	MARK	REVISIONS	DATE
HRG	1	REVISED FOR PERMIT REVISION SUBMITTAL	6/20/2024

TECUMSEH DAM ID NO. 593
LENAWEE COUNTY, MICHIGAN

PART 301 IMPACTS

DUNDEE OFFICE
125 Helle Blvd. Suite 2
Dundee, MI 48131
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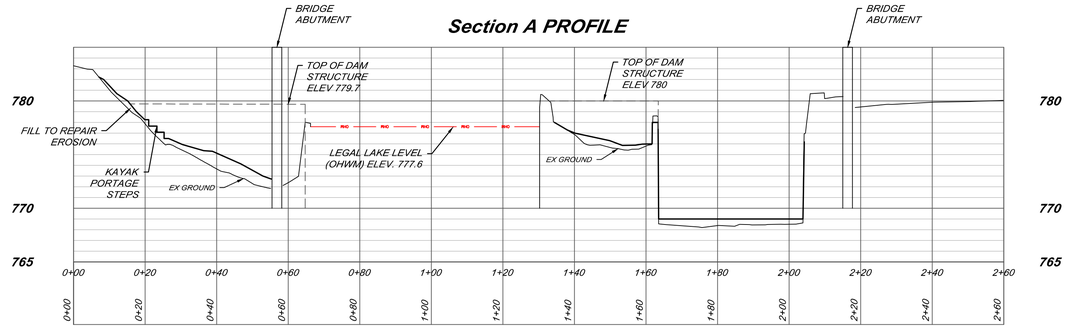
DE. BY: HRG	CH. BY: RVG	PROJECT NO.	
DR. BY: HRG	APP. BY: NDC	129021SG2020	
STDS.		SHEET 23 OF 24	DR 23
DATE SEPTEMBER, 2024		FILE NO.	
SCALE NOT TO SCALE		DR-4501-23	

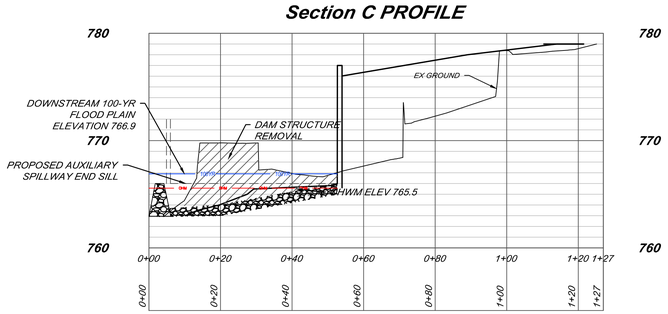
HANNAH GARNER

Section A PROFILE



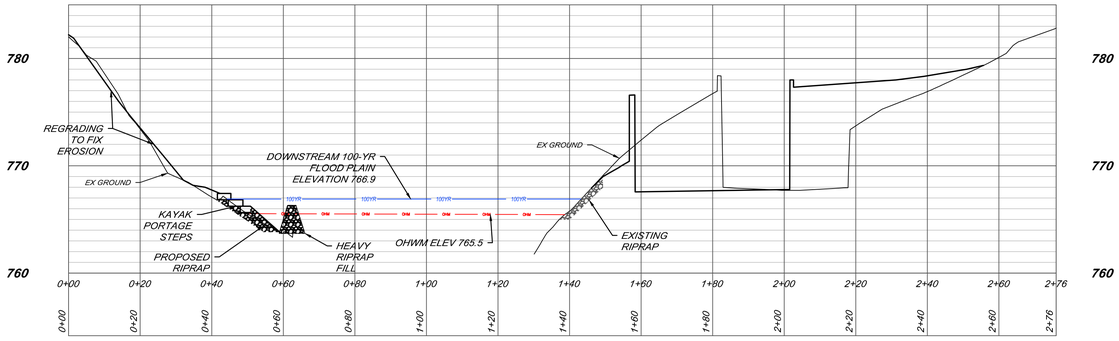
CROSS SECTION A
SCALE: 1" = 20'

Section C PROFILE



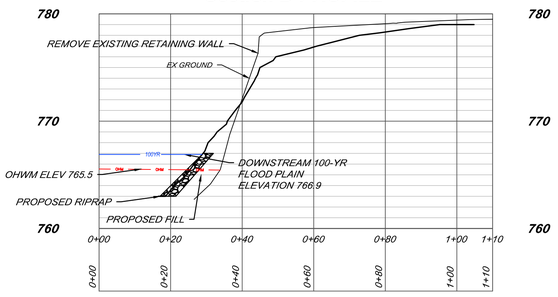
CROSS SECTION C
SCALE: 1" = 20'

Section B PROFILE

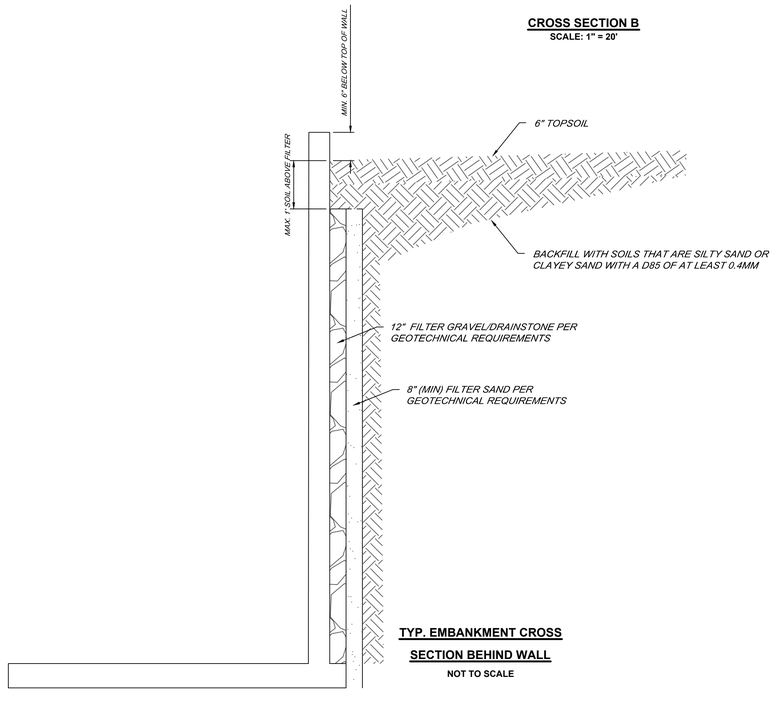


CROSS SECTION B
SCALE: 1" = 20'

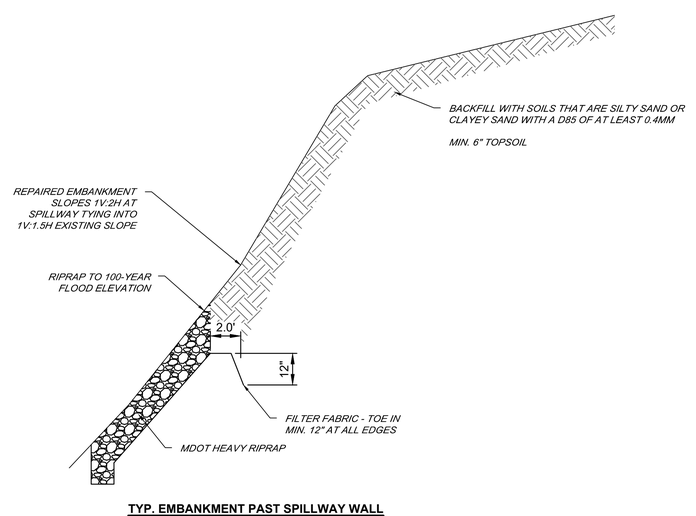
Section D PROFILE



CROSS SECTION D
SCALE: 1" = 20'



TYP. EMBANKMENT CROSS SECTION BEHIND WALL
NOT TO SCALE



TYP. EMBANKMENT PAST SPILLWAY WALL
NOT TO SCALE

BY	MARK	REVISIONS	DATE
HRG		REVISED FOR PERMIT REVISION SUBMITTAL	8/23/2024

TECUMSEH DAM ID NO. 593
LENAWEE COUNTY, MICHIGAN

CROSS SECTIONS

SAGINAW OFFICE
230 S. Washington Ave.
Saginaw, MI 48607
Tel. 989-754-4717
Fax. 989-754-4440
www.SpicerGroup.com

DE. BY: HRG	CH. BY: RVG	PROJECT NO.	
DR. BY: HRG	APP. BY: NDC	129021SG2020	
STDS.	SHEET 24 OF 24	DR 24	
DATE SEPTEMBER, 2024	FILE NO.		
SCALE NOT TO SCALE	DR-4501-24		

HANNAH GARNER

June 11, 2024

GEOTECHNICAL MEMORANDUM

RE: Tecumseh Dam Spillway Improvements
Lenawee County, Michigan
Project No: 129021SG2020

This memorandum summarizes Spicer Group's geotechnical investigation for the proposed spillway improvement project.

Project Overview:
This project will involve removal and reconstruction of the current auxiliary spillway. The existing auxiliary spillway is located at the northeast end of the dam. It is approximately 40 feet wide at the upstream end and 25 feet wide at the downstream end. It is comprised of a concrete slab with 3- to 10-foot-high sidewall. Sidewalls are constructed of concrete and steel sheet piling. The top of the spillway slab is at about elevation 767 or 768. The dam impounds the Red Mill Pond.

The new spillway is conceived to be about 140 feet long by about 40 feet wide with an 18-inch thick concrete slab and concrete sidewalls up to about 11 feet tall.

Subsurface Investigation:
Subsurface conditions at the site were explored on April 4 and 6 and May 1, 2023 by drilling two rig-drilled borings and two hand auger borings near the spillway. Borings B1 through B3 were drilled by McDowell & Associates under subcontract to Spicer Group. B4 was drilled by Spicer Group.

Rig-drilled borings were dilled using hollow stem auger methods, with samples obtained at 2.5- to 5-foot intervals in accordance with the standard penetration test, in which a 2-inch O.D. split barrel sampler is driven three 6-inch increments by a 140-lb hammer falling 30 inches.

Hand auger borings were drilled by 2.75-inch diameter hand auger equipment in locations not accessible to a drill rig. In select locations, relative density and consistency were determined using a Sowers-type dynamic cone penetrometer, in which a 1.5-inch diameter cone is driven three successive 1.75-inch increments using a 15-lb hammer freely falling 20 inches.

During drilling, soils were visually/manually classified in accordance with the Unified Soil Classification System per ASTM D2487 and D248. Boring logs, are attached, along with boring location maps.

Laboratory testing, including moisture content, calibrated penetrometer, and grain-size analyses, were performed on selected soil samples. The results are attached and used to correlate with engineering properties and filtration requirements.

The ground surface elevation at the boring locations was estimated by plotting their locations on the topographic survey. The approximate elevations are shown below:

Boring	B-1	B-2	B-3	B-4
Elevation	773	776	779	771

Conclusions & Recommendations:
In general, the observed subsurface conditions should not impose any significant impediment to the proposed project. The soils at the site will tend to have moderate strength and moderate compressibility. Permeability, moisture sensitivity, and frost susceptibility will be variable, depending on fines content. Grain-size analysis results indicate that the some of the materials immediately below the bottom of the slab (the sand and gravel layer) are broadly graded, and may tend to be more susceptible to internal erosion.

The soils observed in the borings can be categorized into four general units. The units and their appropriate geotechnical design properties are listed below:

Soil	**Unit Weight** lb/ft^3	**Friction Angle** degrees	**Cohesion** lb/ft^2	**Undrained Shear Strength** lb/ft^2
Existing Fill	120	32	0	0
Sand & Gravel	120	33	0	0
Fine Sand	120	34	0	0
Silty Clay	125	32	400	4000

Retaining Walls & Foundations
Spillway walls will support lateral pressures from the soil and groundwater retained behind them. Earth pressure coefficients can be calculated from the parameters provided above. An underdrain system should be considered to prevent excess unbalanced hydrostatic forces.

We expect foundations for cast-in-place concrete spillway walls will bear in the fine sand unit. This material should provide suitable support with a recommended allowable bearing pressure of 2,000 lb/ft^2 (factor of safety of about 3). Under this loading, total settlement can be expected to be less than about 1/4 inch and differential settlements will be about half of the total.

If sheet piling is used to construct spillway walls, or used as temporary cofferdams during construction, the soil properties given in the table above can be used in their design. The cobbley soil units observed in the borings might make driving sheet piles more difficult; however, we do not expect to be an excessive hindrance (there is existing sheet piling at the site and the borings were able to be advanced and sampled through these soils).

Spillway Slab
We expect a new concrete slab will form the spillway bottom. We expect the subgrade to consist predominantly of medium dense fine sand; however, portions of the subgrade might include the existing fill unit or the sand and gravel material. Care should be taken if the subgrade material is existing fill, as undocumented fill can be highly variable and with unknown placement. The fill and sand and gravel soils observed in the borings at that elevation, however, appear to be capable of providing good support. We suggest placing the slab on a base of open-graded coarse crushed aggregate, such as MDOT 29A to provide uniform support and dissipation of excess hydrostatic pressure. A filter-compatible subbase

should be used under the aggregate, such as MDOT 2NS. A perforated underdrain (without geotextile sock) should be placed within the aggregate course and be extended to a positive outlet.

Earthwork

The on-site soils should be able to be readily excavated using conventional equipment. The on-site soils are variable and have a significant amount of clay and silt, so may prove challenging to adequately compact. Therefore, imported fill should be considered, especially for areas supporting structures or slabs. Imported fill should generally meet the requirements of MDOT Class III granular material.

Prior to placing new fill or concrete, the subgrade should be inspected for topsoil, highly organic soils, debris/rubbish, or excessively soft or loose soils. Where encountered, the unsuitable material should be excavated and replaced with compacted granular soil (such are MDOT Class II or III, or 2NS).

All fill should be conditioned to near its optimum moisture content, placed in thin lifts (generally less than about 8 inches thick, depending on the compaction equipment) and compacted to at least 95% of its maximum dry density, as determined by ASTM D1557 or the MDOT one-point cone method.

Temporary excavations should be appropriately sloped or shored, as determined by the contractor's competent person. Site soils can generally be classified as Type C soils, with maximum temporary slopes of 1.5H:1V.

To prevent internal erosion/piping of soils adjacent to the new spillway walls and/or slab, filtration characteristics of the fill should be considered. The procedure discussed in the NRCS *National Engineering Handbook* Part 633, Chapter 26 is appropriate. Based on the laboratory grain-size analyses performed, the coarser material observed in sample B1D would be adequately filtered by MDOT 6A aggregate. The other samples that were tested would be filtered by MDOT 2NS or ASTM C33 sand. MDOT 29A generally meets filter criteria for 2NS sand. For less critical applications, filtration can be accomplished with a needle-punched nonwoven geotextile meeting MDOT's specification for Geotextile Blanket, with an AOS less than 0.35 mm.

SOILS INVESTIGATION
TECUMSEH SPILLWAY
TECUMSEH, MICHIGAN

SPICER GROUP, INC.
331 BAY STREET
PETOSKEY, MICHIGAN 49770

APRIL 10, 2023
BY
McDOWELL & ASSOCIATES

McDowell & Associates
Geotechnical, Environmental & Hydrogeological Services • Materials Testing & Inspection
21355 Hatcher Avenue • Ferndale, MI 48220
Phone: (248) 399-2066 • Fax: (248) 399-2157
www.mcdowasc.com

April 10, 2023

Spicer Group, Inc.
331 Bay Street
Petoskey, Michigan 49770

Job No. 23-111

Attention: Mr. Nils W. Lindwall

Subject: Soils Investigation
Tecumseh Spillway
Tecumseh, Michigan

Dear Mr. Lindwall:

We welcome this opportunity to offer our services for your project.

In accordance with your request, we performed three (3) borings at the subject project. The borings were drilled at the locations you required and are shown approximately on the attached Soil Boring Location Plan.

Detailed soil descriptions and stratifications for each completed boring are shown on the attached boring logs.

If you have any questions or if we can be further service, please do not hesitate to call.

Very truly yours,

McDOWELL & ASSOCIATES

Tony (Antoine) Merheb, M.S., P.E.
Senior Geotechnical Engineer

TM/

McDOWELL & ASSOCIATES
Geotechnical, Environmental, & Hydrogeologic Services
21355 Hatcher Avenue • Ferndale, MI 48220
Phone: (248) 399-2066 • Fax: (248) 399-2157

LOG OF SOIL BORING NO. 1

PROJECT Soils Investigation
Tecumseh Dam Spillway

LOCATION Evans and Maumee Streets
Tecumseh, Michigan

JOB NO. 23-111

SURFACE ELEV. _____ **DATE** 4/6/2023

Sample & Type	Depth	SOIL DESCRIPTION	Penetration Blows for 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. %
	1	Moist dark brown sandy TOPSOIL with trace of gravel, fill						
		1'0"						
A	2	Very compact moist brown clayey SAND with gravel and trace of brick, fill	7					
SS			12	8.6				
	3		7					
		3'6"						
	4	Compact moist dark brown to black SAND & GRAVEL with brick, stones and asphalt, fill						
		4'6"						
B	5	Very stiff moist brown silty CLAY with sand and trace of pebbles, fill	4					
SS			7	14.4				
	6	5'8"	11			*	(3000)	
	7	COBBLES and stones, possible fill						
C								
SS	8	7'7"						
	9							
D	10		3					
SS		Medium compact wet brown fine to coarse SAND & GRAVEL with trace of silt	3	10.1				
	11		4					
	12							
	13							
	14							
E	15	14'6" Very stiff moist blue silty CLAY with sand and						
SS		15'0" pebbles and occasional stones	2					
	16	Very compact wet brown to gray fine SAND with occasional stone and pebbles and discolored streaks	7	11.7				
	17		10					
		17'6"						
	18							
	19							
F	20		7					
SS		Extremely compact wet brown fine SAND with trace of silt	14	22.6				
	21		21					
	22							
	23							
	24	23'8"						
G		Compact wet gray fine SAND with trace of gravel	4					
SS	25	24'6" Very stiff moist blue silty CLAY with traces of sand and pebbles	9					
			12					

TYPE OF SAMPLE
D. - DISTURBED
U.L. - UNDIST. LINER
S.T. - SHELBY TUBE
S.S. - SPLIT SPOON
R.C. - ROCK CORE
( ) - PENETROMETER

REMARKS: *Calibrated penetrometer

Standard Penetration Test - Driving 2" OD Sampler 1' With 140# Hammer Falling 30": Count Made at 6" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT	7	FT.	7	INS.
G.W. ENCOUNTERED AT	15	FT.	2	INS.
G.W. AFTER COMPLETION	5	FT.	6	INS.
G.W. AFTER HRS.		FT.		INS.
G.W. VOLUMES	Heavy			

McDOWELL & ASSOCIATES
Geotechnical, Environmental, & Hydrogeologic Services
21355 Hatcher Avenue • Ferndale, MI 48220
Phone: (248) 399-2066 • Fax: (248) 399-2157

LOG OF SOIL BORING NO. 1 (continued)

PROJECT Soils Investigation
Tecumseh Dam Spillway

LOCATION Evans and Maumee Streets
Tecumseh, Michigan

JOB NO. 23-111

SURFACE ELEV. _____ **DATE** 4/6/2023

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows for 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. %
	26								
			Very stiff moist blue silty CLAY with traces of sand and pebbles						
	27								
	28								
			28'2" COBBLE						
	29		28'11"						
H				34					
SS	30			60					

	31		Extremely stiff moist blue silty CLAY HARDPAN with sand and pebbles						
	32								
	33								
	34								
I				25					
SS	35		35'0"	40					

	36								
	37								
			Note: Used track rig.						
	38								
	39								
	40								
	41								
	42								
	43								
	44								
	45								
	46								
	47								
	48								
	49								
	50								

TYPE OF SAMPLE
D. - DISTURBED
U.L. - UNDIST. LINER
S.T. - SHELBY TUBE
S.S. - SPLIT SPOON
R.C. - ROCK CORE
( ) - PENETROMETER

REMARKS:

Standard Penetration Test - Driving 2" OD Sampler 1' With 140# Hammer Falling 30": Count Made at 6" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT	7 FT.	7 INS.
G.W. ENCOUNTERED AT	15 FT.	2 INS.
G.W. AFTER COMPLETION	5 FT.	6 INS.
G.W. AFTER HRS.	FT.	INS.
G.W. VOLUMES	Heavy	

McDOWELL & ASSOCIATES
Geotechnical, Environmental, & Hydrogeologic Services
21355 Hatcher Avenue • Ferndale, MI 48220
Phone: (248) 399-2066 • Fax: (248) 399-2157

LOG OF SOIL BORING NO. 2

PROJECT Soils Investigation
Tecumseh Dam Spillway

LOCATION Evans and Maumee Streets
Tecumseh, Michigan

JOB NO. 23-111

SURFACE ELEV. _____ **DATE** 4/4/2023

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows for 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. %
	1		Moist dark brown clayey TOPSOIL, fill						
			1'1"						
			Stiff moist brown sandy CLAY with pebbles,						
A	2		stones and concrete, fill	4					
SS			2'0"	4	10.6				
	3		Medium compact moist brown fine to medium	3					
			SAND with traces of clay, gravel and concrete						
	4		and topsoil seams, fill						
B				4					
SS	5		4'6"	4	14.1				
			Stiff moist brown gravelly CLAY with trace of	5					
	6		concrete, fill						
			6'2"						
C	7		COBBLES and stones, possible fill	8					
SS				8					
	8		7'6"	9					
			Compact moist brown SAND & GRAVEL with						
	9		stones, possible fill						
D				6					
SS	10		9'6" Stiff moist blue sandy CLAY with sand and	6	16.9				
			10'0" pebbles, possible fill	3					
	11								
			Compact wet gray clayey gravelly SAND						
	12								
	13								
			13'0"						
	14								
E				2					
SS	15			5	23.1				
				7					
	16								
			Compact wet brown fine SAND with trace of silt						
	17								
	18								
	19								
			19'6"	2					
F	20		Compact wet gray fine SAND	3					
SS				6					
	21		20'6"						
	22								
			Note: Used track rig.						
	23								
	24								
	25								

TYPE OF SAMPLE
D. - DISTURBED
U.L. - UNDIST. LINER
S.T. - SHELBY TUBE
S.S. - SPLIT SPOON
R.C. - ROCK CORE
( ) - PENETROMETER

REMARKS:

Standard Penetration Test - Driving 2" OD Sampler 1' With 140# Hammer Falling 30": Count Made at 6" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT	9	FT.	0	INS.
G.W. ENCOUNTERED AT		FT.		INS.
G.W. AFTER COMPLETION	8	FT.	0	INS.
G.W. AFTER HRS.		FT.		INS.
G.W. VOLUMES	Heavy			

McDOWELL & ASSOCIATES
Geotechnical, Environmental, & Hydrogeologic Services
21355 Hatcher Avenue • Ferndale, MI 48220
Phone: (248) 399-2066 • Fax: (248) 399-2157

LOG OF SOIL BORING NO. 3

PROJECT Soils Investigation
Tecumseh Dam Spillway

LOCATION Evans and Maumee Streets
Tecumseh, Michigan

JOB NO. 23-111

SURFACE ELEV. _____ **DATE** 4/4/2023

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows for 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. %
			0'11" Moist dark brown sandy TOPSOIL with gravel, trace of vegetation and occasional stones, fill						
	1								
			Moist brown clayey fine SAND with gravel and stones, fill						
	2		2'2"						
			Moist brown clayey fine SAND with silt, gravel, cobbles and topsoil streaks, fill						
	3		3'0"						
	4								
	5								
	6								
	7								
	8								
	9								
	10								
	11								
	12								
	13								
	14								
	15								
	16								
	17								
	18								
	19								
	20								
	21								
	22								
	23								
	24								
	25								

Notes:

(1) Boring advanced by hand drilling methods.

(2) Four attempts to drill deeper than 3' but too much stones to advance boring. First attempt refusal at 2'4". Second attempt refusal at 2'8". Third attempt refusal at 3'. Fourth attempt refusal at 2'6".

Note: Used track rig.

TYPE OF SAMPLE
D. - DISTURBED
U.L. - UNDIST. LINER
S.T. - SHELBY TUBE
S.S. - SPLIT SPOON
R.C. - ROCK CORE
( ) - PENETROMETER

REMARKS:

Standard Penetration Test - Driving 2" OD Sampler 1' With 140# Hammer Falling 30": Count Made at 6" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT FT. None INS.
G.W. ENCOUNTERED AT FT. INS.
G.W. AFTER COMPLETION FT. INS.
G.W. AFTER HRS. FT. INS.
G.W. VOLUMES

Job No. 23-111

SIEVE ANALYSIS SUMMARY

Boring	Sample	% Passing #4 Sieve	% Passing #10 Sieve	% Passing #40 Sieve	% Passing #100 Sieve	% Passing #200 Sieve
1	D	45.0	24.7	8.6	4.7	3.8
	F	100.0	100.0	98.5	9.0	6.3
2	D	75.7	66.4	46.1	33.6	28.9
	E	100.0	100.0	96.2	4.3	3.4

LEGEND

Soil Boring Locations, 1 through 3:
Drilled by McDowell & Associates

McDowell & Associates
21355 Hatcher Avenue
Ferndale, Michigan 48220
Phone: (248) 399-2066
Fax: (248) 399-2157

Soil Boring Location Plan

Job No. 23-111

LOGS OF HAND AUGER BORINGS

Client: Lenawee County Drain Commissioner
Project No: 129021SG2020

Project Name: Tecumseh Dam Spillway
Project Location: Lenawee County, Michigan

4

Location: 6 feet south and 8 feet west of d/s end of concrete traiing wall in area between spillway and river.
Lat: Long: By: NWL
Surface: grass/weeds GW: 4.5 feet during drilling Date: 5/1/2023

Depth	Material Description	Sample	DCPT	Other
0	2 inches Topsoil			
	Orange-brown, fine to coarse, CLAYEY SAND (SC) with gravel - moist - loose			
1				
2			6 6 6	
	Light brown, fine, CLAYEY SAND (SC) - moist - loose			
3	Orange-brown, SANDY CLAY (CL) - moist - loose		3 4 7	PP:0.25-0.75tsf
4				
	becomes wet			
5	Brown, fine, SAND WITH SILT (SP-SM) - saturated - loose		3 3 5	
6	becomes gray			
7	Boring termnated at 7 feet below ground surface. Two other attempts encountered refusal on coarse gravel at 1 to 2 feet.			
8				

August 5, 2024

GEOTECHNICAL MEMORANDUM

RE: Tecumseh Dam Spillway Improvements
Lenawee County, Michigan
Project No: 129021SG2020

This memorandum provides revised recommendations for filter sand and drainstone gradations for the spillway underdrain system.

Filter sand and drainstone gradation requirements were determined using the filter methodology presented in NRCS's National Engineering Handbook, Part 633, Chapter 26: *Gradation Design of Sand and Gravel Filters*. A summary of the calculations is attached. The resulting gradations do not exactly fit common AASHTO or MDOT material specifications, so the materials must be produced by blending multiple materials.

Drainstone

Sieve	Opening	Percent Passing
2-in	50 mm	100
1 ½-in	37.5 mm	90 – 100
¾-in	19 mm	40 – 85
½-in	12.5 mm	10 – 50
3/8-in	9.5 mm	5 – 40
No. 4	4.75 mm	0 – 25
No. 8	2.36 mm	0 – 10
No. 200	0.075 mm	0 – 3

This gradation is very similar to MDOT 6A or 46G.

Filter Sand

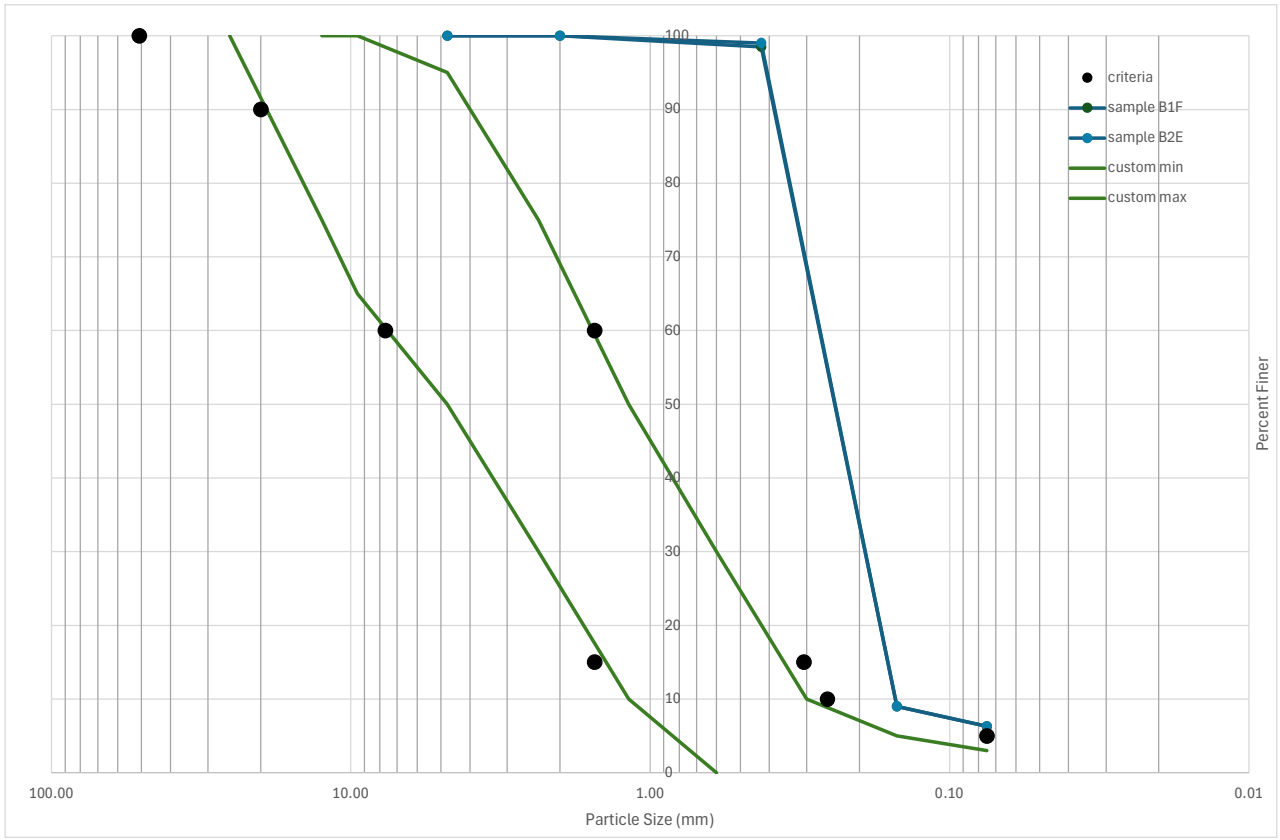
Sieve	Opening	Percent Passing
1-in	25 mm	100
½-in	12.5 mm	75 – 100
3/8-in	9.5 mm	65 – 100
No. 4	4.75 mm	50 – 95
No. 8	2.36 mm	30 – 75
No. 16	1.18 mm	10 – 50
No. 30	0.60 mmm	0 – 30
No. 50	0.30 mm	0 – 10
No. 100	0.15 mm	0 – 5
No. 200	0.075 mm	0 – 3

This gradation is similar to the coarse side of MDOT 2NS.

Aggregates used for sand filter and drainstone should be produced from natural aggregate or ledgestone. Aggregates must be clean, hard, durable, uncoated, and free of clay lumps, organic matter, soft or flakey material, and other foreign matter. Crushed Portland cement concrete or asphaltic concrete should not be used.

Filter Criteria
(in accordance with NRCS Part 633 Soils Engineering, National Engineering Handbook, Chapter 26 Gradation Design of Sand and Gravel Filters)
Tecumseh Dam - Spillway Slab

		Base Soil = B1F		**Base Soil = B2E**	
	Sieve Size (mm)	% Passing	Corrected % Passing	% Passing	Corrected % Passing
No. 4	4.75	100	100.0	100	100.0
No. 10	2	100	100.0	100	100.0
No. 40	0.425	98.5	98.5	99	96.2
No. 100	0.15	9	9.0	9	4.3
No. 200	0.075	6.3	6.3	6.3	3.4



CF =	1.00		1.00	
Category =	4		4	
Filter Gradation				
d85 =	0.38	mm	0.39	mm
Max D15 =	1.53	mm	1.57	mm
Min D15 =	0.31	mm	0.31	mm
Max D60 =	7.67	mm	7.83	mm
Min D60 =	1.53	mm	1.57	mm
Max D100 =	50.80	mm	50.80	mm
Max P200 =	5	percent	5	percent
Min D10 =	0.26	mm	0.26	mm
Min D5 =	0.075	mm	0.075	mm
Max D90 =	20	mm	20	mm

Filter Criteria
(in accordance with NRCS Part 633 Soils Engineering, National Engineering Handbook, Chapter 26 Gradation Design of Sand and Gravel Filters)

Base Soil =Custom Filter (fine side)

	Sieve Size (mm)	% Passing	Corrected % Passing
1"	25	100	100.0
1/2"	12.5	100	100.0
3/8"	9.5	100	100.0
No. 4	4.75	95	95.0
No. 8	2.36	75	75.0
No. 16	1.18	50	50.0
No. 30	0.6	30	30.0
No. 50	0.3	10	10.0
No. 100	0.15	5	5.0
No. 200	0.075	3	3.0

CF =	1.00	
Category =	4	
Filter Gradation		
d85 =	3.56	mm
Max D15 =	14.22	mm
Min D15 =	2.84	mm
Max D60 =	71.10	mm
Min D60 =	14.22	mm
Max D100 =	50.80	mm
Max P200 =	5	percent
Min D10 =	2.37	mm
Min D5 =	0.075	mm
Max D90 =	40	mm