Contract Documents
FOR
Montmorency-Oscoda-Alpena
Solid Waste Management Authority
Cell C Phase I Construction

Prepared by:
GOSLING CZUBAK ENGINEERING SCIENCES, INC.
1280 Business Park Drive
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ADVERTISEMENT FOR BIDS

Montmorency-Oscoda-Alpena Solid Waste Management
Atlanta, Michigan
Cell C Phase I Construction

General Notice

Montmorency-Oscoda-Alpena Solid Waste Management (MOA) is requesting Bids for the construction of the following Project:

Cell C Phase I Construction
250008.07

Bids for the construction of the Project will be received at MOA Landfill , 6751 Landfill Road, Atlanta, MI 49709 until Tuesday, February 3rd, 2026, at 15:00 pm local time. At that time the Bids received will be publicly opened and read. Attendance at the pre-bid conference is mandatory.

The Project includes the following Work:

The Project consists of constructing an approximately 2.7-acre Type-II landfill cell using a double-composite geosynthetic clay liner (GCL) and HDPE liner system.

Bids are requested for the following Contract: Cell C Phase I Construction

Owner anticipates that the Project's total bid price will be approximately $1,900,000. The Project has an expected duration of 120 days.

Obtaining the Bidding Documents

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

https://www.goslingczubak.com/project-bidding/

Bidding Documents may be downloaded from the designated website. Prospective Bidders are urged to register with the designated website as a plan holder, even if Bidding Documents are obtained from a plan room or source other than the designated website in either electronic or paper format. The designated website will be updated periodically with addenda, lists of registered plan holders, reports, and other information relevant to submitting a Bid for the Project. All official notifications, addenda, and other Bidding Documents will be offered only through the designated website. Neither Owner nor Engineer will be responsible for Bidding Documents, including addenda, if any, obtained from sources other than the designated website.

The Issuing Office for the Bidding Documents is:

Gosling Czubak Engineering Sciences, Inc.
1280 Business Park Dr., Traverse City, MI 49686

Prospective Bidders may obtain or examine the Bidding Documents at the Issuing Office on Monday through Friday between the hours of 8:00 a.m. – 5:00 p.m. and may obtain copies of the Bidding Documents from the Issuing Office as described below. Partial sets of Bidding Documents will not be available from the Issuing Office. Neither Owner nor Engineer will be responsible for full or partial sets of Bidding Documents, including addenda, if any, obtained from sources other than the Issuing Office.

Bidding Documents may be purchased from the Issuing Office during the hours indicated above. Cost does not include shipping charges. Upon Issuing Office's receipt of payment, printed Bidding Documents

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or electronic documents on compact disk will be sent via the prospective Bidder's delivery service. The shipping charge amount will depend on the shipping method chosen. Bidding Documents are available for purchase in the following formats:

Format	Cost
Bidding Documents (including Full-Size Drawings)	$75.00
Compact Disc containing Bidding Documents in portable document format (PDF)	$20.00
Electronic download of Bidding Documents	$0.00
Other informational documents – by electronic download only	$0.00

Pre-bid Conference

A mandatory pre-bid conference for the Project will be held on Tuesday, January 13, 2026, at 10:00 a.m. at the MOA Landfill Office, 6751 Landfill Road, Atlanta, Michigan, 49709. 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.

This Advertisement is issued by:

Owner:

Owner: Montmorency-Oscoda-Alpena Solid Waste Management

By: Connie Gerrie

Title: Administrator

Date: December 15, 2025

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INSTRUCTIONS TO BIDDERS FOR CONSTRUCTION CONTRACT

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ARTICLE 1—DEFINED TERMS

1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:

A. *Issuing Office*—The office from which the Bidding Documents are to be issued, and 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 The Issuing Office 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 Bidder may register as a plan holder and obtain complete sets of Bidding Documents, in the number and format stated in the Advertisement or invitation to bid, from the Issuing Office. Bidders may rely that sets of Bidding Documents obtained from the Issuing Office are complete, unless an omission is blatant. Registered plan holders will receive Addenda issued by Owner.

2.05 Plan rooms (including construction information subscription services, and electronic and virtual plan rooms) may distribute the Bidding Documents, or make them available for examination. Those prospective bidders that obtain an electronic (digital) copy of the Bidding Documents from a plan room are encouraged to register as plan holders from the Bidding Documents Website or Issuing Office. Owner is not responsible for omissions in Bidding Documents or other documents obtained from plan rooms, or for a Bidder's failure to obtain Addenda from a plan room.

2.06 *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.

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1. Bidding Documents will be provided in Adobe PDF (Portable Document Format) (.pdf) that is readable by Adobe Acrobat Reader. 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 2.06.A 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.

C. After the Contract is awarded, the Owner will provide or direct the Engineer to provide for the use of the Contractor documents that were developed by Engineer as part of the Project design process, as Electronic Documents in native file formats.

1. Electronic Documents that are available in native file format include:

a. CAD files, including:

1) existing grade surfaces

2) final surface grade

3) survey control points and benchmarks

2. Release of such documents will be solely for the convenience of the Contractor. No such document is a Contract Document.

3. Unless the Contract Documents explicitly identify that such information will be available to the Successful Bidder (Contractor), nothing herein will create an obligation on the part of the Owner or Engineer to provide or create such information, and the Contractor is not entitled to rely on the availability of such information in the preparation of its Bid or pricing of the Work. In all cases, the Contractor shall take appropriate measures to verify that any electronic/digital information provided in Electronic Documents is appropriate and adequate for the Contractor's specific purposes.

4. In no case will the Contractor be entitled to additional compensation or time for completion due to any differences between the actual Contract Documents and any related document in native file format.

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ARTICLE 3—QUALIFICATIONS OF BIDDERS

3.01 Bidder is to submit the following information with its Bid to demonstrate Bidder's qualifications to perform the Work:

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. Bidder's state or other contractor license number, if applicable.

D. Subcontractor and Supplier qualification information.

E. 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 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 *Existing Site Conditions*

A. *Subsurface and Physical Conditions; Hazardous Environmental Conditions*

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1. The Supplementary Conditions identify the following regarding existing conditions at or adjacent to the Site:
    a. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data.
    b. Those drawings known to Owner 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.
    c. Reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site.
    d. Technical Data contained in such reports and drawings.
2. Owner will make copies of reports and drawings referenced above available to any Bidder on request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Conditions, has been identified and established in the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.
3. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.

B. *Underground Facilities:* Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05 of the General Conditions, and not in the drawings referred to in Paragraph 5.02.A of these Instructions to Bidders. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

5.03 *Other Site-related Documents*

A. In addition to the documents regarding existing Site conditions referred to in Paragraph 5.02.A, the following other documents relating to conditions at or adjacent to the Site are known to Owner and made available to Bidders for reference:
    1. Cell B – Phase I Construction and Cell 5 – Zone A Capping, June 2007
    2. Leachate Transfer System Construction, May 2009

    Owner will make copies of these other Site-related documents available to any Bidder on request.

B. Owner has not verified the contents of these other Site-related documents, and Bidder may not rely on the accuracy of any data or information in such documents. Bidder is responsible for any interpretation or conclusion Bidder draws from the other Site-related documents.

C. The other Site-related documents are not part of the Contract Documents.

D. Bidders are encouraged to review the other Site-related documents, but Bidders will not be held accountable for any data or information in such documents. The requirement to review

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and take responsibility for documentary Site information is limited to information in (1) the Contract Documents and (2) the Technical Data.

E. No other Site-related documents are available.

5.04 *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. A Site visit is scheduled following the pre-bid conference. Maps to the Site will be available at the pre-Bid conference.

C. A Site visit is scheduled immediately following the pre-bid meeting on January 13, 2026, at 10:00 am local time. Maps to the Site will be made available upon request.

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

E. All access to the Site other than during a regularly scheduled Site visit must be coordinated through the following Owner or Engineer contact for visiting the Site: Connie Gerrie moalandfill@frontier.com or Adam Segerlind, P.E. aesegerlind@goslingczubak.com Bidder must conduct the required Site visit during normal working hours.

F. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.

G. 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.

H. 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.

I. 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.

5.05 *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.

5.06 *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

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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 Bidder shall submit all questions about the meaning or intent of the Bidding Documents to Engineer in writing. Contact information and submittal procedures for such questions are as follows:

A. Adam Segerlind, P.E. - aesegerlind@goslingczubak.com

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 (5%) 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.

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

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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 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.

8.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within 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 (a) substantially completed and (b) ready for final payment, and (c) Milestones (if any) are to be achieved, 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 allows the Contractor to request that Engineer authorize the use of a substitute or "or-equal" item of material or equipment, application for such acceptance may not be made to and will not be considered by Engineer until after the Effective Date of the Contract.

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

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

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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 The Bid Form is included with the Bidding Documents.

A. All blanks on the Bid Form must be completed in ink and the Bid Form signed in ink. Erasures or alterations must be initialed in ink by the person signing the Bid Form. A Bid price must be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.

B. If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words "No Bid" or "Not Applicable."

12.02 If Bidder has obtained the Bidding Documents as Electronic Documents, then Bidder shall prepare its Bid on a paper copy of the Bid Form printed from the Electronic Documents version of the Bidding Documents. The printed copy of the Bid Form must be clearly legible, printed on 8½ inch by 11-inch paper and as closely identical in appearance to the Electronic Document version of the Bid Form as may be practical. The Owner reserves the right to accept Bid Forms which nominally vary in appearance from the original paper version of the Bid Form, providing that all required information and submittals are included with the Bid.

12.03 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.

12.04 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.

12.05 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.

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

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12.07 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.

12.08 All names must be printed in ink below the signatures.

12.09 The Bid must contain an acknowledgment of receipt of all Addenda, the numbers of which must be filled in on the Bid Form.

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

12.11 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.

12.12 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.

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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 one separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with the Bid security and the other documents required to be submitted under the terms of Article 2 of the Bid Form.

14.02 A Bid must be received no later than the date and time prescribed and at the place indicated in the Advertisement or invitation to bid and must be enclosed in a plainly marked package with the Project title, and, if applicable, the designated portion of the Project for which the Bid is submitted, the name and address of Bidder, and must be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid must be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED." A mailed Bid must be addressed to:

MOA Landfill

Attn: Connie Gerrie

6751 Landfill Road

P.O. Box 13

Atlanta, MI 49709

14.03 Electronic submissions may be submitted instead of a hard copy submittal. Electronic submissions must be submitted as a PDF formatted document simultaneously to both the Owner and Engineer. In such case that both a hard copy and electronic submission is received from a bidder then the hard copy shall take precedence unless specifically withdrawn prior to bid opening in accordance with Article 15. The contact information for electronic submittal is as follows:

A. Owner: Connie Gerrie moalandfill@frontier.com

B. Engineer: Adam Segerlind, P.E. aesegerlind@goslingczubak.com

14.04 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened. Neither Owner nor Engineer is responsible for bids not received due to delivery errors.

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

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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.

B. In the comparison of Bids, alternates will be applied in the same order of priority as listed in the Bid Form. To determine the Bid prices for purposes of comparison, Owner will announce to all bidders a "Base Bid plus alternates" budget after receiving all Bids, but prior to opening them. For comparison purposes alternates will be accepted, following the order of priority

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established in the Bid Form, until doing so would cause the budget to be exceeded. After determination of the Successful Bidder based on this comparative process and on the responsiveness, responsibility, and other factors set forth in these Instructions, the award may be made to said Successful Bidder on its base Bid and any combination of its additive alternate Bids for which Owner determines funds will be available at the time of award.

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

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.

ARTICLE 21—SALES AND USE TAXES

21.01 Owner is exempt from Michigan state sales and use taxes on materials and equipment to be incorporated in the Work. (Exemption No. [number]). Said taxes must not be included in the Bid. Refer to Paragraph SC-7.10 of the Supplementary Conditions for additional information.

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BID FORM FOR CONSTRUCTION CONTRACT

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

ARTICLE 1—OWNER AND BIDDER

1.01 This Bid is submitted to:

Montmorency-Oscoda-Alpena Solid Waste Management Authority

6751 Landfill Road; PO Box 13

Atlanta, Michigan 49709

Attention: Connie Gerrie, Administrator

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—ATTACHMENTS TO THIS BID

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

A. Required Bid security;

B. List of Proposed Subcontractors;

C. List of Proposed Suppliers;

D. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such authority within the time for acceptance of Bids;

E. Contractor's license number as evidence of Bidder's State Contractor's License or a covenant by Bidder to obtain said license within the time for acceptance of Bids;

F. Required Bidder Qualification Statement with supporting data.

ARTICLE 3—BASIS OF BID—LUMP SUM BID AND UNIT PRICES

3.01 *Lump Sum Bids*

A. Bidder will complete the Work in accordance with the Contract Documents for the following lump sum (stipulated) price(s), together with any Unit Prices indicated in Paragraph 3.02:

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Bidder's Name:				
Item	Description	Estimated Quantity	Unit	Extension
	General			
1	Project Mobilization & Administration	1	LS	
	Earth Work			
2	Cell C-1 Grading	1	LS	
3	Perimeter Grading	1	LS	
4	Expose Existing Liner System	1	LS	
	Liner Construction			
5	Geosynthetic Anchor Trench Excavation and Backfill	1	LS	
6	60-mil textured HDPE Geomembrane	1	LS	
7	Geosynthetic Clay Liner (GCL)	1	LS	
8	Geocomposite Drainage Layer	1	LS	
9	Drainage Sand	1	LS	
	Leachate Collection System			
10	Primary & Secondary Piping	1	LS	
11	Cell C Building & Piping	1	LS	
12	Electrical & Controls	1	LS	

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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—BIDDER'S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

5.01 *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 that Bidder may agree to in writing upon request of Owner.

5.02 *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.

5.03 *Receipt of Addenda*

A. Bidder hereby acknowledges receipt of the following Addenda:

Addendum Number	Addendum Date

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.

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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 8.02.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.

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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.

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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) _____

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BID BOND (PENAL SUM FORM)

Bidder Name: Address *(principal place of business)*:	Surety Name: Address *(principal place of business)*:
Owner Name: Montmorency-Oscoda-Alpena Solid Waste Management Authority Address *(principal place of business)*: 6751 Landfill Road, P.O. Box 13 Atlanta, Michigan 49709	Bid Project *(name and location)*: Construction of Landfill Cell C – Phase I 6751 Landfill Road Atlanta, Michigan 49709 Bid Due Date:
Bond Penal Sum: Date of Bond:	
Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth in this Bid Bond, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.	
Bidder _____ *(Full formal name of Bidder)* By: _____ *(Signature)* Name: _____ *(Printed or typed)* Title: _____ Attest: _____ *(Signature)* Name: _____ *(Printed or typed)* Title:	Surety _____ *(Full formal name of Surety) (corporate seal)* By: _____ *(Signature) (Attach Power of Attorney)* Name: _____ *(Printed or typed)* Title: _____ Attest: _____ *(Signature)* Name: _____ *(Printed or typed)* Title:
Notes: (1) Note: Addresses are to be used for giving any required notice. (2) Provide execution by any additional parties, such as joint venturers, if necessary.	

EJCDC® C-430, Bid Bond (Penal Sum Form).
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1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond will be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder occurs upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation will be null and void if:
   3.1. Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
   3.2. All Bids are rejected by Owner, or
   3.3. Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions does not in the aggregate exceed 120 days from the Bid due date without Surety's written consent.
6. No suit or action will be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety, and in no case later than one year after the Bid due date.
7. Any suit or action under this Bond will be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder must be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Postal Service registered or certified mail, return receipt requested, postage pre-paid, and will be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond will be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute governs and the remainder of this Bond that is not in conflict therewith continues in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

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ARTICLE 1—GENERAL INFORMATION

1.01 Provide contact information for the Business:

Legal Name of Business:			
Corporate Office			
Name:		Phone number:	
Title:		Email address:	
Business address of corporate office:			
Local Office			
Name:		Phone number:	
Title:		Email address:	
Business address of local office:			

1.02 Provide information on the Business's organizational structure:

Form of Business:	☐ Sole Proprietorship ☐ Partnership ☐ Corporation		
☐ Limited Liability Company ☐ Joint Venture comprised of the following companies:			
	1.		
	2.		
	3.		
Provide a separate Qualification Statement for each Joint Venturer.			
Date Business was formed:		State in which Business was formed:	
Is this Business authorized to operate in the Project location?	☐ Yes ☐ No ☐ Pending		

1.03 Identify all businesses that own Business in whole or in part (25% or greater), or that are wholly or partly (25% or greater) owned by Business:

Name of business:		Affiliation:	
Address:			
Name of business:		Affiliation:	
Address:			
Name of business:		Affiliation:	
Address:			

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1.04 Provide information regarding the Business's officers, partners, and limits of authority.

Name:		Title:	
Authorized to sign contracts: ☐ Yes ☐ No		Limit of Authority:	$
Name:		Title:	
Authorized to sign contracts: ☐ Yes ☐ No		Limit of Authority:	$
Name:		Title:	
Authorized to sign contracts: ☐ Yes ☐ No		Limit of Authority:	$
Name:		Title:	

ARTICLE 2—LICENSING

2.01 Provide information regarding licensure for Business:

Name of License:			
Licensing Agency:			
License No:		Expiration Date:	
Name of License:			
Licensing Agency:			
License No:		Expiration Date:	

ARTICLE 3—DIVERSE BUSINESS CERTIFICATIONS

3.01 ~~Provide information regarding Business's Diverse Business Certification, if any. Provide evidence of current certification.~~ NOT REQUIRED

~~Certification~~	~~Certifying Agency~~	~~Certification Date~~
~~☐ Disadvantaged Business Enterprise~~		
~~☐ Minority Business Enterprise~~		
~~☐ Woman-Owned Business Enterprise~~		
~~☐ Small Business Enterprise~~		
~~☐ Disabled Business Enterprise~~		
~~☐ Veteran-Owned Business Enterprise~~		
~~☐ Service-Disabled Veteran-Owned Business~~		
~~☐ HUBZone Business (Historically Underutilized) Business~~		
~~☐ Other~~		
~~☐ None~~		

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ARTICLE 4—SAFETY

4.01 Provide information regarding Business's safety organization and safety performance.

Name of Business's Safety Officer:		
Safety Certifications		
Certification Name	Issuing Agency	Expiration

4.02 Provide Worker's Compensation Insurance Experience Modification Rate (EMR), Total Recordable Frequency Rate (TRFR) for incidents, and Total Number of Recorded Manhours (MH) for the last 3 years and the EMR, TRFR, and MH history for the last 3 years of any proposed Subcontractor(s) that will provide Work valued at 10% or more of the Contract Price. Provide documentation of the EMR history for Business and Subcontractor(s).

Year									
Company	EMR	TRFR	MH	EMR	TRFR	MH	EMR	TRFR	MH

ARTICLE 5—FINANCIAL

5.01 Provide information regarding the Business's financial stability. Provide the most recent audited financial statement, and if such audited financial statement is not current, also provide the most current financial statement.

Financial Institution:		
Business address:		
Date of Business's most recent financial statement:		☐ Attached
Date of Business's most recent audited financial statement:		☐ Attached
Financial indicators from the most recent financial statement		
Contractor's Current Ratio (Current Assets ÷ Current Liabilities)		
Contractor's Quick Ratio ((Cash and Cash Equivalents + Accounts Receivable + Short Term Investments) ÷ Current Liabilities)		

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ARTICLE 6—SURETY INFORMATION

6.01 Provide information regarding the surety company that will issue required bonds on behalf of the Business, including but not limited to performance and payment bonds.

Surety Name:			
Surety is a corporation organized and existing under the laws of the state of:			
Is surety authorized to provide surety bonds in the Project location?	☐ Yes ☐ No		
Is surety listed in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" published in Department Circular 570 (as amended) by the Bureau of the Fiscal Service, U.S. Department of the Treasury? ☐ Yes ☐ No			
Mailing Address (principal place of business):			
Physical Address (principal place of business):			
Phone (main):		Phone (claims):	

ARTICLE 7—INSURANCE

7.01 Provide information regarding Business's insurance company(s), including but not limited to its Commercial General Liability carrier. Provide information for each provider.

Name of insurance provider, and type of policy (CLE, auto, etc.):			
Insurance Provider		Type of Policy (Coverage Provided)	
Are providers licensed or authorized to issue policies in the Project location?		☐ Yes ☐ No	
Does provider have an A.M. Best Rating of A-VII or better?		☐ Yes ☐ No	
Mailing Address (principal place of business):			
Physical Address (principal place of business):			
Phone (main):		Phone (claims):	

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ARTICLE 8—CONSTRUCTION EXPERIENCE

8.01 Provide information that will identify the overall size and capacity of the Business.

Average number of current full-time employees:	
Estimate of revenue for the current year:	
Estimate of revenue for the previous year:	

8.02 Provide information regarding the Business's previous contracting experience.

Years of experience with projects like the proposed project:				
As a general contractor:		As a joint venturer:		
Has Business, or a predecessor in interest, or an affiliate identified in Paragraph 1.03:				
Been disqualified as a bidder by any local, state, or federal agency within the last 5 years? ☐ Yes ☐ No				
Been barred from contracting by any local, state, or federal agency within the last 5 years? ☐ Yes ☐ No				
Been released from a bid in the past 5 years? ☐ Yes ☐ No				
Defaulted on a project or failed to complete any contract awarded to it? ☐ Yes ☐ No				
Refused to construct or refused to provide materials defined in the contract documents or in a change order? ☐ Yes ☐ No				
Been a party to any currently pending litigation or arbitration? ☐ Yes ☐ No				
Provide full details in a separate attachment if the response to any of these questions is Yes.				

8.03 List all projects currently under contract in Schedule A and provide indicated information.

8.04 List a minimum of three and a maximum of six projects completed in the last 5 years in Schedule B and provide indicated information to demonstrate the Business's experience with projects similar in type and cost of construction.

8.05 In Schedule C, provide information on key individuals whom Business intends to assign to the Project. Provide resumes for those individuals included in Schedule C. Key individuals include the Project Manager, Project Superintendent, Quality Manager, and Safety Manager. Resumes may be provided for Business's key leaders as well.

ARTICLE 9—REQUIRED ATTACHMENTS

9.01 Provide the following information with the Statement of Qualifications:

A. If Business is a Joint Venture, separate Qualifications Statements for each Joint Venturer, as required in Paragraph 1.02.

B. ~~Diverse Business Certifications if required by Paragraph 3.01~~. NOT REQUIRED

C. Certification of Business's safety performance if required by Paragraph 4.02.

D. Financial statements as required by Paragraph 5.01.

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E. Attachments providing additional information as required by Paragraph 8.02.

F. Schedule A (Current Projects) as required by Paragraph 8.03.

G. Schedule B (Previous Experience with Similar Projects) as required by Paragraph 8.04.

H. Schedule C (Key Individuals) and resumes for the key individuals listed, as required by Paragraph 8.05.

I. Additional items as pertinent.

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This Statement of Qualifications is offered by:

Business: _____
(typed or printed name of organization)

By: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(date signed)

(If Business 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)

Address for giving notices:

_____

_____

_____

Designated Representative:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

_____

_____

_____

Phone: _____

Email: _____

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MOA
Cell C Phase I
Schedule A—Current Projects

Name of Organization				
Project Owner		Project Name		
General Description of Project				
Project Cost		Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager
Name				

Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner		Project Name		
General Description of Project				
Project Cost		Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager
Name				

Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner		Project Name		
General Description of Project				
Project Cost		Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager
Name				

Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					

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Construction Manager					

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MOA
Cell C Phase I
Schedule B—Previous Experience with Similar Projects

Name of Organization				
Project Owner		Project Name		
General Description of Project				
Project Cost		Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager
Name				

Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner		Project Name		
General Description of Project				
Project Cost		Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager
Name				

Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner		Project Name		
General Description of Project				
Project Cost		Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager
Name				

Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					

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Construction Manager					

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MOA
Cell C Phase I
Schedule B—Previous Experience with Similar Projects

Name of Organization				
Project Owner		Project Name		
General Description of Project				
Project Cost		Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager
Name				

Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner		Project Name		
General Description of Project				
Project Cost		Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager
Name				

Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner		Project Name		
General Description of Project				
Project Cost		Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager
Name				

Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					

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Construction Manager					

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MOA
Cell C Phase I
Schedule C—Key Individuals

Project Manager			
Name of individual			
Years of experience as project manager			
Years of experience with this organization			
Number of similar projects as project manager			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	
Project Superintendent			
Name of individual			
Years of experience as project superintendent			
Years of experience with this organization			
Number of similar projects as project superintendent			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	

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Safety Manager			
Name of individual			
Years of experience as project manager			
Years of experience with this organization			
Number of similar projects as project manager			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	

Quality Control Manager			
Name of individual			
Years of experience as project superintendent			
Years of experience with this organization			
Number of similar projects as project superintendent			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	

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NOTICE OF AWARD

Date of Issuance:		
Owner:	Montmorency-Oscoda-Alpena Solid Waste Management Authority	Owner's Project No.:
Engineer:	Gosling Czubak Engineering Sciences, Inc	Engineer's Project No.:
Project:	Cell C – Phase I	
Contract Name:	Cell C – Phase I	
Bidder:		
Bidder's Address:		

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:

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

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): [Describe other conditions that require Successful Bidder's compliance]

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: Montmorency-Oscoda-Alpena Solid Waste Management Authority

By *(signature)*: _____

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Name *(printed)*: _____

Title: Chairman

Copy: Engineer

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AGREEMENT BETWEEN OWNER AND CONTRACTOR FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)

This Agreement is by and between Montmorency-Oscoda-Alpena Solid Waste Management Authority ("Owner") and [name of contracting entity] ("Contractor").

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

Owner and Contractor hereby agree as follows:

ARTICLE 1—WORK

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows: all labor, materials, equipment, and testing to construct the Part 115 type II landfill Cell C – Phase I at the Montmorency-Oscoda-Alpena Landfill in accordance with the specifications.

ARTICLE 2—THE PROJECT

2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows: Construction of Landfill C Phase I

ARTICLE 3—ENGINEER

3.01 The Owner has retained Gosling Czubak Engineering Sciences, 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 part of the Project that pertains to the Work has been designed by Engineer.

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 July 31, 2026, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before September 15, 2026.

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.

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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 $1,000 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 $500 for each day that expires after such time until the Work is completed and ready for final payment.

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

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.

C. The special damages imposed in this paragraph are supplemental to any liquidated damages for delayed completion established in this Agreement.

ARTICLE 5—CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents, the amounts that follow, subject to adjustment under the Contract:

A. For all Work other than Unit Price Work, a lump sum of $[number].

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

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

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Unit Price Work					
Item No.	Description	Unit	Estimated Quantity	Unit Price	Extended Price
				$	$
				$	$
				$	$
				$	$
				$	$
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.

C. Total of Lump Sum Amount and Unit Price Work (subject to final Unit Price adjustment) $[number].

D. For all Work, at the prices stated in Contractor's Bid, attached hereto as an exhibit.

ARTICLE 6—PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

A. Contractor shall submit Applications for Payment in accordance with Article 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 fourth Friday 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 the value of the Work completed (with the balance being retainage).

1) If 50 percent or more of the Work has been 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

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remain satisfactory to Owner and Engineer, there will be no additional retainage; and

b. 90 percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).

B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 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 200 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.

6.05 *Interest*

A. All amounts not paid when due will bear interest at the maximum allowable legal rate per annum.

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 attached sheet index.
7. Addenda (numbers [number] to [number], inclusive).
8. Exhibits to this Agreement (enumerated as follows):
    a. [list exhibits]
9. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:

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a. Notice to Proceed.

b. Work Change Directives.

c. Change Orders.

d. Field Orders.

e. Warranty Bond, if any.

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.

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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 *Standard General Conditions*

A. Owner stipulates that if the General Conditions that are made a part of this Contract are EJCDC® C-700, Standard General Conditions for the Construction Contract (2018), 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.

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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:
Montmorency-Oscoda-Alpena Solid Waste Management Authority	
(typed or printed name of organization)	*(typed or printed name of organization)*
By:	By:
(individual's signature)	*(individual's signature)*
Date:	Date:
(date signed)	*(date signed)*
Name:	Name:
(typed or printed)	*(typed or printed)*
Title: Chairman	Title:
(typed or printed)	*(typed or printed)*
	(If Contractor is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)
Attest:	Attest:
(individual's signature)	*(individual's signature)*
Title:	Title:
(typed or printed)	*(typed or printed)*
Address for giving notices:	Address for giving notices:
6751 Landfill Road	
P.O. Box 13	
Atlanta, MI 49709	
Designated Representative:	Designated Representative:
Name: Connie Gerrie	Name:
(typed or printed)	*(typed or printed)*
Title: Administrator	Title:
(typed or printed)	*(typed or printed)*
Address:	Address:
6751 Landfill Road	
P.O. Box 13	
Atlanta, MI 49709	
Phone: (989) 785-6500	Phone:
Email: moalandfill@frontier.com	Email:
(If Owner is a corporation, attach evidence of authority to sign. If Owner is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this Agreement.)	License No.:
	(where applicable)
	State:

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NOTICE TO PROCEED

Owner:	Montmorency-Oscoda-Alpena Solid Waste Management Authority	Owner's Project No.:	
Engineer:	Gosling Czubak Engineering Sciences, Inc	Engineer's Project No.:	
Contractor:		Contractor's Project No.:	
Project:	Cell C Phase I Construction		
Contract Name:	Cell C Phase I Construction		
Effective Date of Contract:			

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on [date Contract Times are to start] 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:

The date by which Substantial Completion must be achieved is July 31, 2026, and the date by which readiness for final payment must be achieved is September 15, 2026.

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

[Note any access limitations, security procedures, or other restrictions]

Owner:	Montmorency-Oscoda-Alpena Solid Waste Management Authority
By *(signature)*:	
Name *(printed)*:	
Title:	Chairman
Date Issued:	

Copy: Engineer

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PERFORMANCE BOND

Contractor	Surety
Name: Address *(principal place of business)*:	Name: Address *(principal place of business)*:
Owner	**Contract**
Name: Montmorency-Oscoda-Alpena Solid Waste Management Authority Mailing address *(principal place of business)*: 6751 Landfill Road, PO Box 13 Atlanta, MI 49709	Description *(name and location)*: Cell C Phase I Construction 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 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: _____ *(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.	

EJCDC® C-610, Performance Bond.
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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:

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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

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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.

16. Modifications to this Bond are as follows: None

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PAYMENT BOND

Contractor	Surety
Name:	Name:
Address *(principal place of business)*:	Address *(principal place of business)*:
Owner	**Contract**
Name: Montmorency-Oscoda-Alpena Solid Waste Management Authority	Description *(name and location)*: Cell C Phase I Construction
Mailing address *(principal place of business)*: 6751 Landfill Road, PO Box 13 Atlanta, MI 49709	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: _____	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.

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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.

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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;

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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.

18. Modifications to this Bond are as follows: [Describe modification or enter "None"]

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This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

APPLICATION FOR PAYMENT

Prepared By

EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

ACEC
AMERICAN COUNCIL OF ENGINEERING COMPANIES

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

NSPE
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

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GUIDELINES FOR THE INTENDED USE OF EJCDC C-620, APPLICATION FOR PAYMENT

1.0 PURPOSE AND INTENDED USE OF THE DOCUMENT

The Application for Payment is used to facilitate periodic progress payments to the Contractor for Work completed and for stored materials and equipment (referred to in this document as "Stored Materials").

For additional information regarding the Application for Payment, see EJCDC® C–700, Standard General Conditions of the Construction Contract (2018), Paragraph 15.01, and EJCDC® C–001, Commentary on the 2018 EJCDC Construction Documents (2018).

2.0 APPLICATION FOR PAYMENT OVERVIEW

This document was prepared in Microsoft Excel due to the number of calculations involved in the preparation of the Application for Payment. The application consists of a Summary worksheet, and 3 supporting worksheets: Lump Sum worksheet, Unit Price worksheet, and Stored Materials worksheet.

2.1 *Summary Worksheet* — calculates the amount to be paid to the Contractor at the end of each Application for Payment period. This calculation imports numbers from the supporting worksheets to determine the value of the Work completed and Stored Materials, calculate retainage, and deduct amounts previously paid to determine the amount the Contractor should be paid for the current application period. Application periods are typically one month; however these periods may be extended when Contractor's efforts do not result in the billable completion of Work or storage of materials and equipment during the payment period.

2.2 *Lump Sum Worksheet* — calculates the total value for completed Work for which compensation is paid on a Lump Sum basis. The schedule of values included in this worksheet reflects a breakdown of lump sum Work items to which Contractor and Engineer have agreed, pursuant to Article 2 of the General Conditions. Costs for Stored Materials associated with lump sum items are included on this worksheet to calculate the total value for completed lump sum Work and associated Stored Materials. This total is exported to the Summary worksheet. Separate totals for Work Completed and for materials currently stored are also exported to the Summary worksheet for use in calculating the amount of retainage to be held for each.

2.3 *Unit Price Worksheet* — calculates the total value for completed Work for which compensation is paid on a Unit Price basis. The schedule of values included in this spreadsheet is typically a tabulation of Unit Price items from the Agreement. Costs for Stored Materials associated with unit price items are included in this worksheet to calculate the total value for completed Unit Price Work and associated Stored Materials. This total is exported to the Summary worksheet. Separate totals for Work Completed and for Materials Currently Stored are also exported to the Summary worksheet for use in calculating the amount of retainage to be held for each.

2.4 *Stored Materials Worksheet* — calculates the total value for materials and equipment that have been purchased and are being stored until they are incorporated into the Work. This worksheet adds materials and equipment to the worksheet as they are brought to the site and stored; such Stored Materials are then deducted from the Stored Materials worksheet total as they are incorporated into the Work, providing a running net value for the materials and equipment remaining in storage. The values of Stored Materials must be manually added to the Lump Sum or Unit Price line items. These do not automatically update when changes are made. The amount of materials remaining in storage is eligible for payment but must be tracked separately from Work completed since different retainage rates may apply to Work completed and Stored Materials.

3.0 Instructions for filling out the Payment Application form

3.1 Project-specific information is to be entered in the top portion (header) of the Summary worksheet. This same information will automatically be copied to the other worksheets to complete the headers on all other worksheets.

3.2 Outside of the header, data can be entered in non-shaded cells when the sheet is protected. Cells shaded light blue contain equations that will automatically transfer data from other cells or make calculations to complete the worksheet. Altering any of these cells can result in errors in the Application for Payment. It is recommended that the worksheets be protected at all times unless alterations are deliberately being made to the Application for Payment form other than to enter data. See Paragraph 4.0 below for information on Protection of Worksheets.

3.3 Enter information regarding each item in the Lump Sum and/or Unit Price worksheets. For Lump Sum projects, each item should represent an item in the schedule of values prepared by the Contractor and approved by the Engineer/Owner, breaking down the Lump Sum amount into measurable components. For Unit Price contracts, use numbers from the Agreement as the schedule of values. Specific information on the data to be entered into each column may be seen by clicking on the header description for that column. Similar comments may be seen for cells in the "Totals" row that indicates how the number is calculated and where this number is exported to another part of the spreadsheet. See the Commentary for additional information.

3.4 The equations in the Summary worksheet use numbers imported from both the Lump Sum and Unit Price worksheets. Projects will typically either use the Lump Sum or the Unit Price worksheet, but some projects may use both. If one of the worksheets is not used, it should be hidden and not deleted. If it is deleted, Users will need to correct the equations in the Summary worksheet by unprotecting the worksheet and editing the equations. To hide a worksheet, right click on the worksheet tab at the bottom of the worksheet and select "Hide." To unhide a worksheet, right click on any worksheet tab and select "Unhide," and then select the worksheet to unhide and click "Okay." This same process may be used to hide these Guidelines for Use.

4.0 Protection of Worksheets

4.1 The cells in this Workbook that create the forms or contain equations have been coded to "lock" the cells that should not be altered. It is recommended that the Workbook be Protected (cells locked) at all times unless it is necessary to add or delete rows. Directions for adding and deleting rows are provided in the next section. Passwords can be used to lock the Protect / Unprotect settings on spreadsheets, however the worksheets in this workbook do not require a password.

4.2 To unprotect a worksheet, click on the "Review" menu tab at the top of Excel, then click "Unprotect Sheet." To protect a worksheet, click on the "Review" menu tab at the top of Excel, then click "Protect Sheet." This will open a dialog box in which the User is allowed to select protection options. It is recommended that only the top two checkboxes for "Select Locked Cells" and "Select Unlocked Cells" be checked. This will reset the protection for the Worksheet.

5.0 Adding and Deleting Rows

5.1 A limited number of blank rows are provided in the Lump Sum, Unit Price, and Stored Material worksheets. Additional rows may be added to these worksheets by the User. The first step in this process is to unprotect the worksheet as previously discussed. After the sheet is unprotected, move with caution to prevent inadvertently deleting any cells that contain equations. To insert a row, right click in the row heading at the left of the spreadsheet and select "Insert." A new row will be inserted at the location where the cursor was placed in the row heading. If more than one new row is desired, left click and drag the cursor to include the desired number of rows, right click in the selected row headings and then select "Insert." It is important that the line immediately above the "Totals" row not be included in the rows selected. Doing so will require that equations in the "Totals" row be adjusted. When rows are inserted, Excel automatically adjusts the equations to include the new rows, unless the row directly above the "Totals" row is also selected.

5.2 After new rows are inserted, it is important to copy a line from one of the original rows so correct formatting and equations are copied into each new row. To do this, select the row to be copied by clicking the cell in Column A and dragging the cursor to the last column in the table. Then select "Copy" from the menu or type CTRL+C to copy the cells. Excel will show that this row has been copied by showing a moving dashed line around the cells that are to be copied. Then select the new rows into which the information is to be copied as before and select Paste from the menu or type CTRL+V.

5.3 To delete an unused row, right click in the row heading on the left of the spreadsheet for the row to be deleted and select "Delete." The selected row will be deleted. If more than one row is to be deleted, left click and drag the cursor to the desired number of rows to be deleted and then right click to open the menu and select "Delete." Unlike the admonition on adding new rows, it is okay to delete the row just above the "Totals" row.

5.4 After rows have been added or deleted, it is important reset the worksheet protection.

6.0 Saving Files

This file is provided as a Microsoft ® Excel Open XML workbook template (.xltx) to prevent this file from being inadvertently changed. When an application for payment is created for a specific project it should be saved as an Excel workbook (.xlxs) file. To do this, select Save As (F12), type in a new file name and select Excel Workbook (.xlxs) from the drop down Save As Type menu.

7.0 License Agreement

This document is subject to the terms and conditions of the License Agreement, 2018 EJCDC® Construction Series Documents. A copy of the License Agreement was furnished at the time of purchase of this document, and is available for review at www.ejcdc.org and the websites of EJCDC's sponsoring organizations.

Contractor's Application for Payment

Owner:	MOA Solid Waste Management Auth.	Owner's Project No.:	
Engineer:	Gosling Czubak Engineering Sciences, Inc.	Engineer's Project No.:	
Contractor:		Contractor's Project No.:	
Project:	Cell C Phase I Construction		
Contract:	Cell C Phase I Construction		
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)					$ -

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:	

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Progress Estimate - Lump Sum Work

Contractor's Application for Payment

Owner:	MOA Solid Waste Management Auth.	Owner's Project No.:	
Engineer:	Gosling Czubak Engineering Sciences, Inc.	Engineer's Project No.:	
Contractor:		Contractor's Project No.:	
Project:	Cell C Phase I Construction		
Contract:	Cell C Phase I Construction		

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					
1	Project Administration & Mobilization		-			-		-
2	Cell Excavation & Grading					-		-
3	Perimeter Grading					-		-
4	Expose Existing Liner System					-		-
5	Liner System					-		-
6	Drainage Material					-		-
7	Leachate Piping					-		-
8	Berm & Rain flap					-		-
9	Leachate Building & Pumps					-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
	Original Contract Totals	$ -	$ -	$ -	$ -	$ -		$ -

EJCDC C-620 Contractor's Application for Payment
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Progress Estimate - Lump Sum Work

Contractor's Application for Payment

Owner:	MOA Solid Waste Management Auth.	Owner's Project No.:	
Engineer:	Gosling Czubak Engineering Sciences, Inc.	Engineer's Project No.:	
Contractor:		Contractor's Project No.:	
Project:	Cell C Phase I Construction		
Contract:	Cell C Phase I Construction		

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	$ -	$ -	$ -	$ -	$ -		$ -

EJCDC C-620 Contractor's Application for Payment

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Progress Estimate - Unit Price Work

Contractor's Application for Payment

Owner: MOA Solid Waste Management Auth.
Engineer: Gosling Czubak Engineering Sciences, Inc.
Contractor:
Project: Cell C Phase I Construction
Contract: Cell C Phase I Construction

Owner's Project No.:
Engineer's Project No.:
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	$ -		$ -	$ -	$ -		$ -

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Progress Estimate - Unit Price Work

Contractor's Application for Payment

Owner: MOA Solid Waste Management Auth.
Engineer: Gosling Czubak Engineering Sciences, Inc.
Contractor:
Project: Cell C Phase I Construction
Contract: Cell C Phase I Construction

Owner's Project No.:
Engineer's Project No.:
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	$ -		$ -	$ -	$ -		$ -

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Owner: MOA Solid Waste Management Auth.
Engineer: Gosling Czubak Engineering Sciences, Inc.
Contractor:
Project: Cell C Phase I Construction
Contract: Cell C Phase I Construction

Owner's Project No.:
Engineer's Project No.:
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	$ -	$ -	$ -	$ -	$ -	$ -	$ -

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CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner:	Montmorency-Oscoda-Alpena Solid Waste Management Authority	Owner's Project No.:
Engineer:	Gosling Czubak Engineering Sciences, Inc.	Engineer's Project No.:
Contractor:		Contractor's Project No.:
Project:	Cell C Phase I Construction	
Contract Name:	Cell C Phase I Construction	

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

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

Date of Substantial Completion:

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

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

Engineer

By *(signature)*: _____

Name *(printed)*: _____

Title: _____

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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

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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,

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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.

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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

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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.

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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.

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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.

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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.

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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.

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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

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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.

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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,

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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.

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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)

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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.

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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.

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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.

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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.

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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.

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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

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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

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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.

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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.

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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;

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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.

6.04 *Builder's Risk and Other Property Insurance*

A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the Work's full insurable replacement cost (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). The specific requirements applicable to the builder's risk insurance are set forth in the Supplementary Conditions.

B. *Property Insurance for Facilities of Owner Where Work Will Occur*: Owner is responsible for obtaining and maintaining property insurance covering each existing structure, building, or facility in which any part of the Work will occur, or to which any part of the Work will attach or be adjoined. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, providing coverage consistent with that required for the builder's risk insurance, and will be maintained until the Work is complete, as set forth in Paragraph 15.06.D.

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C. *Property Insurance for Substantially Complete Facilities*: Promptly after Substantial Completion, and before actual occupancy or use of the substantially completed Work, Owner will obtain property insurance for such substantially completed Work, and maintain such property insurance at least until the Work is complete, as set forth in Paragraph 15.06.D. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, and provide coverage consistent with that required for the builder's risk insurance. The builder's risk insurance may terminate upon written confirmation of Owner's procurement of such property insurance.

D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide advance notice of such occupancy or use to the builder's risk insurer, and obtain an endorsement consenting to the continuation of coverage prior to commencing such partial occupancy or use.

E. *Insurance of Other Property; Additional Insurance*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, then the entity or individual owning such property item will be responsible for insuring it. If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.04, it may do so at Contractor's expense.

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

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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.

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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.

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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

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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

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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.

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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.

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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.

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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;

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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.

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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.

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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.

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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.

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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,

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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;

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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,

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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.

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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.

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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

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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.

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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.

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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

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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).

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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.

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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.

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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.

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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

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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

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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.

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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

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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.

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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;

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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.

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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

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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

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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.

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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;

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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

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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

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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.

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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,

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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.

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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,

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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,

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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.

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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.

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SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

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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 1—DEFINITIONS AND TERMINOLOGY

SC 1.01.A.8 Add to the following language at the end of last sentence of paragraph 1.01.A.8: The Change Order form to be used on this Project is EJCDC C-941. Owner approval is required before Change Orders are effective.

SC 1.01.A.50 Add the following language at the end of the last sentence of Paragraph 1.01.A.50:

A Work Change Directive cannot change Contract Price or Contract Times without subsequent Change Order.

SC 1.01.A.51 Add the following definitions to Paragraph 1.01.A:

DEWATERING – Process of controlling groundwater level(s) below the excavation bottom and/or construction grades, and surface water, to permit construction activities to be made "in the dry" (it does not mean drying of fill material).

GEOCOMPOSITE – A synthetic layer used for planar fluid flow composed of a high density polyethylene (HDPE) drainage geonet encapsulated by geotextile.

GEOMEMBRANE – A synthetic liner or barrier used in landfill and surface impoundment projects.

GEOSYNTHETIC CLAY LINER – A geosynthetic clay liner (GCL) is a woven fabric-like material used for the lining of landfills and incorporates a bentonite or other clay, which has a very low hydraulic conductivity.

GEOSYNTHETIC RESEACH INSTITUE – The Geosynthetic Institute (GSI) is a consortium of organizations interested in, and involved with, geosynthetic material such as geotextiles, geomembranes, geogrids, geonets, geocomposites, geosynthetic clay liners, geopipe and geofoam.

GEOTEXTILE – A relatively porous fabric used in civil engineering. Various applications include separation of materials with different pore size openings to limit clogging, reinforcement to support some or all of the load applied to a composite system (such as soil-geotextile) and cushioning to provide protection for a material from damage by a second dissimilar material.

IN-SITU – "As is", or as it exists in place naturally.

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MATERIALS – The term "material" shall include products, equipment, assembly methods, manufacturer, brand, trade name or other description. References to "equal", "approved equal" or similar terms mean that approval of the ENGINEER is required.

MAXIMUM DRY DENSITY – Maximum Dry Density is the maximum dry soil unit weight measured by the Modified Proctor Test Moisture Density Relationship (ASTM D1557) or other acceptable test method, as specified.

MOISTURE CONTENT – Ratio of quantity of water in the soil (by weight) to the weight of the soil solids (dry soil), expressed in percentage; also referred to as water content.

OPTIMUM MOISTURE CONTENT (OMC) – Moisture content corresponding to maximum dry density as determined by the Modified Proctor Test Moisture Density Relationship (ASTM D1557), as specified.

PERMEABILITY – Ability of pore fluid to travel through a soil mass via interconnected voids. "High" permeability indicates relatively rapid flow of pore fluid. Rates of permeability are often reported in centimeters per second. Typically used interchangeably with “hydraulic conductivity.”

PLASTICITY – Ability of soil mass to be remolded without raveling or breaking apart. The plasticity index, numerically equal to the difference between the liquid and plastic limit, is a comparative number, which describes the range of moisture contents over which a soil behavior is plastic.

ARTICLE 2—PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

SC-2.01 Delete Paragraphs 2.01.B. and C. in their entirety and insert the following in their place:

B. *Evidence of Contractor’s Insurance:* When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner copies of the policies (including all endorsements, and identification of applicable self-insured retentions and deductibles) of insurance required to be provided by Contractor in this Contract. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

C. *Evidence of Owner’s Insurance:* After receipt from Contractor of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor copies of the policies of insurance to be provided by Owner in this Contract (if any). Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

2.02 *Copies of Documents*

SC-2.02 Amend the first sentence of Paragraph 2.02.A. to read as follows:

Owner shall furnish to Contractor two (2) printed copies of the Contract Documents (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF).

2.03 *Before Starting Construction*

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SC-2.03 Add to Paragraph 2.03A:

3. The Schedule of Values shall provide sufficient detail such that no one item accounts for more than five percent (5%) of the Contract Price.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.05 *Delays in Contractor's Progress*

SC-4.05 Amend Paragraph 4.05.C by adding the following subparagraphs:

5. *Weather-Related Delays*

a. If "abnormal weather conditions" as set forth in Paragraph 4.05.C.2 of the General Conditions are the basis for a request for an equitable adjustment in the Contract Times, such request must be documented by data substantiating each of the following: 1) that weather conditions were abnormal for the period of time in which the delay occurred, 2) that such weather conditions could not have been reasonably anticipated, and 3) that such weather conditions had an adverse effect on the Work as scheduled.

b. The existence of abnormal weather conditions will be determined on a month-by-month basis in accordance with the following:

1) Every workday on which one or more of the following conditions exist will be considered a "bad weather day":

i) Total precipitation (as rain equivalent) occurring between 7:00 p.m. on the preceding day (regardless of whether such preceding day is a workday) through 7:00 p.m. on the workday in question equals or exceeds 0.10 inches of precipitation (as rain equivalent, based on the snow/rain conversion indicated in the table entitled Foreseeable Bad Weather Days; such table is hereby incorporated in this SC-4.05.C by reference.

ii) Ambient outdoor air temperature at 11:00 a.m. is equal to or less than the following low temperature threshold: 40 degrees Fahrenheit; or, at 3:00 p.m. the ambient outdoor temperature is equal to or greater than the following high temperature threshold: 90 degrees Fahrenheit.

2) Determination of actual bad weather days during performance of the Work will be based on the weather records measured and recorded by National Weather Service weather monitoring station at Gaylord Regional Airport (KGLR).

3) Contractor shall anticipate the number of foreseeable bad weather days per month indicated in Exhibit A to these Supplementary Conditions

4) In each month, every bad weather day exceeding the number of foreseeable bad weather days established Exhibit A – Foreseeable Bad Weather Days will be considered as "abnormal weather conditions." The existence of abnormal weather conditions will not relieve Contractor of the obligation to demonstrate and document that delays caused by abnormal weather are

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specific to the planned work activities or that such activities thus delayed were on Contractor's then-current Progress Schedule's critical path for the Project.

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

5.03 *Subsurface and Physical Conditions*

SC-5.03 Add the following new paragraphs immediately after Paragraph 5.03.D:

E. The following list of reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data, and specifically identifies the Technical Data in the report upon which Contractor may rely:

1. Monitoring Well Information dated June 2012, prepared by Golder Associates, from Appendix B of the Montmorency-Oscoda-Alpena Joint Sanitary Landfill, consisting of 211 pages. The Technical Data contained in such report upon whose accuracy Contractor may rely are those indicated in the definition of Technical Data in the General Conditions.

F. The following list of 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 specifically identifies the Technical Data upon which Contractor may rely:

1. Drawings dated May 1, 2007, of Cell B – Phase I, prepared by GZA GeoEnvironmental, Inc., Grand Rapids, MI., entitled: "2007 Cell B – Phase I Construction", consisting of 9 sheets numbered 01 to 07B, inclusive. The Technical Data contained in such report upon whose accuracy Contractor may rely are those indicated in the definition of Technical Data in the General Conditions.

2. Drawings dated November 17, 2009, of Cell B – Phase II, prepared by GZA GeoEnvironmental, Inc., Grand Rapids, MI., entitled: "Record Drawings: 2009 Cell B – Phase II Construction", consisting of 11 sheets numbered 01 to 07B, inclusive. The Technical Data contained in such report upon whose accuracy Contractor may rely are those indicated in the definition of Technical Data in the General Conditions.

3. Drawings dated May 1, 2009, of the Leachate Transfer System Construction, prepared by GZA GeoEnvironmental, Inc., Grand Rapids, MI., entitled: "As-Built: 2009 Leachate Transfer System Construction", consisting of 9 sheets numbered 01 to 07, inclusive. The Technical Data contained in such report upon whose accuracy Contractor may rely are those indicated in the definition of Technical Data in the General Conditions.

G. Contractor may examine copies of reports and drawings identified in SC-5.03.E and SC-5.03.F that were not included with the Bidding Documents at M-O-A Solid Waste Management Authority office during regular business hours, or may request copies from Engineer.

5.06 *Hazardous Environmental Conditions*

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SC-5.06 Add the following new paragraphs immediately after Paragraph 5.06.A.3:

4. The following table lists the reports known to Owner relating to Hazardous Environmental Conditions at or adjacent to the Site, and the Technical Data (if any) upon which Contractor may rely: [If there are no such reports, so indicate in the table]

Report Title	Date of Report	Technical Data
Second Quarter 2025 Hydrogeological Monitoring Report	July 28, 2025	Groundwater elevation and analytical data; leachate analytical data

5. The following table lists the drawings known to Owner relating to Hazardous Environmental Conditions at or adjacent to the Site, and Technical Data (if any) contained in such Drawings upon which Contractor may rely:

Drawings Title	Date of Drawings	Technical Data
None		

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

SC-6.01 Add the following paragraphs immediately after Paragraph 6.01.A:

1. *Required Performance Bond Form:* The performance bond that Contractor furnishes will be in the form of EJCDC® C-610, Performance Bond (2010, 2013, or 2018 edition).

2. *Required Payment Bond Form:* The payment bond that Contractor furnishes will be in the form of EJCDC® C-615, Payment Bond (2010, 2013, or 2018 edition).

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: [Here list by legal name (not category, role, or classification) other persons or entities to be included as additional insureds. See GC-6.03.C.]

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).

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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
Jones Act (if applicable)	
Bodily injury by accident—each accident	$
Bodily injury by disease—aggregate	$
Employer's Liability	
Each accident	$500,000
Each employee	$
Policy limit	$
Stop-gap Liability Coverage	
For work performed in monopolistic states, stop-gap liability coverage must be endorsed to either the worker's compensation or commercial general liability policy with a minimum limit of:	$

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—Form and Content:* Contractor's commercial liability policy must be written on a 1996 (or later) Insurance Services Organization, Inc. (ISO) commercial general liability form (occurrence form) and include the following coverages and endorsements:

1. Products and completed operations coverage.
    a. Such insurance must be maintained for three years after final payment.
    b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
2. Blanket contractual liability coverage, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
3. Severability of interests and no insured-versus-insured or cross-liability exclusions.
4. Underground, explosion, and collapse coverage.
5. Personal injury coverage.

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6. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together). If Contractor demonstrates to Owner that the specified ISO endorsements are not commercially available, then Contractor may satisfy this requirement by providing equivalent endorsements.

7. For design professional additional insureds, ISO Endorsement CG 20 32 07 04 "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.

H. *Commercial General Liability—Excluded Content:* The commercial general liability insurance policy, including its coverages, endorsements, and incorporated provisions, must not include any of the following:

1. Any modification of the standard definition of "insured contract" (except to delete the railroad protective liability exclusion if Contractor is required to indemnify a railroad or others with respect to Work within 50 feet of railroad property).

2. Any exclusion for water intrusion or water damage.

3. Any provisions resulting in the erosion of insurance limits by defense costs other than those already incorporated in ISO form CG 00 01.

4. Any exclusion of coverage relating to earth subsidence or movement.

5. Any exclusion for the insured's vicarious liability, strict liability, or statutory liability (other than worker's compensation).

6. Any limitation or exclusion based on the nature of Contractor's work.

7. Any professional liability exclusion broader in effect than the most recent edition of ISO form CG 22 79.

I. *Commercial General Liability—Minimum Policy Limits*

Commercial General Liability	Policy limits of not less than:
General Aggregate	$2,000,000
Products—Completed Operations Aggregate	$2,000,000
Personal and Advertising Injury	$1,000,000
Bodily Injury and Property Damage—Each Occurrence	$1,000,000

J. *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 Person	$1,000,000
Each Accident	$1,000,000

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Automobile Liability	Policy limits of not less than:
Property Damage	
Each Accident	$1,000,000
[or]	
Combined Single Limit	
Combined Single Limit (Bodily Injury and Property Damage)	$2,000,000

K. *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	$5,000,000
General Aggregate	$5,000,000

L. *Using Umbrella or Excess Liability Insurance to Meet CGL and Other Policy Limit Requirements:* Contractor may meet the policy limits specified for employer's liability, commercial general liability, and automobile liability through the primary policies alone, or through combinations of the primary insurance policy's policy limits and partial attribution of the policy limits of an umbrella or excess liability policy that is at least as broad in coverage as that of the underlying policy, as specified herein. If such umbrella or excess liability policy was required under this Contract, at a specified minimum policy limit, such umbrella or excess policy must retain a minimum limit of $5,000,000 after accounting for partial attribution of its limits to underlying policies, as allowed above.

M. *Contractor's Pollution Liability Insurance:* Contractor shall purchase and maintain a policy covering third-party injury and property damage, including cleanup costs, as a result of pollution conditions arising from Contractor's operations and completed operations. This insurance must be maintained for no less than three years after final completion.

Contractor's Pollution Liability	Policy limits of not less than:
Each Occurrence/Claim	$1,000,000
General Aggregate	$1,000,000

N. *Contractor's Professional Liability Insurance:* If Contractor will provide or furnish professional services under this *Contract*, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance must cover negligent acts, errors, or omissions in the performance of professional design or related services by the insured or others for whom the insured is legally liable. The insurance must be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. The retroactive date on the policy must pre-date the commencement of furnishing services on the Project.

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Contractor's Professional Liability	Policy limits of not less than:
Each Claim	$
Annual Aggregate	$

O. ~~*Railroad Protective Liability Insurance:* Prior to commencing any Work within 50 feet of railroad-owned and controlled property, Contractor shall (1) endorse its commercial general liability policy with ISO CG 24 17, removing the contractual liability exclusion for work within 50 feet of a railroad, (2) purchase and maintain railroad protective liability insurance meeting the following requirements, (3) furnish a copy of the endorsement to Owner, and (4) submit a copy of the railroad protective policy and other railroad-required documentation to the railroad, and notify Owner of such submittal.~~

~~[Insert additional specific requirements, commonly set by the railroad, here.]~~

~~Railroad Protective Liability Insurance~~	~~Policy limits of not less than:~~
~~Each Claim~~	~~$~~
~~Aggregate~~	~~$~~

P. ~~*Unmanned Aerial Vehicle Liability Insurance:* If Contractor uses unmanned aerial vehicles (UAV—commonly *referred* to as drones) at the Site or in support of any aspect of the Work, Contractor shall obtain UAV liability insurance in the amounts stated; name Owner, Engineer, and all individuals and entities identified in the Supplementary Conditions as additional insureds; and provide a certificate to Owner confirming Contractor's compliance with this requirement. Such insurance will provide coverage for property damage, bodily injury or death, and invasion of privacy.~~

~~Unmanned Aerial Vehicle Liability Insurance~~	~~Policy limits of not less than:~~
~~Each Claim~~	~~$~~
~~General Aggregate~~	~~$~~

Q. ~~*Other Required Insurance:*~~

6.04 *Builder's Risk and Other Property Insurance*

SC-6.04 Supplement Paragraph 6.04 of the General Conditions with the following provisions:

F. *Builder's Risk Requirements:* The builder's risk insurance must:

1. be written on a builder's risk "all risk" policy form that at a minimum includes insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment stored and in transit, and must not exclude the coverage of the following risks: fire; windstorm; hail; flood; earthquake, volcanic activity, and other earth movement; lightning; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; collapse; explosion; debris removal; demolition

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occasioned by enforcement of Laws and Regulations; and water damage (other than that caused by flood).

a. Such policy will include an exception that results in coverage for ensuing losses from physical damage or loss with respect to any defective workmanship, methods, design, or materials exclusions.

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

2. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.

3. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of contractors, engineers, and architects).

4. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier). If this coverage is subject to a sublimit, such sublimit will be a minimum of $250,000.

5. extend to cover damage or loss to insured property while in transit. If this coverage is subject to a sublimit, such sublimit will be a minimum of $250,000.

6. allow for the waiver of the insurer's subrogation rights, as set forth in this Contract.

7. allow for partial occupancy or use by Owner by endorsement, and without cancellation or lapse of coverage.

8. include performance/hot testing and start-up, if applicable.

9. be maintained in effect until the Work is complete, as set forth in Paragraph 15.06.D of the General Conditions, or until written confirmation of Owner's procurement of property insurance following Substantial Completion, whichever occurs first.

10 include as named insureds the Owner, Contractor, Subcontractors (of every tier), and any other individuals or entities required by this Contract to be insured under such builder's risk policy. For purposes of Paragraphs 6.04, 6.05, and 6.06 of the General Conditions, and this and all other corresponding Supplementary Conditions, the parties required to be insured will be referred to collectively as "insureds." In addition to Owner, Contractor, and Subcontractors of every tier, include as insureds the following:

a. Gosling Czubak Engineering Sciences, Inc.

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11. include, in addition to the Contract Price amount, the value of the following equipment and materials to be installed by the Contractor but furnished by the Owner or third parties:

    a. Not Applicable

12. If debris removal in connection with repair or replacement of insured property is subject to a coverage sublimit, such sublimit will be a minimum of $100,000.

13. In addition to the coverage sublimits stated above, the following coverages are also subject to sublimits, as follows:

    a. Not applicable

       If this coverage is subject to a sublimit, such sublimit will be a minimum of $[amount].

~~C-6.04 Supplement Paragraph 6.04 of the General Conditions with the following provision:~~

~~G. *Coverage for Completion Delays:* The builder's risk policy will include, for the benefit of Owner, loss of revenue and soft cost coverage for losses arising from delays in completion that result from covered physical losses or damage. Such coverage will include, without limitation, fixed expenses and debt service for a minimum of 12 months with a maximum deductible of 30 days, compensation for loss of net revenues, rental costs, and attorneys' fees and engineering or other consultants' fees, if not otherwise covered.~~

SC-6.04 Supplement Paragraph 6.04 of the General Conditions with the following provisions:

H. *Builder's Risk and Other Property Insurance Deductibles:* The purchaser of any required builder's risk, installation floater, or other property insurance will be responsible for costs not covered because of the application of a policy deductible.

1. The builder's risk policy (or if applicable the installation floater) will be subject to a deductible amount of no more than $150,000 for direct physical loss in any one occurrence.

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 6:00 a.m. – 7:00 p.m. Monday – Saturday.

2. Owner's legal holidays are New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day

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 a Sunday or any legal holiday without Owner's written consent, which will not be unreasonable withheld."

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

D. Owner shall be responsible for the cost of any overtime pay or other expense incurred by the Owner for Engineer's services (including those of the Resident Project Representative, if

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any), Owner's representative, and construction observation services, occasioned by the performance of Work on Saturday, Sunday, any legal holiday, or as overtime on any regular work day. If Contractor is responsible but does not pay, or if the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under Article 15.

7.10 *Taxes*

SC-7.10 Add a new paragraph immediately after Paragraph 7.10.A:

A. Owner is exempt from payment of sales and compensating use taxes of the State of Michigan and of cities and counties thereof on all materials to be incorporated into the Work.

1. Owner will furnish the required certificates of tax exemption to Contractor for use in the purchase of supplies and materials to be incorporated into the Work.

2. Owner's exemption does not apply to construction tools, machinery, equipment, or other property purchased by or leased by Contractor, or to supplies or materials not incorporated into the Work.

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. *Conferences and Meetings:* Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings (but not including Contractor's safety meetings), and as appropriate prepare and circulate copies of minutes thereof.

2. *Safety Compliance:* Comply with Site safety programs, as they apply to RPR, and if required to do so by such safety programs, receive safety training specifically related to RPR's own personal safety while at the Site.

3. *Liaison*

a. Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.

b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.

c. Assist in obtaining from Owner additional details or information, when required for Contractor's proper execution of the Work.

4. *Review of Work; Defective Work*

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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. Observe whether any Work in place appears to be defective.

c. Observe whether any Work in place should be uncovered for observation, or requires special testing, inspection or approval.

5. *Inspections and Tests*

a. Observe Contractor-arranged inspections required by Laws and Regulations, including but not limited to those performed by public or other agencies having jurisdiction over the Work.

b. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Work.

6. *Payment Requests:* Review Applications for Payment with Contractor.

7. *Completion*

a. Participate in Engineer's visits regarding Substantial Completion.

b. Assist in the preparation of a punch list of items to be completed or corrected.

c. Participate in Engineer's visit to the Site in the company of Owner and Contractor regarding completion of the Work, and prepare a final punch list of items to be completed or corrected by Contractor.

d. Observe whether items on the final punch list have been completed or corrected.

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

ARTICLE 13—COST OF WORK; ALLOWANCES, UNIT PRICE WORK

13.03 *Unit Price Work*

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

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 extended price of a particular item of Unit Price Work amounts to 5 percent or more of the Contract Price (based on estimated quantities at the time of Contract formation) and the variation in the quantity of that particular item of Unit Price Work actually furnished or performed by Contractor differs by more than 15 percent 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 15—PAYMENTS TO CONTRACTOR, SET OFFS; COMPLETIONS; CORRECTION PERIOD

15.01 *Progress Payments*

SC 15.01.D. Modify Paragraph 15.01.D.1 to read: "Thirty days after presentation of the Application for Payment to Owner with Engineer's recommendation, …"

SC 15.01.E. Add the following new subparagraph to Paragraph 15.01.E.1:

m. If some or all of the material testing completed by Owner, Engineer or a third-party testing laboratory indicates the material provided or proposed by Contractor is not in accordance with the Specifications, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, shall be paid by Contractor to Owner. If Contractor does not pay, or the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under Article 15.

15.03 *Substantial Completion*

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

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

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17.02 *Arbitration*

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

17.02 *Arbitration*

A. All matters subject to final resolution under this Article will be settled by arbitration administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules (subject to the conditions and limitations of this Paragraph SC-17.02). Any controversy or claim in the amount of $100,000 or less will be settled in accordance with the American Arbitration Association's supplemental rules for Fixed Time and Cost Construction Arbitration. This agreement to arbitrate will be specifically enforceable under the prevailing law of any court having jurisdiction.

B. The demand for arbitration will be filed in writing with the other party to the Contract and with the selected arbitration administrator, and a copy will be sent to Engineer for information. The demand for arbitration will be made within the specific time required in Article 17, or if no specified time is applicable within a reasonable time after the matter in question has arisen, and in no event will any such demand be made after the date when institution of legal or equitable proceedings based on such matter in question would be barred by the applicable statute of limitations.

C. The arbitrator(s) must be licensed engineers, contractors, attorneys, or construction managers. Hearings will take place pursuant to the standard procedures of the Construction Arbitration Rules that contemplate in-person hearings. The arbitrators will have no authority to award punitive or other damages not measured by the prevailing party's actual damages, except as may be required by statute or the Contract. Any award in an arbitration initiated under this clause will be limited to monetary damages and include no injunction or direction to any party other than the direction to pay a monetary amount.

D. The Arbitrators will have the authority to allocate the costs of the arbitration process among the parties, but will only have the authority to allocate attorneys' fees if a specific Law or Regulation or this Contract permits them to do so.

E. The award of the arbitrators must be accompanied by a reasoned written opinion and a concise breakdown of the award. The written opinion will cite the Contract provisions deemed applicable and relied on in making the award.

F. The parties agree that failure or refusal of a party to pay its required share of the deposits for arbitrator compensation or administrative charges will constitute a waiver by that party to present evidence or cross-examine witness. In such event, the other party shall be required to present evidence and legal argument as the arbitrator(s) may require for the making of an award. Such waiver will not allow for a default judgment against the non-paying party in the absence of evidence presented as provided for above.

G. No arbitration arising out of or relating to the Contract will include by consolidation, joinder, or in any other manner any other individual or entity (including Engineer, and Engineer's consultants and the officers, directors, partners, agents, employees or consultants of any of them) who is not a party to this Contract unless:

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1. the inclusion of such other individual or entity will allow complete relief to be afforded among those who are already parties to the arbitration;
2. such other individual or entity is substantially involved in a question of law or fact which is common to those who are already parties to the arbitration, and which will arise in such proceedings;
3. such other individual or entity is subject to arbitration under a contract with either Owner or Contractor, or consents to being joined in the arbitration; and
4. the consolidation or joinder is in compliance with the arbitration administrator's procedural rules.

H. The award will be final. Judgment may be entered upon it in any court having jurisdiction thereof, and it will not be subject to modification or appeal, subject to provisions of the Laws and Regulations relating to vacating or modifying an arbitral award.

I. Except as may be required by Laws or Regulations, neither party nor an arbitrator may disclose the existence, content, or results of any arbitration hereunder without the prior written consent of both parties, with the exception of any disclosure required by Laws and Regulations or the Contract. To the extent any disclosure is allowed pursuant to the exception, the disclosure must be strictly and narrowly limited to maintain confidentiality to the extent possible.

17.03 *Attorneys' Fees*

SC-17.03 Add the following new paragraph immediately after Paragraph 17.02:

17.03 *Attorneys' Fees*

A. For any matter subject to final resolution under this Article, the prevailing party shall be entitled to an award of its attorneys' fees incurred in the final resolution proceedings, in an equitable amount to be determined in the discretion of the court, arbitrator, arbitration panel, or other arbiter of the matter subject to final resolution, taking into account the parties' initial demand or defense positions in comparison with the final result.

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EXHIBIT A—FORESEEABLE BAD WEATHER DAYS

Month	Number of Foreseeable Bad Weather Days in Month Based on Precipitation as Rain Equivalent (inches) (1)	Ambient Outdoor Air Temperature (degrees F)	
		Number of Foreseeable Bad Weather Days in Month Based on Low Temperature (at 11:00 a.m.)	Number of Foreseeable Bad Weather Days in Month Based on High Temperature (at 3:00 p.m.)
January	10	31	0
February	10	28	0
March	10	15	0
April	10	10	0
May	15	0	0
June	15	0	2
July	10	0	5
August	10	0	2
September	15	0	0
October	15	5	0
November	10	10	0
December	10	31	0

Notes:

1. Two inches of sleet equal one inch of rain. Five inches of wet, heavy snow equal one inch of rain. Fifteen inches of "dry" powder snow equals one inch of rain.

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WORK CHANGE DIRECTIVE NO.:

Owner:	Montmorency-Oscoda-Alpena Solid Waste Management Authority	Owner's Project No.:
Engineer:	Gosling Czubak Engineering Sciences, Inc.	Engineer's Project No.:
Contractor:		Contractor's Project No.:
Project:	Cell C Phase I Construction	
Contract Name:	Cell C Phase I Construction	
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:

☐ 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 by Engineer	Authorized by Owner
By:		
Title:		
Date:		

EJCDC® C-940, Work Change Directive.
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CHANGE ORDER NO.:

Owner:	Montmorency-Oscoda-Alpena Solid Waste Management Authority	Owner's Project No.:
Engineer:	Gosling Czubak Engineering Sciences, Inc.	Engineer's Project No.:
Contractor:		Contractor's Project No.:
Project:	Cell C Phase I Construction	
Contract Name:	Cell C Phase I Construction	
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 by Engineer (if required)	Accepted by Contractor
By:		
Title:		
Date:		
	Authorized by Owner	**Approved by Funding Agency (if applicable)**
By:		
Title:		
Date:		

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FIELD ORDER NO.:

Owner:	Montmorency-Oscoda-Alpena Solid Waste Management Authority	Owner's Project No.:
Engineer:	Gosling Czubak Engineering Sciences, Inc.	Engineer's Project No.:
Contractor:		Contractor's Project No.:
Project:	Cell C Phase I Construction	
Contract Name:	Cell C Phase I Construction	
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 by Engineer

By: _____

Title: _____

Date: _____

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SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

The Work consists of providing all labor, materials, superintendence, equipment, and services necessary to complete all construction and installation for the project as indicated on the drawings and specified herein. The Work includes, but is not necessarily limited to, the following:

A. General:

Contractor shall provide mobilization of sufficient labor, equipment and material to adequately advance the Work, furnish all materials, labor, tools, and equipment necessary for the assembling and setting up for the project and demobilization equipment at the completion of the project.

Coordinate testing, inspection and survey with Engineer and Construction Quality Assurance (CQA) Plan.

The Contractor shall be responsible for obtaining and complying with all necessary permits required to execute the construction including but not limited to: mining permits for off-site borrow materials, highway permits, and all required Work permits. Fines levied by regulators for the Contractor's failure to comply shall be the responsibility of the Contractor at no cost to the Owner or Engineer

B. Earth Work: Perform all required clearing, grubbing, utility/structure removal and abandonment, site preparation, dewatering, excavation, proof rolling, earthwork, screening, grading, filling, ditching, hauling, leveling, compaction, restoration, top soiling, seeding, and all other Work as shown on the drawings or specified herein to complete the project.

Specific activities include, but are not limited to, the following:

- Site preparation including construction of a Contractors' equipment and material staging area(s), and installation of silt control fencing.
- Excavation of existing soil materials to achieve suitable subgrade materials, proof-rolling and construction of a liner sub grade and perimeter berms to the lies and grades shown on the plans. Preparation of sub-grade includes excavation of approximately 87,500 net cubic yards of native soil materials (95,660 cubic yards of cut and 8,160 cubic yards of fill).
- Pre-procurement sourcing; sampling; delivery; installation; and, in-situ testing of approximately 14,325 cubic yards of sand for the primary leachate collection system

- Perimeter excavation and grading to establish design grade and perimeter ditch
- Pre-procurement sourcing, testing; delivery; installation; and, in-situ testing of approximately 333,000 square feet of geosynthetic clay liner for the primary and secondary liner systems
- Pre-procurement sourcing, testing; delivery; installation; and, in-situ testing of approximately 333,000 square feet of 60-mil, textured, high-density polyethylene (HDPE) for the primary and secondary liner systems
- Pre-procurement sourcing, testing; delivery; installation; and, in-situ testing of approximately 333,000 square feet of geocomposite drainage layer for the primary and secondary leachate systems
- Pre-procurement sourcing, testing; delivery; installation; and, in-situ testing of approximately 1,050 lineal feet of HDPE piping for the primary and secondary leachate collection systems
- Design, labor, and permitting for the construction of the Cell C leachate building, associated electrical, plumbing, and connection to existing force main.

1.02 CONTRACTS

All work will be awarded under one contract.

1.03 ALTERNATES

No alternative bids will be considered for this project.

1.04 WORK BY OTHERS

A. The Owner has awarded separate contracts for activities at the site that are to be completed simultaneously with the Work. These separate contracts are:

1. Construction Quality Assurance.

The Owner has retained the Engineer to perform documentation, verification and certification services for the cell construction. Engineer will test Contractor's work to ensure compliance with specifications and CQA Plan. Engineer will survey the Work to ensure that the Contractor has obtained the required lines, grades, elevations of materials. Engineer will also perform surveying measurements to establish unit quantities for unit pay items.

2. Private Utility Marking

The Owner has retained Field Tech Services to mark private utilities under the control of the Owner. Owner or Engineer will coordinate initial staking of Owner maintained utilities within three day of Contractor providing Engineer a copy of the Miss Digg staking request. Contractor is responsible for protecting the markings and any expenses related to remarking.

B. Conduct the Work in a manner that shall minimize interference with the operations of other Contractors and the Owner involved in the performance of other Work on or adjacent to the project site. Except as otherwise specified, the Contractor shall keep the Owner and the Engineer fully informed at least 14 days prior to the beginning of any Work which may affect the Owner's operations, or the Work of other Contractors retained by the Owner. All proposed work which may affect the Owner's operations must be preapproved by the Owner and Engineer.

C. The Contractor shall maintain all existing leachate systems and drainage systems, etc. in operation during the course of this project. Any necessary interruptions in service shall be coordinated with the Owner and the Contractor shall provide by-pass or temporary systems to maintain current operating systems, as required by the Owner.

1.05 FUTURE WORK

No future work is anticipated that will affect work under this project.

1.06 WORK SEQUENCE

No prescribed work sequence beyond typical and ordinary construction sequencing is specified for this project.

1.07 COORDINATION

Coordinate all work with the Owner to minimize any inconvenience to Owner.

1.08 AVAILABILITY OF LANDS

All work will take place on property owned or controlled by the Owner.

1.09 PRE-ORDERED ITEMS

No items have been pre-ordered for this project.

1.10 OWNER FURNISHED ITEMS

No specified items will be furnished by the Owner for this project. The Contractor may elect to utilize onsite stockpiled native soil materials provided the Contractor proves the material meets contract specifications. Neither the Owner nor the Engineer make any guarantees as to the suitability of these materials.

1.11 PROJECT IDENTIFICATION AND SIGNS

No project identification signs are required or will be allowed without approval of Owner.

1.12 PRECONSTRUCTION CONDITIONS:

Existing site conditions and topographic contours depicted on the contract drawings are based on a survey completed by Engineer in September 2025.

1.13 CONSTRUCTION PROCEDURES:

A. Survey

The Contractor's Surveyor shall establish necessary survey base lines and control points to

complete the Work as shown on the drawings.

B. Construction
The Contractor is expected to excavate and construct to the grades and lines shown and specified on the Contract Drawings and in accordance with these specifications. Any deviations from the drawings or specifications require the prior approval of the Owner and the Engineer and must be documented by "record" revisions to the drawings.

C. Disposing and Stockpiling of Materials
The Contractor shall be responsible for making all arrangements for and/or coordinating the disposal/stockpiling of excavated material and stockpiling fill materials as specified or as directed by the Owner or the Engineer.

D. Maintenance of Roads, Haul Roads, Access Ramps
The Contractor shall be responsible for maintenance, including filling, grading, repairs, traffic control, cleaning, sweeping and restoration of all on-site and off-site roads, haul roads, access ramps, etc. used for its operations. The Contractor's operations shall not block or disrupt on-site or off-site traffic flow of either the Owner's operations or the public without the written authorization/approval of the Owner.

E. Site Access
The Contractor may access the Site from the north through the Landfill Road entrance off of County Road 487. Access outside of normal landfill operating hours must be coordinated with the Owner. Access via the historic south entrance will only be permitted in special circumstances as pre-approved by the Owner. At a minimum, the Contractor shall provide a full-time sentry at the south entrance during hours of use to prevent unauthorized access to the MOA property. Any improvements to the south entrance shall be the responsibility of the Contractor and at no expense to the Owner or Engineer.

F. Maintenance of Existing Site Drainage
The Contractor shall be responsible for providing all temporary ditches, piping, pumps, controls, operational equipment and personnel, flow monitoring, etc. required and acceptable to the Owner to bypass or maintain existing site surface water drainage or groundwater during the course of the project. The Contractor shall not disrupt or cause backup of surface water flow both on-site and off-site without the written authorization/approval of the Owner and the Engineer.

1.16 INDEPENDENT TESTING LABORATORY(S)

Where the term Independent Testing Laboratory(s) is used, it means a testing laboratory(s), who by contract with the Contractor (or supplier/subcontractor), shall perform quality control and quality assurance testing on soil and geosynthetic components of the liner.

Tests that are not specified as to be completed by the INDEPENDENT TESTING LABORATORY will be completed by the Engineer.

The CQA Engineer will perform in place moisture density testing of the compacted soil materials.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 SUMMARY

A. Refer to Article 15 of the General Conditions.

B. Bid price includes all labor, tools, equipment, materials, transportation, and applicable fees, use tax, and sales tax necessary to complete the work in accordance with the Plans and Specifications.

C. All measurement and payment will be based on completed work, ready for use, performed in strict accordance with the Plans and Specifications.

D. Bid quantities listed in the Bid Schedule have been estimated and are only for the purpose of comparing, on a uniform basis, the Bids offered for the Work. Completed quantities for payment will be based on field measurements.

E. Neither the Owner nor Engineer shall be held responsible should any of the estimated quantities be found incorrect.

F. Payment will be made only on items listed in the BID SCHEDULE. All other work not listed in the BID SCHEDULE shall be considered incidental to the performance of the Work.

G. Owner reserves the right to delete any line item or quantity on the BID SCHEDULE.

H. Final total quantities will not include nor will payment be made for the following:
   1. Quantities of material wasted, including liner scrap.
   2. Rejected loads of material, including material rejected after it has been placed, by reason of failure to conform to the provisions of the Contract.
   3. Material not unloaded from the transporting vehicle.
   4. Material placed outside the design lines and grades indicated on the Contract Drawings or established by the Engineer.
   5. Material remaining on hand after completion of the Work.
   6. Loading, hauling and disposing of rejected material.
   7. Material included in final quantities for which properly signed transportation, scale or tracking tickets have not been provided.

1.02 APPLICATION FOR PAYMENT

A. Pay period: 30 days, in accordance with the General Conditions and Agreement

B. Payment requests shall be submitted on the forms included in the Specifications.

1.03 SUBMITTALS

A. Submit Conditional Partial Waiver of Lien with each application for payment request, as specified in the General Conditions paragraph 15.

B. Submit a schedule of values in accordance with Section 01300 for all Lump Sum Bids items.

C. Prior to the first partial payment, submit a construction progress schedule in accordance with Section 2 of the General Conditions.

1.04 ITEMS OF THE BID FORM

Measurement and Payment for the Pay Items listed on the Bid Schedule shall be as follows:

Item No. 1 Project Administration & Mobilization

1. This pay item includes, but is not necessarily limited to, the following items:
   - Insurance and bonds
   - Preparatory work and operation, for the movement of personnel, equipment, supplies, and incidentals to the project site
   - Establishment of a project office, staging area(s), and other facilities needed to undertake the Work
   - Soil erosion control measure installation and maintenance
   - Construction survey
   - Coordination of material deliveries;
   - Cooperation with Engineer, CQA personnel, and Surveyor
   - Maintaining site, including material stockpiles needed for the work, in an orderly manner
   - Watering for dust control
   - Coordination and management of Subcontractors and suppliers
   - Protection of monitoring wells, gas probes, and other instrumentation
   - Site restoration

2. Related Sections:
   - 520 – Agreement
   - 700 – General Conditions
   - 800 – Supplementary Conditions
   - 01010 – Summary of Work
   - 01300 – Submittals
   - 02100 – Instrumentation
   - 02270 – Erosion Control
   - 02900 – Site Restoration

3. Unit of measure: Lump Sum in accordance with the Schedule of Values

Item No. 2 Cell Excavation & Grading (cut & fill)

1. This pay item shall include all equipment, personnel, labor, and all else required to excavate and prepare the subgrade for Cell C – Phase I to the elevations and within the limits shown on the Drawings. The price shall also include all
   - Excavation, loading, transportation and offloading in the Owner designate drop site
   - Grading, compacting, and shaping the subgrade
   - Proof rolling
   - Dewatering

2. Related Sections:
   - 02140 – Dewatering
   - 02200 – Earthwork

3. Unit of measure: Lump Sum in accordance with the Schedule of Values

Item No. 3 Perimeter Grading

1. This pay item shall include all equipment, personnel, labor, and all else required to excavate, fill, grade and restore the perimeter road, drainage way, and embankment sloping to the elevations and limits shown on the Drawings. The price shall also include all:
   - Excavation, loading, transportation and offloading in the Owner designate drop site
   - Grading, compacting and shaping the subgrade
   - Dewatering
   - Top soiling and restoration
   - Construction of temporary access road

2. Related Sections:
   - 02100 – Instrumentation
   - 02140 – Dewatering
   - 02200 – Earthwork
   - 02270 – Erosion Control
   - 02900 – Site Restoration

3. Unit of measure: Lump Sum in accordance with the Schedule of Values

Item No. 4 Expose Existing Liner System

1. This pay item shall include all equipment, personnel, labor, and all else required to expose (broom-clean) the existing liner systems for the adjacent cells to the limits necessary to complete the Work. The price shall also include all:
   - Removal and relocation of refuse, temporary soil cap, soils, and miscellaneous temporary/protective geosynthetics and plywood covering the components of the existing liner systems
   - Exposure of Cell B – Phase I anchor trench to allow tie-in
   - Exposure and removal of any rain flap or other materials above the base liner.

- Dewatering
- Leachate management

2. Related Sections:
   - 02140 – Dewatering
   - 02200 – Earthwork
   - 02300 – Geosynthetics, General

3. Unit of measure: Lump Sum in accordance with the Schedule of Values

Item No. 5 Geosynthetic Anchor Trench Excavation and Backfill

1. This pay item shall include all equipment, personnel, labor, and all else required to prepare, excavate, grade, backfill and compact the geosynthetic anchor trench. The price shall also include all:
   - Connection and overlap to Cell B – Phase I geosynthetics
   - Dewatering

2. Related Sections:
   - 02300 – Geosynthetics, General
   - 02330 – Geosynthetic Clay Liner
   - 02320 – Geocomposite Drainage Layer
   - 02310 – Geomembrane
   - 02140 – Dewatering
   - 02200 – Earthwork

3. Unit of measure: Lump Sum in accordance with the Schedule of Values

Item No. 6 60-mil Textured HDPE Geomembrane

1. This pay item shall include all personnel, labor, and all else required to furnish and install the:
   - 60-mil textured high-density polyethylene (HDPE) geomembrane

   for the primary and secondary liner systems.

   The price shall also include all:
   - Manufacturing
   - Shipping
   - Loading and offloading
   - Storage of material
   - Maintenance of storage area
   - Submittal of geomembrane test data
   - Submittal of layout plan
   - Placement
   - Seaming
   - Non-destructive seam testing
   - On-site destructive seam testing

- Collection of samples for off-site CQA testing
- Repair and patching of sample locations
- Overlap and Scrap material
- Connection and overlap to Cell B geosynthetics & liner system
- Construction, placement, and filling of anchor trench(s)

2. Related Sections:
   - 01300 – Submittals
   - 01045 – Cutting and Patching
   - 02140 – Dewatering
   - 02200 – Earthwork
   - 02300 – Geosynthetics, General
   - 02310 – Geomembrane
   - 02320 – Geocomposite Drainage Layer
   - 02330 – Geosynthetic Clay Liner
3. Unit of measure: Lump sum in accordance with Schedule of Values

Item No. 7 Geosynthetic Clay Liner

1. This pay item shall include all personnel, labor, and all else required to furnish and install the geosynthetic clay liner (GCL) for the primary and secondary liner systems. The price shall also include all:
   - Manufacturing
   - Shipping
   - Loading and offloading
   - Storage of material
   - Maintenance of storage area
   - Submittal of GCL test data
   - Submittal of layout plan
   - Placement
   - Repair and patching of sample locations
   - Repair and replacement of defective work
   - Overlap and Scrap material

2. Related Sections:
   - 01300 – Submittals
   - 01045 – Cutting and Patching
   - 02330 – Geosynthetic Clay Liner

3. Unit of measure: Lump Sum in accordance with the Schedule of Values

Item No. 8 Geocomposite Drainage Layer

1. This pay item shall include all personnel, labor, and all else required to furnish and install the geonet drainage layer for the primary and secondary liner systems. The price shall also include all:
   - Manufacturing

- Shipping
- Loading and offloading
- Storage of material
- Maintenance of storage area
- Submittal of geocomposite test data
- Submittal of layout plan
- Placement
- Repair and patching of sample locations
- Repair and replacement of defective work
- Overlap and Scrap material

2. Related Sections:
   - 01300 – Submittals
   - 01045 – Cutting and Patching
   - 02320 – Geocomposite

3. Unit of measure: Lump Sum in accordance with the Schedule of Values

Item No. 9 Drainage Sand

1. This pay item shall include all equipment, personnel, labor, and all else required to source, deliver, prepare, place, compact and otherwise establish the drainage sand and stone for the primary and secondary leachate collection systems in accordance with the drawings and specifications. The price shall also include all:
   - Mining
   - Maintenance of stock piles
   - Grading
   - Tie-in to existing drainage sand layers
   - Coordination of testing and survey work with Engineer
   - Dewatering

2. Related Sections:
   - 02140 – Dewatering
   - 02200 – Earthwork
   - 02230 – Granular Drainage Material

3. Unit of measure: Lump Sum in accordance with Schedule of Values

Item No. 10 Primary & Secondary Piping

1. This pay item shall include all equipment, personnel, labor, and all else required to purchase and install solid and perforated 8” and 18” HDPE SDR-17 drainage pipe for the primary and secondary leachate collection systems in accordance with the drawings and specifications. The price shall also include all:
   - Transport from storage area
   - Placement
   - Repair and replacement of defective work

- Mining, loading, transport and unloading
- Maintenance of stock piles
- Grading
- Tie-in to existing leachate piping and drainage stone layers
- Coordination of testing and survey work with Engineer
- Dewatering
- Non-destructive testing

2. Related Sections:
   - 01045 – Cutting and Patching
   - 02140 – Dewatering
   - 02200 – Earthwork
   - 02230 – Granular Drainage Material
   - 02600 – High Density Polyethylene (HDPE) Pipe

3. Unit of measure: Lump Sum in accordance with the Schedule of Values

Item No. 11 Cell C Leachate Building & Pumps

1. This pay item shall include all personnel, labor, permits, and all else required to furnish and install the Cell C leachate building, plumbing, and force main connection. The price shall also include all:
   - Manufacturing
   - Shipping
   - Loading and offloading
   - Storage of material
   - Maintenance of storage area
   - Permitting
   - Submittal of layout plan

2. Related Sections:
   - 01300 – Submittals
   - 03101 – Concrete Formwork
   - 03201 – Concrete Reinforcement
   - 03251 – Concrete Accessories
   - 03301 – Cast-in-Place Concrete
   - 06 11 00 – Carpentry
   - 06 17 00 – Prefabricated Wood Trusses
   - 06 83 16 – Fiberglass Reinforced Panels
   - 07 21 00 – Thermal Insulation
   - 07 25 00 – Vapor Barriers
   - 07 41 00 – Metal Roofing
   - 07 46 00 – Preformed Siding
   - 08 10 00 – Steel Foors
   - 08 70 00 – Builders Hardware
   - 11210 – Leachate Pumps and Equipment

- 15480 – Process Piping and Valves
- 15600 – Leachate Flow Meter

3. Unit of measure: Lump Sum in accordance with Schedule of Values

Item No. 12 Electric and Controls

1. This pay item shall include all personnel, labor, permits, and all else required to furnish and install the Cell C electrical, ventilation, controls, and electrical service connection. The price shall also include all:
   - Manufacturing
   - Shipping
   - Loading and offloading
   - Storage of material
   - Maintenance of storage area
   - Permitting
   - Submittal of layout plan

2. Related Sections:
   - 01300 – Submittals
   - 11306 – Submersible Pump Controller
   - 15600 – Leachate Flow Meter

3. Unit of measure: Lump Sum in accordance with Schedule of Values

END OF SECTION

SECTION 01045

CUTTING AND PATCHING

1.01 GENERAL:

A. The CONTRACTOR shall be responsible for all cutting, fitting and patching, including consequential excavation and backfilling, required to complete the work and/or to:

1. Make all parts fit together properly, and be functional;

2. Uncover portions of the work to provide for installation of ill-timed work;

3. Remove and replace work not conforming to requirements of Contract Documents;

4. Remove portions of installed work as specified for testing; and

5. Replace material sampled for testing, repair sample location and remediate those material locations where testing indicated the material did not meet project requirements.

END OF SECTION

SECTION 01050

FIELD ENGINEERING

PART 1 GENERAL

1.01 STAKEOUT AND SURVEYING

A. Owner's responsibility:

1. Provide staking in accordance with Article 4.03 of the General Conditions.

2. Owner will provide for and contract with Engineer to serve as CQA Surveyor to perform surveying to measure pay quantities, verify elevations, grades, and thickness, and prepare as-built certification record drawings.

B. Contractor's responsibility:

1. The Contractor shall provide all labor, materials, tools, supervision, transportation, and equipment necessary to perform the field layout staking and surveying work as specified herein and as needed for construction of the liner system, access roads, leachate system, and other structures and features as shown on the Drawings.

2. Obtain field measurements, line and grade control, and facility locations based on site control and initial staking provided by the Owner.

3. Preserve and protect all field staking provided by the Owner.

4. Compensate the Owner for all costs of replacement of staking damaged by the Contractor.

5. The work of this Section shall include, but not necessarily be limited to establishing survey control points and providing survey control during construction.

1.02 SOIL BORINGS

A. Soil borings have been conducted at the site and are shown on the project Plans. Soil boring logs are included in the reports reference in Section 800, SC-5.03.

B. Accuracy of the logs is not guaranteed.

C. Boring logs indicate the conditions at the boring location only and do not necessarily reflect soil conditions elsewhere.

1.03 EXISTING UTILITIES

A. Existing utilities are shown on the Plans in their approximate location, based on the available data.

B. The Owner will not be responsible for omissions or variations from the locations shown.

C. Contact Miss Dig (1-800-482-7171) 72 hours prior to any excavation to locate existing buried utilities.

D. Preserve and protect existing utilities from damage. Repair all damage to existing utilities at no cost to the Owner. Work stoppages resulting from damaged utilities will not entitle the Contractor to additional payment.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.01 DESCRIPTION

A. Contractor shall perform the construction layout based on the following:

1. Design data provided by the ENGINEER in the form of 3-dimensional Triangular Integrated Networks (TINs), for earthwork and cell liner system. The data will be presented in AutoCAD format.

2. The Contractor will be required to develop data to accurately measure and record locations and elevations on a 50-foot maximum spaced grid system to supplement the information provided of the grade break lines presented with the TINs. Where the Contractor discovers errors in the data provided by the ENGINEER (e.g. data showing insufficient layer thickness), the Contractor shall contact the ENGINEER to resolve the error.

3. Design Data shown on the drawings for installation of the leachate and secondary collection pipes, geosynthetic installations, and other items shown on the drawings.

B. The next phase or following phase of construction shall not continue until the Engineer checks Work completed by the CONTRACTOR and records “as-built” measurements.

C. Data generated by optical survey measurements will be used for quality assurance.

D. The Engineer’s Surveyor is required, as a minimum, to provide the following survey data for each of the following phases for construction certification:

1. Following excavation achieve subgrade (for overlying layer thickness certification and for pay quantities).

2. Following filling to the top of sub grade within the liner area (for overlying layer thickness certification and for pay quantities).

3. Following completion of the leachate collection system components and leak detection system components including limits of leak detection geocomposite placement and pipes including pipe alignment and invert elevations.

4. During placement of the HDPE liners including limits of liner placement, all seams, destructive test samples, and all leak and patch locations.

5. At all interfaces of low permeability soil liner; and, granular fill.

6. Following construction of all appurtenant structures.

E. The Contractor shall provide Engineer a minimum 72-hour notice prior to requesting Survey services for CQA and as-built documentation.

F. The CONTRACTOR shall not proceed with subsequent Work phases until the Surveyor has completed its survey measurements and all survey data conform to the provisions in these documents.

3.02 ACCURACY:

Optical Survey, Tape Measurements and Electronic Measurements: Minimum accuracy of ±0.01 feet in horizontal location and ±0.01 feet in elevation.

3.03 TOLERANCES:

The CONTRACTOR shall excavate and place all clay, fill, pipe, drainage material, topsoil and all other materials to the lines, grades, and slopes shown on drawings and within the elevation tolerances specified below.

DESCRIPTION	ELEVATION TOLERANCE
Excavation/Top of Prepared Subgrade	-0.20 feet to 0.00 feet
Top of Primary Liner System	0.00 feet to +0.10 feet
Top of Leachate Drainage Sand Layers	0.00 feet to +0.10 feet
Leachate and Secondary Collection Pipes	±0.02 feet

3.04 JOB CONDITIONS:

A. The CONTRACTOR shall safeguard all survey points and bench marks. Should any of these points be disturbed or destroyed, the replacement cost will be borne by the

CONTRACTOR.

B. The CONTRACTOR will be held entirely responsible for rectifying Work improperly constructed and any associated liabilities or costs to the Owner resulting from failure to maintain and protect established survey points and bench marks.

C. The Contractor shall promptly notify the Owner in writing of any discrepancies discovered before or during construction.

D. The Contractor shall make no changes or relocations to control points without prior written approval from the Owner.

E. Use of grade stakes shall be in accordance with any provisions given in the Specifications and QA/QC Plan.

F. The Contractor shall be aware of independent surveying activities, conducted as part of the CQA program and record documentation, and shall account for them in the construction schedule.

G. The Contractor shall cooperate fully with the Owner, and Engineer at all times.

3.05 SURVEY MEASUREMENTS:

A. Prior to commencement of construction Work, the CONTRACTOR and its Surveyor shall establish all necessary base lines, horizontal control points and vertical control benchmarks in order to properly complete construction work. Survey control points shall be established such that any point within the job site can accurately be re-established and elevations obtained to the required tolerances at any time during construction. Existing horizontal and vertical control points for the Project shall be provided by the Owner outside of construction area and within reasonable proximity of work. The CONTRACTOR'S Surveyor will tie all base lines and horizontal control benchmarks to the site coordinate system.

B. Topographic measurements for the various components and layers will be measured at grid line intersections spaced no greater than 50 feet apart and at all break lines, crests, slope toes, etc., as necessary to accurately measure the Work.

C. All survey Work by the CONTRACTOR'S Surveyor shall utilize recognized engineering and construction survey practices. A complete and accurate log of control and survey work must be maintained by the Contractor.

3.06 MEASUREMENT AND PAYMENT:

No separate measurement or payment will be made for Work required under this section. All costs incurred by the CONTRACTOR in connection therewith will be considered incidental to the Work under this Contract. Owner may reduce payments to Contractor for related survey costs when work completed by the Contractor is not in accordance with the contract documents.

END OF SECTION

SECTION 01090

ABBREVIATIONS AND SYMBOLS

PART 1 GENERAL

1.01 DEFINITIONS

A. Reference to codes, standards, institutions, associations, or government authorities is made in accordance with the following abbreviations:

AASHTO	- American Association of State Highway Officials
ACGIH	- American Conference of Governmental Industrial Hygienists
ACI	- American Concrete Institute
AGC	- Associated General Contractors of America
AIA	- American Institute of Architects
AISC	- American Institute of Steel Construction
AISI	- American Iron and Steel Institute
ANSI	- American National Standard Institute
ASTM	- American Society of Testing Materials
AWS	- American Welding Society
AWWA	- American Water Works Association
BOCA	- Building Officials Code Association
CQA	- Construction Quality Assurance
CRSI	- Concrete Reinforcing Steel Institute
EGLE	- Michigan Department of Environment, Great Lakes, and Energy
FAA	- Federal Aviation Association
FTMS	- Federal Test Method Standard
GRI	- Geosynthetics Research Institute
HASP	- Health and Safety Plan
MDEQ	- Michigan Department of Environmental Quality (replaced by EGLE)
MDOT	- Michigan Department of Transportation
MDNR	- Michigan Department of Natural Resources
MI-OSHA	- Michigan Department of Occupational Safety & Health Association
MOA SWMA	- Montmorency-Oscoda-Alpena Solid Waste Management Authority
NEC	- National Electric Code
NEMA	- National Electrical Manufacturers Association
NIOSH	- National Institute for Occupational Safety and Health
NFPA	- National Fire Protection Association
NSF	- National Sanitation Foundation
NSWMA	- National Solid Wastes Management Association
PCA	- Portland Cement Association
PCI	- Prestressed Concrete Institute
RECD	- Rural Economic Community Development

USEPA	- United States Environmental Protection Agency
UL	- Underwriter's Laboratories
USACOE	- United States Army Corps of Engineers
USDOT	- United States Department of Transportation
QA/QC	- Quality Assurance/Quality Control

PART 2 PRODUCT - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01200
PROJECT MEETINGS

PART 1 GENERAL

1.01 PRECONSTRUCTION MEETING

A. Prior to delivery of materials or the start of any construction, a preconstruction meeting will be held.

B. The Engineer will establish the meeting place, time and date, distribute agenda, notify participants, and administer the meeting. Contractor shall notify major subcontractors.

C. Attendance:
   1. OWNER
   2. ENGINEER, including CQA field personnel
   3. CONTRACTOR, including, at a minimum: foreman or superintendent, and project manager
   4. Major Subcontractors, including, at a minimum, Geosynthetics installer
   5. EGLE personnel (by invitation from Owner, attendance not required)

D. Agenda:
   1. Distribution by Contractor and discussion of:
      a. List of name and phone number of superintendent, foreman and other key personnel.
      b. List of major subcontractors and suppliers.
      c. Projected Construction Schedules.
      d. On-site permits that require compliance.
      e. Schedule of Values
   2. Designation of responsible personnel and chain-of-command
   3. Critical work sequencing.
   4. Major equipment deliveries and priorities.
   5. Project coordination
   6. Responsibilities of Owner, Engineer, Contractor and other agencies.
   7. Utility Discussions/Critical Utilities
   8. Permit Issues
   9. Procedures and processing of:
      a. Field decisions.
      b. Proposal requests.
      c. Submittals.
      d. Change orders.
      e. Application for payment.
   10. Adequacy of distribution of Contract Documents.
   11. Procedures for maintaining Record Documents.
   12. Use of premises.
      a. Office and storage areas

b. The Owner's requirements

13. Construction facilities, controls and construction aids.
14. Temporary utilities.
15. Safety and first aid procedures.
16. Security procedures.
17. Housekeeping procedures.
18. Testing and Staking
19. Sign Contracts

E. The Engineer will prepare minutes and distribute copies to participants within seven (7) days of meeting. Participants shall report corrections and comments within ten (10) days of receipt of minutes.

1.02 PROGRESS MEETINGS

A. Weekly Progress Meetings will be held as required by the progress of the work.

B. The Engineer will establish the meeting place, time and date, distribute agenda, notify participants and administer the meeting. Contractor shall notify major subcontractors.

C. Attendance:
1. OWNER
2. ENGINEER
3. CQA Field Personnel as appropriate to the agenda
3. CONTRACTOR
4. Subcontractor as appropriate to the agenda
5. Suppliers as appropriate to the agenda
6. Others

D. Agenda:
1. Review minutes of previous meeting.
2. Review of work progress since previous meeting.
3. Review field observations, problems, and conflicts.
4. Review problems that impede Construction Schedules.
5. Review of shop drawings, off-site fabrication, and delivery schedules.
6. Review corrective measures and procedures to regain projected schedule.
7. Review revisions to Construction Schedules.
8. Review plan progress, schedule, during succeeding work period.
9. Review coordination of schedules.
10. Review submittal schedules; expedite as required.
11. Review maintenance of quality standards.
12. Review proposed changes for:
    a. Effect on Construction Schedule and on completion date.
    b. Effect on other Contracts of the Project.
13. Other business.

E. The Engineer will prepare minutes and distribute copies to participants and Owner within seven (7) days of meeting for review at the next meeting.

PART 2 PRODUCT - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.01 DESCRIPTION:

This section specifies the general requirements and procedures for preparing and transmitting data to the Engineer for its information or review by the Owner. Required submittals are specified under applicable sections of the Specifications.

1.02 CONTRACTOR'S Submittals:

A. General:
   1. Make Submittals to Engineer in accordance with Section 700, Article 7.16
   2. The CONTRACTOR'S Submittals shall show the general arrangement and such details as necessary to provide a comprehensive description of the Work to be performed and/or demonstrate material conformity with the specifications.
   2. As indicated below, the CONTRACTOR shall prepare shop and Working drawings, for temporary and permanent Work, and for the proposed methods of construction as required under the applicable sections of the specifications, complete with all relevant calculations, descriptions, technical and performance data, as necessary to adequately perform the Work. The CONTRACTOR shall take responsibility for such drawings and for the safe and successful construction of the Work.
   3. Shop drawings shall be presented in a clear and thorough manner, complete with respect to dimensions, design criteria, materials of construction, and like information to enable the ENGINEER to review information as required.
   4. Sheet size: 8-1/2 " x 11" minimum size, no larger than 36" x 48"

B. Submit to the Engineer, in writing, detailed descriptions and schedules of proposed construction procedures and activities that may interfere with the OWNER'S operations. The information shall be submitted to the OWNER and ENGINEER for review and the OWNER'S approval not less than 14 days prior to the beginning of the specific operation. Information submitted to the OWNER shall include the sequencing and complete inventory of personnel, materials and equipment on hand or needed to perform the Work. No Work which interferes with the OWNER'S operations will be permitted until the OWNER and ENGINEER have reviewed and the OWNER has approved, in writing, the proposed construction plans, and procedures submitted by the CONTRACTOR. Approval of a CONTRACTOR'S plan shall not constitute acceptance of the completed work or otherwise limit the CONTRACTOR'S performance requirements.

C. If in the opinion of the ENGINEER and the OWNER, the CONTRACTOR'S sequencing of Work or plans are not acceptable, or the CONTRACTOR does not or will not have sufficient materials and equipment on site to complete the Work, the schedule will be rejected, and the CONTRACTOR will not be allowed to perform the Work at the scheduled time and will be required to re-schedule and re-submit its plans. Submission and approval or rejection of detailed descriptions and schedules does not relieve the CONTRACTOR of completing the Contract within the time allowed in the Agreement.

1.03 SAMPLES:

Any samples shall be clearly identified as to material, manufacturer, any pertinent catalog numbers, and use for which intended, and shall be of sufficient size and quantity to clearly illustrate functional characteristics of item, with integrally related parts and attachment devices.

1.04 CONTRACTOR RESPONSIBILITIES:

A. Review shop drawings and samples prior to submission
   a. Indicate approval by stamping "Approved", with Contractor's signature and date on all copies submitted.
   b. Shop Drawings submitted without stamped approval of the Contractor will be returned without review.

B. Determine and verify:
   1. Field measurements.
   2. Field construction criteria.
   3. Catalog numbers and similar data.
   4. Conformance to specifications.

C. Coordinate each submittal with requirements of Work and of Contract Documents.

D. Notify the OWNER and ENGINEER in writing, at time of submission, of any deviations in submittals from requirements of plans, specifications and Contract Documents.

E. Begin no fabrication or Work which requires submittals until submittals have been reviewed by the Engineer and OWNER, as appropriate. Associated shipping, Work, and use of materials by CONTRACTOR shall not begin until the OWNER'S and ENGINEER's review of each respective submittal is complete, and resubmission is not required by the ENGINEER.

F. Literature from manufacturers that includes data not pertinent to this submittal, shall be clearly marked to indicate which portion of the contents is being submitted for the Engineer's review.

G. Samples shall illustrate materials, equipment, or workmanship and establish standards by which completed work is judged.

H. Unless otherwise specifically directed by the Engineer, all samples shall be of the precise article proposed to be furnished.

1.05 SUBMISSION REQUIREMENTS:

A. Make submittals to the ENGINEER promptly in accordance with approved schedule and in such sequence as to cause no delay in Work or in Work of any other CONTRACTOR, the OWNER, or the ENGINEER.

B. Number of Submittals Required:
Submit the number of copies that the Contractor requires to be returned, plus three copies that will be retained by the Engineer.

C. Submittals Shall Contain:
   1. Submittal number.
   2. Date of submission.

3. Project title and number.
4. Contract identification.
5. Names of:
   a. CONTRACTOR.
   b. Manufacturer/supplier.
6. Identification of product, with specification section number.
7. Field dimensions, clearly identified as such.
8. Relation to adjacent or critical features of Work or materials.
9. Applicable standards, such as ASTM or Federal Specification numbers.
10. Identification of deviations from Contract Documents.
11. Identification of revisions on resubmittals.

1.06 RESUBMISSION REQUIREMENTS:

A. Make any corrections or changes in submittals required by the OWNER and/or ENGINEER and resubmit revised editions.

B. Shop drawings:
   1. Revise initial shop drawings and resubmit as specified for initial submittal.
   2. Indicate any changes which have been made other than those requested by ENGINEER.

1.07 DISTRIBUTION:

The Engineer will distribute submittals to the Owner, CQA Personnel or will designate appropriate direct distribution to be made by the CONTRACTOR.

1.08 OWNER AND ENGINEER DUTIES:

A. Return submittals to CONTRACTOR for distribution or for resubmission, if required by Contract Documents. The Engineer will respond to all submittals within fourteen (14) Working days from the date of receipt. Reports from laboratory analysis of submittals to verify compliance with material specifications will be provided to the Contractor within thirty (30) calendar days of receipt by the Engineer. The CONTRACTOR shall provide additional time required for the OWNERS and ENGINEERS review upon request by the ENGINEER.

B. The OWNER and ENGINEER's review of submittals shall not relieve CONTRACTOR from responsibility for any deviations from Contract Documents unless CONTRACTOR has, in writing, called ENGINEER's attention to such deviation at time of submission and the OWNER and/or ENGINEER have given written concurrence pursuant to Contract Documents to the specific deviation, nor shall any concurrence by the OWNER and ENGINEER relieve CONTRACTOR from responsibility for errors or omissions in submittals.

1.12 REQUIRED SUBMITTALS:

CONTRACTOR shall complete all of the following submittal items and any other required submittals specified herein or as requested by the OWNER. The following items and any others specified in the Contract Documents shall be submitted by the CONTRACTOR.

1. Submittal schedule and shop drawing list.
2. Plan of Operations and Progress Schedule.
3. Proposed sources of stone products

4. Certificates of compliance with standards specified for pipe, pipe joints, spacers, fittings, other accessories and specialties.
5. Health and Safety Plan including procedures and facilities.
6. Site Security Plan, if requested by ENGINEER.
7. Dewatering Plan
8. Dust Control Procedures.
9. Plans and procedures for excavation, material placement, haul roads and access ramps, traffic control, material storage and stockpiling and site restoration.
10. Geosynthetics supplier, geosynthetics installer and all pre—construction and construction conformance test data.
11. Leachate Collection and Leak Detection pipes, Spacers and Fittings.
12. Seed mix.
13. Manufacturer's/Suppliers product specifications.
14. Manufacturer's Supplier written certificates of compliance with standards specified for all items specified in this contract upon delivery of such items to the project site.
15. Copies of required manufacturer's quality control test data and reports.
16. Performance data and operating characteristics for materials and equipment.
17. Manufacturer's instructions for installation.
18. Samples of materials for testing and as required by specifications.
19. Friction Analyst Test Results

PART 2 PRODUCT - Not Used

PART 3 EXECUTION – Not Used

END OF SECTION

SECTION 01310

PROGRESS SCHEDULES

PART 1 GENERAL

1.01 SCOPE

A. This section covers requirements for submission, approval and updating of progress schedules and related documents.

1.02 PLAN OF OPERATIONS AND PROGRESS SCHEDULE

A. The CONTRACTOR shall prepare a Plan of Operations and Progress Schedule which shall show concisely the manner of which Work will be started, executed, times upon which different phases of Work are to be started, methods and rate of progress for the different phases and dates of completion of each phase of the Work and all constraints specified in the Contract Documents. The Plan of Operations and Progress Schedule shall be submitted prior to start of Work.

B. The CONTRACTOR shall revise and update his Plan of Operations and Progress Schedule whenever one of the following conditions apply:
   1. When a delay in completion of any Work item or sequence of Work items results in an indicated extension of the Project completion by 10 Working days or more.
   2. When delays in submittals or deliveries, or Work stoppages are encountered which make re-planning or rescheduling of the Work necessary.
   3. When the schedule does not represent the actual production and progress of the Project.

   The CONTRACTOR shall take all appropriate actions including providing additional shifts, crews, personnel, equipment and materials necessary to keep the project on schedule.

C. The CONTRACTOR shall submit four (4) copies of the Plan of Operations and Progress Schedule and each revision to the ENGINEER for review.

1.03 PROGRESS REPORTS

A. The CONTRACTOR shall submit progress reports to the ENGINEER with each payment application. Each report shall include a description of the amount of progress during the past period in terms of completed activities in the Plan of Operations and Progress Schedule currently in effect, a description of problem areas, current and anticipated delay factors and their estimated impact on performance of other activities and completion dates, and an explanation of corrective actions taken or proposed. The progress report shall also include plans for the next period and plans to bring the project back on schedule should it fall behind the schedule submitted by the CONTRACTOR.

B. Four (4) hard copies or one (1) digital copy of each progress report shall be submitted to the ENGINEER.

PART 2 PRODUCT - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01400

QUALITY CONTROL

PART 1 GENERAL

1.01 SCOPE

A Construction Quality Assurance program as required by EGLE and these specifications. The construction Quality Assurance/Quality Control (QA/QC) Plan is incorporated as part of the contract documents. All excavation, earthwork related construction, pipe installations and geosynthetic construction must be performed in the presence of the ENGINEER'S representative. The CONTRACTOR shall cooperate with and assist the ENGINEER with sampling and testing as required by these specifications. The data generated as part of the quality assurance program will govern over data generated from the CONTRACTOR'S required quality control program and any other test data.

1.02 PURPOSES

A. Service of the CQA ENGINEER as specified herein is intended for the OWNER'S verification of the CONTRACTOR'S compliance with the requirements of the Contract Documents and the requirements of the construction permit and shall, in no way, relieve the CONTRACTOR of his responsibilities to provide his own inspection and quality control.

B. Services and quantities of testing as specified herein are approximate and may vary; actual services and quantities of testing will be determined by the OWNER and CQA ENGINEER during the construction period.

1.03 TESTING

A. Earthwork

1. Proposed sources of all materials shall be submitted to the ENGINEER. The CONTRACTOR shall sample the sources and provide samples to the ENGINEER for laboratory analysis. The CONTRACTOR shall not utilize the materials until approval is received from ENGINEER.

2. The following tests may be made as a minimum. ASTM designations specified refer to the latest publication.
   a) Grain Size Analysis (ASTM D-422).
   b) Modified Proctor Moisture-Density Relationship of Soils (ASTM D-1557).
   c) Laboratory permeability testing.
   d) Falling head permeability (ASTM D-5084)
   e) Constant head permeability (ASTM D-2434)
   f) Organic content (ASTM D-2974).
   g) pH content (ASTM D-2976).

h) Atterberg Limits

3. Tests shall be performed by the CONTRACTOR as determined necessary by the OWNER and CQA ENGINEER before acceptance and delivery of fill to the site. Any change in the source of material or change of quality of the material will require a new series of tests to determine acceptability.

4. Delivery and compaction of fill material shall be made in the presence of the ENGINEER and shall be subject to the approval of the ENGINEER. Such observations and tests by no means absolves the CONTRACTOR from responsibility to properly compact and test as specified.

5. Acceptance and/or rejection of materials placed and compacted shall be based upon in-place density test result requirements for each lift and other requirements as stated in these specifications.

B. Geosynthetics

1. Contractor shall provide onsite non-destructive and destructive testing services for review and approval by Engineer in accordance with Section 02310.
2. All geosynthetic installation work and Q/C testing shall be done in the presence of the ENGINEER and shall be subject to its approval.

C. Piping, Mechanical, and Plumbing Systems

1. All piping installation work and testing shall be done in the presence of the CQA ENGINEER and shall be subject to its approval.

PART 2 PRODUCT - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01410

TESTING LABORATORY SERVICES

PART 1 GENERAL

1.01 SUMMARY

A. Section includes, testing required by the Owner to determine that materials and methods provided for the Work meet the specified requirements. Testing includes, but is not limited to:
   1. Bituminous pavement.
   2. Concrete.
   3. Soil gradation.
   4. Welding.
   5. Water quality testing.
   6. Density testing.

1.02 UNIT PRICES

A. The Contractor will be responsible for providing and paying for all testing procedures as described in Article 13 of General Conditions unless specified in this section.

B. The Contractor will be responsible for selecting proper testing laboratories subject to Engineer's approval.

C. Inspections and testing performed exclusively for the Contractor's convenience will be paid for by the Contractor.

D. The Owner will select the testing laboratories and pay for the following tests/inspections:
   1. Density testing
   2. Density and extraction testing of asphalt
   3. Grading of subbase and aggregate base
   4. Concrete testing
   5. Liner seam weld testing

1.03 QUALITY ASSURANCE

A. Testing shall be in accordance with all pertinent codes, regulations, procedures, and requirements of the ASTM and other appropriate agencies.

PART 2 PRODUCTS -Not Used

PART 3 EXECUTION

3.01 PROCEDURE

A. Provide representatives of the testing laboratory with access to the Work at all times.

B. Coordinate the Work with the testing required. Provide a minimum of 24 hours notice to the testing laboratory prior to the need of testing.

C. Furnish all material required for sampling. The testing laboratory will obtain all specimens and samples required for testing. The testing laboratory will be responsible for transporting samples to the laboratory.

D. The testing laboratory will furnish two copies of lab report to the Engineer and one copy to the Contractor.

END OF SECTION

SECTION 01510

TEMPORARY UTILITIES

PART 1 GENERAL

1.01 SUMMARY

A. The CONTRACTOR shall provide all temporary facilities required; including, but not limited to, those in this section.

B. Maintain all temporary facilities in proper and safe condition.

C. Provide and pay all costs for all water, sanitary, electricity, heat, and telephone utilities necessary for the performance of the work.

D. Remove all temporary utilities at the close of the project.

PART 2 PRODUCTS

2.01 GENERAL

A. Materials must be adequate in capacity, must be safe, and must not violate requirements of applicable codes and standards.

2.02 SANITARY FACILITIES

A. The CONTRACTOR shall provide necessary housing for his workmen's use in changing clothes. Toilet accommodations shall be properly secluded from observation and shall be erected and maintained in conformity with prevailing ordinances and sanitary regulations. Adequate washing facilities, including a supply of soap, shall be provided close by and kept in good working conditions. Thorough daily wash-downs and disinfections of the premises throughout the Contract shall be required. These structures along with others for tools, machinery or supplies will be permitted only at approved places and the surrounding area shall be maintained in a satisfactory manner. The ground shall be cleared of paper, cans, bottles and other misc. debris daily. Refuse receptacles shall be provided in convenient locations to the work and maintained.

B. Comply with State and local health department rules and regulations, and all requirements of the Michigan Department of Labor Construction Safety Commission Standards.

2.03 WATER, ELECTRICITY, AND TELEPHONE

A. The contractor will make their own arrangements for temporary service of these utilities.

B. The contractor will be responsible for all costs associated with these utilities.

2.04 TEMPORARY HEATING

A. Provide temporary heat and ventilation necessary to maintain environmental conditions to

facilitate work progress and meet the minimum conditions for the installation of materials, and to protect materials and finishes from damage due to temperature or humidity.

B. The contractor will be responsible for all costs associated with temporary heating and ventilation.

2.05 OFFICE FACILITIES:

A. The CONTRACTOR shall maintain office facilities on the site, including telephone, fax and e-mail/internet connections, for its own operations and shall have a complete set of plans and specifications along with all approved schedules and shop drawings available for reference.

2.06 OWNER'S AND ENGINEER'S CONSTRUCTION OFFICE:

A. The OWNER will provide office space, furniture, and equipment for its personnel, the ENGINEER, CQA personnel, and representatives of EGLE.

PART 3 EXECUTION

3.01 GENERAL

A. Maintain and operate systems to assure continuous service. Modify and extend systems as work progress requires.

B. Install all temporary facilities in accordance with applicable codes. Trailers shall be placed on concrete blocks and leveled, with adequate wooden steps and handrails provided at each exterior door. All laydown and stockpile areas shall be surrounded with silt fence and delineated with orange construction fencing.

C. Remove all temporary facilities when they are no longer required or when the CQA ENGINEER or the OWNER directs the removal of same.

D. Repair all damage to the Project Site caused by the installation of the temporary facilities.

END OF SECTION

SECTION 01536

SAFETY PRECAUTIONS, TEMPORARY CONTROLS AND SECURITY

PART 1 GENERAL

1.01 SUMMARY

A. Provide and maintain adequate facilities for the protection and safety of all persons and property in accordance with Article 7 of General Conditions.

B. The CONTRACTOR shall be solely responsible for performing the construction in a safe manner. The CONTRACTOR shall comply with all applicable statutes and regulations of the State of Michigan, the United States Environmental Protection Agency (USEPA), the United States Department of Transportation (US DOT), and the United States Occupational Safety and Health Administration (OSHA) pertaining to the safe performance of the work.

C. The work to be performed under this contract includes excavation and construction adjacent to miscellaneous fill materials. Excavation and work near the existing landfill cells may encounter hazardous vapors, gases, leachate and other objectionable materials. The work will also involve other potential physical, chemical, and environmental hazards associated with construction materials, equipment and activities in general.

D. Safety program shall be in accordance with Section 700, Article 7.12 through 7.15.

E. Provide and maintain adequate facilities for the protection and safety of all persons and property in accordance with Article 7 of General Conditions.

1.02 UNIT PRICES

A. All work under this Section shall be considered as incidental to construction.

1.03 SUBMITTALS

A. The CONTRACTOR shall prepare and submit to the Engineer a site specific Health and Safety Plan (HASP) designed to address the conditions cited above as well as the CONTRACTOR'S overall HASP for working on the site safely with equipment, materials and personnel. The OWNER, the ENGINEER and its subconsultants and other CONTRACTORS retained by the OWNER, are responsible for preparing and executing their own Health and Safety Plan for their personnel working on the site.

1.04 JOB CONDITIONS

A. The CONTRACTOR shall permit only its employees and subcontractors to enter the site and Work areas. All visitors and unauthorized personnel shall sign in with, and receive

authorization from, the OWNER before entering the site.

B. The CONTRACTOR shall maintain on a daily basis, a list of all CONTRACTOR, subcontractor, and vendor personnel present on the site and shall designate an assembly location in the case of a natural or other site emergency.

C. The CONTRACTOR shall properly barricade all excavations at the end of each Workday.

D. The CONTRACTOR shall lock all gates and inspect the site at the end of the Workday to determine that the site will be secure and safe during the periods when it is unattended by the CONTRACTOR.

E. The CONTRACTOR shall include in his Work Plan specified procedures for surveillance of dewatering pump stations. The work plan shall address procedures to be adopted in the event of pump stoppages, and periods of heavy precipitation when the CONTRACTOR'S normal Work force is not present.

1.05 SITE ACCESS

The CONTRACTOR may access the Site through the Landfill Road entrance.

1.06 REFERENCED STANDARDS

A. Unless otherwise specified, the work for this Section shall conform to all State and National laws, ordinances, rules and regulations pertaining to the kind, including but not limited to the following Standard Specifications:
   1. State of Michigan "Occupational Safety and Health Act", Act 154 of the Public Acts of 1974 (MIOSHA) as administered by the Michigan Department of Labor and Public Health.
   2. MDOT Michigan Manual of Uniform Traffic Control Devices (MMUTCD)

PART 2 PRODUCTS

2.01 SIGNS AND BARRICADES

A. Provide in accordance with MDOT Michigan Manual of Uniform Traffic Control Devices - Part 6.

2.02 TEMPORARY FENCING

A. All fencing be strong and durable enough to discourage unauthorized entrance, constructed with the following materials:
   1. Posts: Wood or steel
   2. Fabric: Snow fence type, wood or plastic, 4 feet high.

2.03 FIRST AID KIT

A. The Contractor shall provide and maintain an emergency first aid kit in an appropriate location onsite. Store this equipment in portable cases in order that it may be easily transported within the work area. Include the following equipment at a minimum:
    a) First-aid kit to accommodate the numbers of on-Site personnel.
    b) Portable emergency eye wash.
    c) Two 20-pound ABC type dry chemical fire extinguishers.
    d) Blankets and towels.
    e) Stretcher.
    f) Hand-held emergency siren

PART 3 EXECUTION

3.01 GENERAL

A. Provide adequate warning signs, barricades, lights, and flagmen as necessary for the protection of the work and safety of the workmen and public. Control devices shall:
    1. Protect workmen and the public from all open trenches and excavations.
    2. Provide temporary fencing to discourage unauthorized entrance.

B. Maintain temporary fencing throughout the duration of construction.

C. Remove temporary fencing at project completion or after permanent fencing is installed.

END OF SECTION

SECTION 01600

MATERIALS AND EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. Furnish all labor, tools, facilities, and materials necessary to properly transport, handle, store and protect all materials and equipment necessary for the performance of the work.

B. All materials shall be new.

C. Immediately upon delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals and that products are properly protected and undamaged.

D. The terms and requirements of the Contract Documents apply to all the Work of this section.

E. Definitions:

1. The term "material" shall include products, equipment, assembly methods, manufacturer, brand, trade name or other description.

2. References to "equal", "approved equal" or similar terms mean that approval of the Engineer is required.

1.02 TRANSPORTATION AND HANDLING

A. Properly protect all materials and equipment to prevent damage during transportation and handling.

B. Detailed special handling requirements are specified under the appropriate specification section for the products handled.

1.03 STORAGE AND PROTECTION

A. Store all materials and equipment to insure the preservation of quality and fitness for the work.

B. All materials shall be shipped, delivered and stored in the manufacturer's undamaged crating and packaging.

C. Protect all materials and equipment before, during, and after installation.

D. All materials shall be protected and stored off the ground and covered as appropriate. All materials shall be protected from damage due to weather, vandalism, sunlight, etc.

E. All previously used, damaged, defective or improperly installed materials and equipment shall be removed from the OWNER'S property and replaced with new, subject to Engineer approval.

F. No damaged material shall be used in the work.

G. All materials requiring specific grading quality or certification shall be stamped with the appropriate designations.

H. All materials shall be stored, tested, installed and cleaned in accordance with the specifications and all specific manufacturer's requirements.

I. All borrow materials shall be segregated by borrow source.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01650

START-UP SERVICES

PART 1 GENERAL

1.01 TEST OPERATION AND RUN-IN:

A. Notify the Engineer and test operate the equipment to the Engineer's satisfaction.

B Test operate all equipment including controls and associated items, after completion of the electrical and mechanical work.

C. Run-in and make ready for operation all equipment after test operations.

D. "Run-in" shall mean sufficient operation to wear in gears, motors, bearings, and any other items in accordance with the manufacturer's recommendations.

E. "Ready for operation" shall mean fully aligned, tested under full load, adjusted, cleaned, and ready for use.

F. "Completely installed" shall mean that the installation is complete and ready for final payment.

1.02 FIELD SERVICES:

A. Secure the services of a qualified equipment manufacturer representative to assist in erection, inspection, make necessary adjustments, initiate the start-up and resolve start-up problems.

B. Provide a qualified equipment manufacturer's representative for instruction of Owner's personnel in the proper operation and maintenance of the equipment.

C. Coordinate the training of personnel through the Engineer after "test operation" and "run-in."

D. Furnish written reports from the equipment manufacturer for each visit. The report shall contain the findings, recommendations, and any pertinent comments, with a signature and title of the representative. At least three (3) copies of the report shall be furnished to the Engineer.

PART 2 PRODUCT - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01700
CONTRACT CLOSE-OUT

PART 1 GENERAL

1.01 SUMMARY

A. Section includes contract close-out requirements.

B. Contract close-out shall be done in accordance with the Contract Documents before final payment will be released.

1.02 GENERAL REQUIREMENTS

A. Clean the site in accordance with Section 5.02 of the General Conditions.

B. Disconnection and removal of temporary utilities from site. Telephone lines shall be disconnected at the source. Water lines or other utility lines required during the post construction period as identified by the ENGINEER or the OWNER, or other utilities considered part of permanent Work shall remain on site.

C. Removal of the temporary facilities.

D. Repair of damaged areas and permanent site security fences damaged during the performance of the Work.

1.03 PROJECT RECORD DOCUMENTS

A. Provide one set of record documents in accordance with Section 7.11 of General Conditions.

B. Provide materials certifications as specified by the Engineer.

C. Submittal of the Record Documents shall be made with a transmittal letter containing:
   1. Date
   2. Project title and number
   3. Contractor’s name and address
   4. Title and number of each Record Document

1.04 GUARANTEES

A. Provide in accordance with Section 7.17 of the General Conditions.

B. Manufacturer's Guarantee:
   1. For each item of equipment, furnish the guarantee of the manufacturer.
   2. Guarantee that the equipment will perform its intended service and that any defective design or workmanship shall be corrected or replaced at no expense to the OWNER.
   3. The guarantee period of the manufacturer's guarantee shall be one year from the

date of final payment of the project by the Owner, unless specified otherwise.

1.05 SUBSTANTIAL COMPLETION

A. Certification that the work is substantially complete shall be in accordance with Section 15.03 of the General Conditions.

1.06 FINAL INSPECTION AND PAYMENT

A. The final inspection, final application for payment and acceptance shall be in accordance with Section 15.05 through 15.08 of the General Conditions.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 02100

INSTRUMENTATION

PART 1- GENERAL

1.01 SCOPE OF WORK

It is of paramount importance on this site that the Contractor protects all instrumentation from damage. Instrumentation includes water quality monitoring wells and/or other devices used to monitor surficial or subsurface properties at the site. Due to the nature of the site and proposed construction, instrumentation may be located within or close to the limits of work.

Subsurface Instrumentation within the proposed grading limits identified on the plans shall be extended to 3-feet +/- 0.5-feet above finish grade using approved materials and methods.

1.02 APPLICABLE SECTIONS

A. Section 02270- Temporary Erosion Control
B. Section 02200- Earthwork

1.03 SUBMITTALS

Prior to the start of site work activities, the Contractor shall submit a plan, at the request of the ENGINEER, detailing the measures to be employed to mark, protect and adjust, as appropriate, instrumentation. The plan shall identify by list and location sketch all instrumentation located within the limits of work.

1.04 PAYMENT

No separate payment will be made for this section. Payment for work under this section shall be incidental to the project.

PART 2- PRODUCTS

2.01 MONITORING WELL CASING

Contractor shall provide 2-inch schedule 40 PVC well casing meeting ASTM standard D1785, or other if approved by Engineer.

Contractor shall provide 2-inch schedule 40 PVC fittings that meet ASTM standard F480, or other if approved by Engineer.

2.02 PROTECTIVE CASING

Contractor shall reuse existing, undamaged well protective casing. Should Contractor damage protective casing during the course of the work, Contractor shall provide new protective cover at no charge to the project.

2.03 EQUIPMENT

1. The Contractor shall only use equipment that has been approved for this work.
2. The Contractor shall furnish, operate, and maintain equipment as is necessary.
3. No PVC solvent glue or primer shall be used.

PART 3- EXECUTION

3.01 GENERAL

The Contractor shall exercise care in performing work adjacent to instrumentation. Any disturbance of the instrumentation shall be reported immediately to the Engineer. Damaged instrumentation shall be replaced or repaired, as directed by the Engineer, at the Contractor's expense within three weeks of the damage occurring. All work shall be stopped within a 100-foot radius of a damaged installation, or as directed by the Engineer, until the installation is repaired and accepted by the Engineer. The installation shall be repaired by the Contractor or at the Contractor's expense as coordinated with and approved by the Engineer. All repair work will be subject to approval by Engineer.

3.02 MARKING

The Contractor shall verify the location and adequately mark and protect all instrumentation within 100 feet beyond the limits of work, including monitoring wells M-605 and soil gas probe GP-7R, prior to beginning site work activities. Such protective measures may consist of, but are not limited to, the temporary placement of boulders or manhole segments around the instrumentation. Caution markings shall be clearly visible from construction equipment.

3.03 WELL EXTENSION

The Contractor shall notify the Engineer prior to extending any monitoring device at the site. Well extension work includes, at a minimum, that the Contractor:

1. Cut and thread casings to extend well casings to 3-feet +/- 0.5-feet above finish grade
2. Provide a flush top-of-casing.
3. Prevent debris and other materials from entering the well casing during completion of the work
4. Set protective cover around well casing such that the top-of-casing can be easily accessed by opening the protective cover
5. Set protective cover in min. 18"x18"x6" thick concrete base

END SECTION

SECTION 02140

DEWATERING

PART 1 GENERAL

1.01 SUMMARY

A. This section specifies the removal and control of leachate, surface water, groundwater, and hydrostatic pressures in the work area to permit all excavation and construction under this contract to be performed in the dry and with stable subgrades. Dewatering consists of performing all work necessary to remove snow, ice, surface water, leachate, groundwater, control of groundwater levels, and control of hydrostatic pressures in order that all excavation and construction is performed in the dry. The CONTRACTOR shall implement, maintain and operate adequate surface and subsurface drainage methods, including storage, sampling, transporting and treatment and disposal of waters collected to the satisfaction of the ENGINEER. The purpose is to keep the construction site dry and excavation side slopes and bottom stable and to control potentially contaminated water from migrating off-site and impacting the surrounding environment. Dewatering shall also be implemented such that the placement and compaction of fill can then proceed unhindered by saturation and the degradation of the area in accordance with the plans and specifications.

B. The CONTRACTOR shall develop, at the request of the ENGINEER, a soil erosion and sedimentation control plan that will include proposed measures to effectively reduce soil erosion resulting from construction practices. Payment of any fines or penalties incurred due to the CONTRACTOR'S negligence or non-compliance shall be the sole responsibility of the CONTRACTOR.

C. The CONTRACTOR shall develop and submit to the ENGINEER a site dewatering plan. The plan shall include the proposed action to remove or prevent snow, ice, surface water, and groundwater from interfering with the proposed work and to prevent such water, which is contaminated or potentially contaminated, from migrating outside the work areas and off-site.

D. Dewatering work shall include all mobilization, supply, installation, operation, maintenance, supervision, dismantling and removal of dewatering equipment from the site, including proper site restoration as approved by the OWNER and or the ENGINEER. Dewatering shall also include all collection and storage facilities, sampling, transportation, treatment and disposal required to properly remove and discharge waters in a proper manner and in compliance with all applicable laws and regulations.

E. The CONTRACTOR shall request and obtain approval from the OWNER prior to commencing any pumping operations or other dewatering operations that divert any on-site water to off-site receptors. The CONTRACTOR shall not pump surface water or groundwater from the Landfill Cell C Phase I construction into previously constructed landfill cells without authorization from the OWNER or the ENGINEER.

F. Related Sections:
Section 01025 MEASUREMENT AND PAYMENT

1.02 UNIT PRICES

Dewatering will be considered incidental to the construction.

1.03 SUBMITTALS

A. Submit a description of the proposed system to the Engineer prior to installation.

B. Description shall include the number, size, and length of wells, pumping equipment, temporary underdrain location, discharge location, and sedimentation control measures.

1.04 QUALITY ASSURANCE

A. Design of the dewatering method shall be the responsibility of the Contractor.

B. Comply with the Soil Erosion and Sedimentation Control Act, and other state and local codes that govern dewatering activities.

1.05 DESIGN REQUIREMENTS

A. Dewatering system shall be capable of lowering the static water table a minimum of 12 inches below all excavations.

1.06 JOB CONDITIONS

A. The CONTRACTOR must familiarize himself with the potential for precipitation, site conditions, subsurface conditions and groundwater conditions.

B. It is anticipated at the time of the construction that there will be potential for water ponding in the excavations, and some subgrades will be wet.

C. The CONTRACTOR shall have on site such equipment as pumps, well points, etc. as necessary to deal with groundwater/surface water conditions. Dewatering system(s) shall be properly constructed to prevent removal of soil fines from the site during dewatering operation. The CONTRACTOR shall monitor the dewatering system. Any dewatering system which does not properly perform, leaks or removes fines from the soil shall be immediately terminated and the dewatering scheme revised accordingly.

PART 2 PRODUCTS

The CONTRACTOR shall provide all equipment, sediment filtering equipment for groundwater treatment, facilities and materials necessary to perform the required dewatering. Such equipment, facilities and materials shall be suitable for their intended use,

have sufficient capacity and shall not leak. Use of leaking pumps, hoses, pipes, storage tanks. etc. shall not be permitted.

PART 3 EXECUTION

3.01 SURFACE WATER DEWATERING:

A. Surface water shall not be pumped or allowed to drain into leachate collection conveyance pipelines until the installation of the geomembrane and leak testing of the leachate and secondary collection piping has met the project requirements to the satisfaction of the ENGINEER. The CONTRACTOR shall take measures to prevent surface water from contacting groundwater, refuse, or leachate contained in existing landfill cells. Water allowed to contact contaminated groundwater, refuse or leachate contained in existing landfill cells shall be treated as leachate and disposed of into the leachate transfer system at the CONTRACTOR's expense.

B. Maintain and operate adequate surface drainage methods to keep the construction site dry and excavation side slopes and bottom stable such that the placement and compaction of fill can proceed unhindered by saturation and degradation of the area. The CONTRACTOR'S proposed plan to eliminate sediment and suspended solids must be approved by the OWNER and the ENGINEER prior to implementation. Diversion ditches, berms, etc. shall be constructed to prevent surface water, resulting from precipitation events, from infiltrating/flowing into working areas not adequately covered by soil or vegetated.

C. Surface water shall be controlled so that the stability of excavated and constructed slopes or bottom is not adversely affected by water, erosion is prevented, and flooding of excavations or damage to pipe and structures does not occur.

D. Surface water must be intercepted and drained away from excavations, work areas, and all exposed fill areas. Pumped surface water shall be done using methods that limit the transportation of suspended solids.

E. Surface water shall not pond on subgrades, in excavations or on fill. Provide proper site grading and construction procedures to promote positive drainage.

F. The CONTRACTOR must take measures to eliminate sediment and suspended solids from flowing to the OWNER'S leachate collection system. The use of filters, stone sumps and settlement basins may be required. The CONTRACTOR'S proposed plan to eliminate sediment and suspended solids must be approved by the OWNER and the ENGINEER prior to implementation.

3.02 GROUNDWATER DEWATERNG:

Where excavations encounter groundwater conditions, the CONTRACTOR must lower the groundwater, prior to excavation, a minimum of 1.5 feet below the excavation bottom using a method approved by the ENGINEER. The CONTRACTOR shall maintain the depressed groundwater elevation until fill material has been placed and compacted to the satisfaction

of the ENGINEER.

The CONTRACTOR shall have on site such equipment as pumps, piping, well points, hoses, pipes, etc. as necessary to control groundwater conditions.

3.03 RESTORATION:

Restore all drainage ditches, sumps and settling basins, berms, etc. used for dewatering when no longer needed, to the satisfaction of the OWNER and the ENGINEER.

3.04 PERFORMANCE REQUIREMENTS

A. Reliability:
   1. Monitor the dewatering system at frequent intervals to insure proper operation.
   2. Provide stand-by equipment as necessary to avoid equipment or power failure.

B. Surface water runoff:
   1. Divert surface water from entering excavated areas or trenches.
   2. Protect adjacent property from damage.
   3. Repair any damage from dewatering activities at no additional cost to the Owner.

C. Remove all dewatering wells and equipment after project completion.

END OF SECTION

SECTION 02150

SHORING AND BRACING

PART 1 GENERAL

1.01 SCOPE

A. Sheeting may be necessary for support of earth excavations where excavation side slopes cannot be sloped backed properly for stability and safety and/or for groundwater considerations. Sheeting shall be used in conformance with pertinent OSHA Regulations to protect employees and to satisfactorily complete the work without causing subsidence and to prevent damage to adjacent ground and structures. These requirements are minimum standards and shall be increased depending on the potential hazard. If removal of temporary sheeting can potentially damage the existing appurtenances, landfills, structures, and the new construction, the sheeting and bracing as necessary, must remain permanently.

1.02 RELATED SECTIONS

Section 01025	MEASUREMENT AND PAYMENT
Section 02200	EARTHWORK
Section 02140	DEWATERING

1.03 UNIT PRICES

Temporary Sheeting, shoring, and bracing will be considered incidental to the performance of the work, unless specifically indicated on the BID SCHEDULE and referred to in Section 01025 MEASUREMENT AND PAYMENT.

Permanent Sheeting, shoring, and bracing will be considered by the Owner and Engineer as a potential change order.

1.04 QUALITY ASSURANCES

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Comply with all standards set forth in the Federal and State Occupational Safety and Health Act.

1.05 DESIGN CRITERIA:

A. The CONTRACTOR shall assume responsibility for the design of all excavation support systems, regardless of approval of the plans or methods of construction, by the ENGINEER and/or the OWNER. The CONTRACTOR shall design and construct support systems in accordance with the following criteria.

B. The design of the excavation support shall be made by a Registered Engineer licensed in the State of Michigan experienced in the design of earth support systems. The CONTRACTOR shall submit sheeting and bracing plans bearing the stamp of the Professional Engineer for review by the ENGINEER and the OWNER.

C. Design each member with a proper factor of safety to support the maximum loads that can occur during construction including all potential live loads and surcharge loads.

D. Carry the bottom of the support system to a depth below the main earth excavation adequate to resist design soil pressures. The design shall account for potential undercutting of the excavation bottom due to the presence of unsuitable subgrade soils.

E. Design for staged removal to conform to construction and backfill sequences.

F. Do not continue excavation in running soils. Dewater properly prior to excavation. Employ a positive means of containing the material behind the lagging before excavation continues.

1.06 SUBMITTALS:

A. Working Drawings:

1. General: Submit working drawings in accordance with Section: 01300.

2. Include the following on the drawings:

a. Details, arrangement and method of construction of the proposed system.

b. The method of preloading and bracing.

c. The elevation of struts and shores, as applicable, and permissible depth to which excavation may be carried before such supports are installed and preloaded.

d. The full excavation depths, the depths below the main excavation to which the support system will be installed, and the maximum design load to be carried by the various members of the support system, and preloads.

e. Design calculations including references to design methods, assumptions, design parameters, material properties, allowable stresses and other pertinent information.

PART 2 PRODUCTS - Not used.

PART 3 EXECUTION

3.01 INSTALLATION

A. Provide sheeting, shoring, trench box, or bracing to prevent caving or sliding, and to protect workmen and adjacent structures and facilities.

B. Fill and compact voids outside the sheeting.

C. Prevent concentrated loads on any structure or pipe within the excavation.

D. Installation of earth support systems shall be performed without causing damage to adjacent ground, structures, utilities and the landfill.

E. If unstable material is encountered during excavation, suitable measures must be taken to contain it in place and prevent ground displacement that may cause damage.

3.02 REMOVAL

A. Removal of support system shall be done such that the constructed structure remains undisturbed and no disturbance or damage shall occur to adjacent structures, utilities, landfill, or other appurtenances. If removal of temporary support system can potentially damage adjacent features, then the support system may remain permanently with permission from the owner.

B. Fill all voids caused by withdrawal of sheeting with clean compacted sand.

C. The CONTRACTOR shall repair all damage to property resulting from installation or removal of the support system at no additional cost to the OWNER.

END OF SECTION

SECTION 02200
EARTHWORK

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:
   1. Excavating, shaping, and grading surfaces
   2. Placing fill and embankments
   3. Salvaging and stockpiling select material
   4. Disposal of surplus or unsuitable material
   5. Other earthwork indicated on the plans for site modification or placement of structures.

1.02 DEFINITIONS

A. Earth excavation is the removal of in-place fill soils and natural overburden soil using proper earth moving equipment.

B. Fill placement or back filling is the placement of compaction of earthen materials to construct the various components of the project to the lines and grades shown.

C. Authorized excavation is excavation of overburden soils to the excavation limits shown. It includes excavation of material considered unsuitable by the Engineer and other excavation as directed by the Owner or the Engineer.

D. Unauthorized excavation is excavation of materials beyond the limits shown or excavation not authorized by the Owner or the Engineer.

1.03 QUALITY ASSURANCES

A. Materials:
   1. All materials used as fill or subgrade shall be approved by the Engineer.
   2. Determine gradation in accordance with ASTM C136.
   3. Determine percent loss by washing in accordance with ASTM C117.

B. Compaction:
   1. Determine maximum density using the Modified Proctor Method, ASTM D1557.
   2. Field determination of in place density shall be by Nuclear Density Method, ASTM D6938, or other approved method.

1.04 SITE CONDITIONS

A. Dust Control: The Contractor shall control dust in the work area and hail roads by sprinkling with potable water or by other methods approved by the OWNER. Petroleum

products shall not be utilized.

B. Access Roads, Ramps and Staging Areas:

1. The Contractor shall construct temporary staging areas and access roads as necessary to provide access to the work areas, as approved by the Owner and the Engineer. Staging and material storage areas shall be constructed in the areas of the site shown for such purposes.
2. The Contractor shall be responsible for maintaining existing site access roads throughout the duration of the contract, as necessary to provide access to the site for both the Contractors' operations and the operations of the Owner and others engaged by the Owner at the site.
3. The Contractor shall remove all temporary roads, ramps and staging areas when no longer needed to restore the site conditions as approved by the Owner and the Engineer.

C. Contractor shall provide all stone products required.

D. Contractor may use screened fill material from an on-site stockpile meeting the material requirements set forth in this Section for all granular soils backfill required. Contractor shall perform all on-site screening.

E. Construction Quality Assurance:

1. A Construction Quality Assurance (CQA) program will be implemented during construction to ensure that the in-place soils and materials meet the requirements of these specifications. The Engineer will oversee the quality program. The Contractor shall comply with the requirements of the CQA Plan, as detailed in these specifications, and provide all necessary sampling, testing and documentation that is specified to be the responsibility of the Contractor or its subcontractors and suppliers. The Contractor shall assist the Engineer to accommodate certain specified sampling and testing items at no additional cost to the Owner.

2. Inspection of Material Sources: The Engineer may inspect off-site sources of materials and request the Contractor to perform tests of those materials to verify compliance with the specifications. The Engineer may also make his own tests.

F. Soil Borings

1. Soil borings were not conducted at the site for the preparation of these specifications. Refer to Supplementary Condition SC-5.03 for information on subsurface conditions.

1.05 UNIT PRICES

Refer to Section 01025 MEASUREMENT AND PAYMENT.

1.06 REFERENCED STANDARDS

Unless otherwise specified, the work for this Section shall conform to the applicable portions of the following Standard Specifications:

ASTM - American Society for Testing and Materials
MDOT - Michigan Department of Transportation
OSHA - Occupational Health and Safety Association

A. The latest version of the following ASTM standards shall be used:

1. ASTM D422 – Standard Test Method for Particle Size Analysis of Soils. (Withdrawn 2016)
2. ASTM D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3).
3. ASTM D1556 – Test Methods for Density and Unit Weight of Soil in Place by Sand-Cone Method.
4. ASTM D1557- Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3).
5. ASTM D2216 – Standard Method for Laboratory Determination of Water (moisture) Content of Soil and Rock by Mass.
6. ASTM D2434 – Standard Test Methods for Permeability of Granular Soils (Constant Head). (Withdrawn 2015).
7. ASTM D2487 – Standard Test Methods for Classification of Soils for Engineering Purposes.
8. ASTM D6938 – Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
9. ASTM D4318 – Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soil.
10. ASTM D4373 – Standard Test Method for Rapid Determination of Carbonate Content of Soils.
11. ASTM D5084 – Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.

1.07 SUBMITTALS

A. The Contractor shall submit dust control procedures, location of off-site material sources, and test samples of proposed material samples (off and on-site) for analysis by Engineer to confirm compliance with specified requirements

B. Earthwork procedures, material handling and stockpiling procedures and locations shall be detailed by the Contractor in the Work Plan, as required by the Owner and the Engineer.

C. At least 30 days prior to commencing filling operations, the Contractor shall submit to the Engineer samples for laboratory testing to be performed on representative samples of soil materials from the proposed sources. The test results shall demonstrate compliance of each material with the properties required in these specifications.

D. The Contractor shall follow the same procedure set forth in paragraph 1.07C of this Specification for any required or desired change in material sources.

E. If the Contractor's test samples fully satisfy the specification requirements, the test results may be counted by the Engineer as the first conformance test for the subject material.

F. The Contractor shall submit all other documents required herein for review and acceptance in accordance with this specification.

PART 2 PRODUCTS

2.01 MATERIALS

A. General:
1. Onsite soil may be utilized as fill material if approved by the Engineer prior to placement.
2. Fill material shall be free from large rocks (greater than 6"), clay, organic matter, roots, debris, and frozen soil.
3. Obtain fill material from on-site excavations, or from an approved borrow area.
4. Provide Engineer with access to material source.

B. Topsoil:
Dark brown or black loam, clay loam, or sandy loam, of a fertile, humus soil origin.

2.02 MATERIALS, GENERAL

A. General: Excavations made at the site for the construction of project facilities will generate soil materials. These soils will either be suitable or unsuitable for use as fill in the construction of earth-related portions of the project.

1. Suitable Materials: Those materials generated on-site excavations that satisfy the property requirements for the material for which it is to be used. Specified properties for suitable project materials are set forth in Paragraphs 2.03A. The specified properties must be met unless approved otherwise by the Engineer.

2. Unsuitable Materials: Those materials generated from on-site excavations that do not satisfy the specifications for the project materials identified in Paragraphs 2.03 through 2.03D. Generally, these materials will contain vegetation, organic matter, debris, or frozen materials. Disposal or stockpiling of unsuitable materials shall be in accordance with Paragraph 3.01E

2.03 MATERIALS, SUBGRADE

A. Subgrade

1. Suitable materials include:
MDOT Class III from a MDOT certified source
Onsite materials that meet the following gradation:

SIEVE DESIGNATION	% PASSING BY WEIGHT
6-inch	100
3-inch	85-100
1-inch	75-100
No. 4	50-100
No. 100	0-20
No. 200	0-10

2. The Contractor shall identify and sample, and allow Engineer to sample, the material from the borrow source at least 30 days prior to construction for analysis by the Engineer. The Engineer will develop moisture-density-permeability relationships for the proposed soils to determine field control parameters for in-place density tests and determine that proposed soils will satisfy permeability required at the specified moisture contents and densities for placement and compaction.

PART 3 EXECUTION

3.01 DUST CONTROL

A. Control dust at the Work area at all times to prevent dust from becoming a nuisance to the public, neighbors, or the work of others on the site.

B. Provide moisture or otherwise treat surfaces to control dust.

3.02 TOPSOIL

A. Removal:
1. Remove all topsoil from areas to be occupied by structures, improved surfaces, or where new grades are to be established.
2. Stockpile topsoil for future use in finish grading at a site approved by the Engineer.

B. Application:
1. Provide topsoil over all disturbed areas not occupied by structures or improved surfaces.
2. Spread the stockpiled topsoil over the prepared rough grade to a minimum depth of

3 inches.
3. Provide additional topsoil as required to complete the Work.
4. Finish grade, and rake the topsoil to remove all stones, sticks, roots, and debris in preparation for seeding.
5. Excess topsoil may be used for fill in non-critical areas.

3.03 EXCAVATING-GENERAL

A. Excavate to the lines and grades shown on the plans.
B. Provide safe excavation slopes in accordance with OSHA Regulation 29CFR1926, Subpart P.
C. Dispose of excess excavated material off site or on site at a location approved by the Engineer.
D. Enlarge excavations laterally to provide adequate room for construction or provide shoring and bracing in accordance with Section 02150, as necessary.
E. No additional allowance above the bid price for excavation will be made on account of any of the material being wet or frozen.
F. Common excavation includes all material, including peat, silt, clay, glacial till, and sand.

3.04 EXCAVATING, BACKFILLING, AND COMPACTING FOR CRITICAL AREAS

A. Critical areas include all:
   a. Areas within existing, proposed and future cell boundaries
   b. Liner anchor trench
   c. Proposed final access roads
   d. Other areas as indicated on the plans

B. Over-excavation:

1. Excavations shall be made to the full dimensions required and shall be finished to the prescribed lines and grades.
2. In the event clay or stone is encountered at the bottom of the excavation, undercut bottom a minimum of 12 inches.
3. If muck or other deleterious material is encountered, remove this material to a depth where suitable subgrade soil is encountered, unless otherwise instructed by the Engineer.
4. Backfill to proposed subgrade elevation with material in accordance with 2.03.
5. Compact backfill in lifts not exceeding 9 inches to 95% Modified Proctor density.
6. Any and all excess excavation for the convenience of the Contractor or over excavation performed by the Contractor for any purpose or reason, except as pre-approved in writing by the Owner, and whether or not due to the fault of the Contractor, shall be at the expense of the Contractor. Where required to complete the work, all such excess excavation and over excavation shall be refilled with materials furnished and placed at the expense of the Contractor.
7. The Contractor shall inform the Engineer and the Owner of all substantial over excavation operations prior to commencing any such work, so that any associated

stability issues may be identified. The Contractor shall be prepared to alter their operations to enhance stability.

8. All excavation to subgrade for liner system construction, embankment construction, pipe installation, and structure foundations shall be performed in the dry, with adequate dewatering procedures implemented.
9. All necessary precautions shall be taken to ensure that the material below and beyond the established excavation lines remains in the soundest possible condition.

C. Backfilling:
1. Remove all debris from excavation prior to backfilling.
2. Compact excavation bottom to 95% Modified Proctor density to a depth of 2 feet prior to placing backfill.
3. Backfill material shall meet the specifications in 2.03.
4. Compact backfill in lifts not exceeding 9 inches (loose) to 95% Modified Proctor density.

D. Subgrade Preparation-General
1. Prior to fill placement, the subgrade shall be firm, dry and free from debris, ice, and snow. Fill shall not be placed over frozen soil unless otherwise approved by the Engineer.
2. Subgrade preparation shall be followed as closely as possible by fill placement. Deterioration of the subgrade between excavation and initial fill placement shall be responsibility of the contractor and shall be repaired at the Contractor's expense.
3. The Contractor shall proof roll exposed subgrade using a smooth-drum roller prior to placing fill or liner system components. Proof rolling shall be performed in the presence of the Engineer.
4. All subgrade must be inspected and approved by the Engineer prior to fill placement. Sufficient time shall be given to the Engineer to inspect and perform any necessary tests (e.g., field moisture-density tests) on the subgrade as set forth in Paragraph 3.07 of this section, as well as to visually inspect proof-rolling activities.

E. Refilling Unauthorized Excavation:
1. The Contractor shall use materials selected by the Engineer based on the location of the excavation.

F. Disposition of Excavation Materials:
1. Suitable materials generated from excavations shall be used, to the maximum extent shown on the Drawings, to construct the earthwork components of the project.
2. Suitable materials are those materials meeting the property requirements set forth in Paragraph 2.03 of this section.
3. Excavated materials which are unsuitable for, or are more volume than the project earthwork requirements, shall be stored in the stockpile areas designed on the drawings or as directed by the Owner.
4. The Contractor's operations in excavations shall yield as much suitable material for construction as practicable. The Contractor shall excavate unsuitable materials to be stored, and the unsuitable materials shall be segregated by loads during the

excavation operations. The suitable materials shall be placed in the designated final locations directly from the excavation or shall be placed in temporary stockpiles and later placed in the designated locations.

5. Excavated materials which are suitable for reuse shall be placed and compacted as soon as practicable following excavation. During winter-like working conditions (freezing temperatures), the Contractor's operations shall be coordinated, and the appropriate equipment used to ensure the reuse of excavated materials is maximized to the extent practicable. Frozen materials shall not be allowed for reuse unless allowed to thaw and properly adjust for moisture content. If material is placed while still frozen, the Contractor shall remove and handle as an unsuitable material at no additional expense to the Owner.

3.05 EXCAVATING, BACKFILLING, AND COMPACTING FOR NON-CRITICAL AREAS

A. Non-Critical areas are those not designated as critical areas.

B. Over-excavation:

1. Excavations shall be made to the full dimensions required and shall be finished to the prescribed lines and grades.
2. If muck or other deleterious material is encountered, remove this material to a depth where suitable subgrade soil is encountered, unless otherwise instructed by the Engineer.
3. Backfill to proposed subgrade elevation with native, local material.
4. Compact backfill in lifts not exceeding 9 inches to 90% Modified Proctor density.
5. Any and all excess excavation for the convenience of the Contractor or over excavation performed by the Contractor for any purpose or reason, except as pre-approved in writing by the Owner, and whether or not due to the fault of the Contractor, shall be at the expense of the Contractor. Where required to complete the work, all such excess excavation and over excavation shall be refilled with materials furnished and placed at the expense of the Contractor.
6. The Contractor shall inform the Engineer and the Owner of all substantial over excavation operations prior to commencing any such work, so that any associated stability issues may be identified. The Contractor shall be prepared to alter their operations to enhance stability.
7. All necessary precautions shall be taken to ensure that the material below and beyond the established excavation lines remains in the soundest possible condition.

C. Backfilling:
1. Remove all debris from excavation prior to backfilling.
2. Compact excavation bottom to 90% Modified Proctor density to a depth of 2 feet prior to placing backfill.
3. Compact backfill in lifts not exceeding 9 inches to 90% Modified Proctor density.

D. Subgrade Preparation-General
1. Prior to fill placement, the subgrade shall be firm, dry and free from debris, ice, and

snow. Fill shall not be placed over frozen soil unless otherwise approved by the Engineer.

2. Subgrade preparation shall be followed as closely as possible by fill placement. Deterioration of the subgrade between excavation and initial fill placement shall be responsibility of the contractor and shall be repaired at the Contractor's expense.
3. All subgrade must be inspected and approved by the Engineer prior to fill placement. Sufficient time shall be given to the Engineer to inspect and perform any necessary tests (e.g., field moisture-density tests) on the subgrade as set forth in Paragraph 3.07 of this section, as well as to visually inspect proof-rolling activities.

E. Refilling Unauthorized Excavation:
1. The Contractor shall use materials selected by the Engineer based on the location of the excavation.

F. Disposition of Excavation Materials:
1. Suitable materials generated from excavations shall be used, to the maximum extent shown on the Drawings, to construct the earthwork components of the project.
2. Suitable materials are those materials meeting the property requirements set forth in Paragraph 2.03 of this section.
3. Excavated materials which are unsuitable for, or are more than the project earthwork requirements shall be stored in the stockpile areas designed on the drawings or as directed by the Owner.
4. The Contractor's operations in excavations shall yield as much suitable material for construction as practicable. The Contractor shall excavate unsuitable materials to be stored, and the unsuitable materials shall be segregated by loads during the excavation operations. The suitable materials shall be placed in the designated final locations directly from the excavation or shall be placed in temporary stockpiles and later placed in the designated locations.
5. Excavated materials which are suitable for reuse shall be placed and compacted as soon as practicable following excavation. During winter-like working conditions (freezing temperatures), the Contractor's operations shall be coordinated, and the appropriate equipment used to ensure the reuse of excavated materials is maximized to the extent practicable. Frozen materials shall not be allowed for reuse unless allowed to thaw and properly adjust for moisture content. If material is placed while still frozen, the Contractor shall remove and handle as an unsuitable material at no additional expense to the Owner.

3.06 STABILITY OF EXCAVATIONS

A. General:
1. Side slopes of excavations and means for access/egress shall comply with OSHA, other Federal, and State Regulations and Local Codes. The Contractor shall shore and brace in accordance with Section 02150.

3.07 GRADING

A. Grading: The Contractor shall uniformly grade areas within limits of grading including adjacent transition areas. The Contractor shall smooth finish surfaces within the following specified tolerances:

DESCRIPTION	ELEVATION TOLERANCE
Excavation/Top of Prepared Subgrade	-0.20 feet to 0.00 feet
Top of Primary Liner System	0.00 feet to +0.10 feet
Top of Leachate Drainage Sand Layers	0.00 feet to +0.10 feet
Leachate and Secondary Collection Pipes	±0.02 feet
Non-Critical Areas	-0.2 to +0.2 feet

B. Compaction: After grading, the Contractor shall compact the surface to the percentage of maximum density specified for each area and fill material, unless approved otherwise by the Engineer.

3.08 DEWATERING

A. General:
1. The Contractor shall perform all work in the dry, and shall prevent surface water and groundwater from flowing into excavations and from flooding any portion of the project site or surrounding area. Refer to section 02140 for additional requirements for dewatering.

3.09 TESTING

A. General:
1. The Engineer will measure the actual in-place moisture and density of fill materials using field tests. Costs for initial tests will be paid by Owner. The Contractor shall perform, at no additional cost to the Owner, additional work to obtain proper compaction if in—place moisture or density do not meet specifications.
2. The Engineer will observe construction and perform testing at locations that he will select. The results of these tests will be made available to the Contractor on a timely basis so the Contractor can take such actions as are required to remedy indicated deficiencies.
3. Removal of non-conforming materials could damage subsequently installed components of the liner system. For this reason, conformance testing of these materials (i.e. grain size distribution, etc.) will be performed on samples obtained by the Engineer at either the borrow pit or from on—site stockpiles. Placement of these materials shall not commence until satisfactory test results are received and approval to place the fill material is given to the Contractor by the Engineer.
4. Delivery and compaction of fill materials shall be made during the presence of the Engineer and shall be subject to testing to determine compliance with material, placement, and compaction specifications. The Engineer 's presence does not include supervision or direction of the actual work by the Contractor, his employees, or agents. Neither the

presence of the Engineer, nor any observations and testing performed by him, shall excuse the Contractor from defects discovered in his work.

3 .10 MAINTENANCE

A. Protection of Graded Areas: The Contractor shall protect newly graded areas from traffic or erosion, and keep free of trash and debris. The Contractor shall repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

B. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, the Contractor shall scarify the surface, re-shape, and compact to the required moisture and density at no additional cost to the Owner.

3.11 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. The CONTRACTOR shall dispose of excess and waste materials in accordance with Section 02900.

END OF SECTION

SECTION 02330
GEOSYNTHETIC CLAY LINER

PART 1- GENERAL

1.01 SCOPE

This specification covers the technical requirements for the Manufacturing and Installation of the fabric encased geosynthetic clay liner (GCL). All materials meet or exceed the requirements of this specification, and all work will be performed in accordance with the procedures provided in these project specifications.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)
1. ASTM D 4632, "Standard Test Method for Grab Breaking Load and Elongation of Geotextiles"
2. ASTM D 4643, “Determination of Water (Moisture) Content of Soil by the Microwave Oven Method”
3. ASTM D 5084, “Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter”
4. ASTM D 5261, “Standard Test Method for Measuring Mass Per Unit Area of Geotextiles”
5. ASTM D 5321, “Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method”
6. ASTM D 5887, "Measurement of Index Flux Through Saturated Geosynthetic Clay Liner Specimens Using a Flexible Wall Permeameter"
7. ASTM D 5888, “Standard Guide for Storage and Handling of Geosynthetic Clay Liners”
8. ASTM D 5889, “Standard Practice for Quality Control of Geosynthetic Clay Liners”
9. ASTM D 5890, “Standard Test Method for Swell Index of Clay Mineral Component of Geosynthetic Clay Liners”
10. ASTM D 5891, “Standard Test Method for Fluid Loss of Clay Component of Geosynthetic Clay Liners”
11. ASTM D 5993, "Standard Test Method for Measuring Mass Per Unit of Geosynthetic Clay Liners"
12. ASTM D 6102, "Standard Guide for Installation of Geosynthetic Clay Liners"
13. ASTM D 6243, "Standard Test Method for Determining the Internal and Interface Shear Resistance of Geosynthetic Clay Liner by the Direct Shear Method"
14. ASTM D 6496, "Standard Test Method for Determining Average Bonding Peel Strength Between the Top and Bottom Layers of Needle-Punched Geosynthetic Clay Liners"
15. ASTM D 6768, "Standard Test Method for Tensile Strength of Geosynthetic Clay Liners"
16. ASTM E 96, "Standard Test Methods for Water Vapor Transmission of Materials"

1.03 DEFINITIONS

A. Geosynthetic Clay Liner (GCL) - A factory manufactured hydraulic barrier consisting of granular sodium bentonite clay, sandwiched between, supported and encapsulated by two geotextiles, held together by needle punching.
B. Geotextile - A semi-permeable woven or nonwoven fabric used to contain the bentonite used in a GCL.
C. Sodium Bentonite - The high swelling clay component of GCLs consisting primarily of the mineral Montmorillonite.
D. Needle punching - A GCL manufacturing process whereby boards of barbed needles incorporate the staple fibers from a nonwoven geotextile, through a sodium bentonite clay layer, into the matrix of a second geotextile layer.
E. Thermal Fusing - A needle punching enhancement process utilizing heat to bond the needle punched fibers and more permanently lock them into the second geotextile to increase the internal shear strength characteristics.
F. Minimum Average Roll Value (MARV) - The minimum average value of the material in a particular lot calculated as the mean of the tested values minus two standard deviations providing a 95% confidence level.

1.04 SUBMITTALS

A. Post-Award
    1. Manufacturer's Quality Control Manual
    2. Manufacturer's Product Datasheet for proposed material with certified test results for all properties identified in Table 2.3A.
    3. Project Reference List for GCL consisting of at least ten projects totaling 5 million square feet in size.
    4. At least 14 days prior to shipping material to site
        a. Certification of quality control tests from manufacturer on GCL product
        b. Certification of quality control tests from manufacturer on Bentonite
        c. A representative sample, approximately 3" x 5" of proposed GCL
    5. Prior to installing GCL
        a. Certification signed by the Contractor and CQA Inspector of subgrade acceptance
    6. Upon completion of GCL installation
        a. Certification by Installer that the GCL was installed per project specifications
        b. Material and Installation Warranties
        c. As-built drawings showing actual GCL placement

1.05 CONSTRUCTION QUALITY ASSURANCE (CQA)

A. The OWNER will engage and pay for the services of a third party CQA inspector (ENGINEER) for monitoring the quality and installation of the GCL.
B. The specific CQA inspector designated by the Owner shall be responsible for all aspects of the field QA program in accordance with this specification and specification 01400.
C. The Contractor shall be responsible for submitting, to the Engineer, the requested testing results requested of the Manufacturer, including the documentation and monitoring of the manufacturing and installation processes.

1.06 QUALIFICATIONS

A. Manufacturer
   1. MANUFACTURER shall have manufactured a minimum of 10 million square feet of GCL.

B. Installer
   1. Installation shall be performed by an installer approved by the Manufacturer
   2. Installer shall have experience installing GCLs on at least 5 projects and have installed a minimum of 1 million square feet of GCL materials.

1.07 DELIVERY, STORAGE & HANDLING

A. General: Conform to the MANUFACTURER'S requirements and ASTM D5888 unless otherwise specified.

B. Delivery:
   1. Deliver material to the site only after the Engineer accepts required submittals.
   2. Material shall be covered with a waterproof plastic covering resistant to ultraviolet degradation.
   3. Ship less than one month prior to scheduled installation unless otherwise approved by Engineer.
   4. Each roll shall be marked with the following information:
      a. manufacturer's name
      b. product identification
      c. Lot number and roll number
      d. Roll length, width and weight

C. Handling:
   1. The Contractor shall verify that proper handling equipment exists which does not pose any danger to installation personnel or risk of damage or deformation to the liner material itself. Suitable handling equipment is described below:
      a. Spreader Bar Assembly - A spreader bar assembly shall include both a core pipe or bar and a spreader bar beam. The core pipe shall be used to uniformly support the roll when inserted through the GCL core while the spreader bar beam will prevent chains or straps from chafing the roll edges.
      b. Stinger - A stinger is a rigid pipe or rod with one end directly connected to a forklift or other handling equipment. If a stinger is used, it should be fully inserted to its full length into the roll to prevent excessive bending of the roll when lifted.
      c. Roller Cradles - Roller cradles consist of two large diameter rollers spaced approximately 3 inches apart, which both support the GCL roll and allows it to freely unroll. The use of roller cradles shall be permitted if the rollers support the entire width of the GCL roll.
      d. Straps – A properly structured and supported pole or "carpet puller" can be used to unload GCL rolls onsite. As an alternative, straps that are appropriately rated can be used as an approved lifting method to unload GCL rolls.

D. Storage:
   1. Store rolls in space allocated by Engineer. Space should be at high ground level or elevated above ground surface.
   2. Stack no more than 3 rolls high.
   3. Protect rolls from UV, precipitation, other sources of moisture, mud, dirt, dust, puncture, cutting or any other damaging or deleterious conditions.
   4. An additional tarpaulin or plastic sheet shall be used over the stacked rolls to provide extra protection for GCL material stored outdoors.

5. Preserve integrity and readability of roll labels.
6. Bagged bentonite material shall be stored and tarped next to GCL rolls unless other more protective measures are available. Bags shall be stored on pallets or other suitably dry surface which will prevent undue prehydration.

E. GCL Inspection upon Delivery:

1. Each roll shall be visually inspected when unloaded to determine if any packaging or material has been damaged during transit.
2. Repairs to damaged GCL shall be performed in accordance with Section 3.7 of this specification.

a. Rolls exhibiting damage shall be marked and set aside for closer examination during deployment.

b. Minor rips or tears in the plastic packaging shall be repaired with moisture resistant tape prior to being placed in storage to prevent moisture damage.

c. GCL rolls delivered to the project site shall be only those indicated on GCL manufacturing quality control certificates.

d. For needlepunched GCLs, the presence of free-flowing water within the packaging shall require that roll to be set aside for further examination to ascertain the extent of damage, if any. Free-flowing water within the packaging of GCLs shall be cause for rejection of that roll.

1.08 WARRANTY

A. Material shall be warranted, on a pro-rata basis against Manufacturer's defects for a period of 5 years from the date of geomembrane installation.

B. Installation shall be warranted against defects in workmanship for a period of 1 year from the date of geomembrane completion.

PART 2- PRODUCT

2.01 QUALIFICATIONS

A. The GCL product supplied to the project shall be in full accordance with the requirements of this section.

B. The GCL shall be manufactured by mechanically bonding the geotextiles using a needlepunching process as described in Section 1.3 to enhance frictional and internal shear strength characteristics.

2.02 MATERIALS

A. Acceptable Products
   1. GSE BentoLiner
   2. CETCO Bentomat
   3. Engineer approved alternative

B. Alternative Materials

1. Prior to considering an alternative GCL material, the Contractor shall submit certified test results and statements of quality from the proposed GCL supplier to the engineer, indicating without exception that the proposed GCL meets the requirements of this specification.

2.3 GCL PHYSICAL PROPERTIES

A. The GCL material shall be in accordance with the test methods, test frequencies and material physical properties as listed in Table 2.3A.
B. Overlap Markings - A minimum overlap guide-line and a construction match-line delineating the overlap zone shall be imprinted with non-toxic ink on both edges of the GCL panel to ensure the accuracy of the seam. These lines shall be used during CQA to ensure the minimum overlap is achieved. The minimum overlap guideline shall indicate where the edge of the panel must be placed in order to achieve the correct overlap for each panel
C. Accessory Bentonite - Any accessory bentonite used for sealing seams, penetrations, or repairs, shall be the same granular bentonite as used in the production of the GCL itself.

Table 2.3A: Geosynthetic Clay Liner Properties

Tested Property	Test Method	Frequency	Value
Geotextile Property			
Cap Nonwoven, Mass/Unit Area	ASTM D 5261	1/200,000 ft^2	6.0 oz/yd^2 MARV(1)
Carrier Woven, Mass/Unit Area	ASTM D 5261	1/200,000 ft^2	3.1 oz/yd^2 MARV
Bentonite Property			
Sodium Bentonite Content			90%, minimum
Swell Index	ASTM D 5890	1/100,000 lb	24 ml/2 g min
Moisture Content	ASTM D 4643	1/100,000 lb	12% max
Fluid Loss	ASTM D 5891	1/100,000 lb	18 ml max
Finished GCL Property			
Bentonite, Mass/Unit Area(2)	ASTM D 5993	1/40,000 ft^2	0.75 lb/ft^2 MARV
Tensile Strength(3)	ASTM D 6768	1/40,000 ft^2	30 lb/in MARV
Peel Strength	ASTM D 6496 ASTM D 4632(4)	1/40,000 ft^2	3.5 lb/in MARV
Hydraulic Conductivity(5)	ASTM D 5887	1/Week	5 x 10^{-9} cm/sec max
Index Flux(5)	ASTM D 5887	1/Week	1 x 10^{-8} m^3/m^2/sec max
Internal Shear Strength(6)	ASTM D 6243	Periodically	500 psf

NOTES:
• (1)Minimum Average Roll Value.

- [(2)]At 0% moisture content.
- [(3)]Tested in machine direction.
- [(4)]Modified ASTM D 4632 to use a 4 in wide grip. The maximum peak of five specimens averaged in machine direction.
- [(5)]Deaired, deionized water @ 5 psi maximum effective confining stress and 2 psi head pressure.
- [(6)]Typical peak value for specimen hydrated for 24 hours and sheared under a 200 psf normal stress.

2.04 CONFORMANCE TESTS

A. Shear strength conformance testing shall be performed on samples submitted by the Contractor or Manufacturer to the QA Laboratory prior to GCL installation activities start. The samples should be submitted directly from the manufacturer's plant. Only one shear strength test for each interface shall be performed. Manufacturer's shear strength may also be submitted if available and meets the project specifications.

B. Samples shall be identified with a waterproof marker by manufacturer's name, product identification, lot and roll number. The date, a unique sample number, the machine direction, and the top surface of the GCL shall also be noted on the sample. The outer layer of the GCL roll shall be discarded prior to sampling a roll

C. Samples shall be collected by cutting the full-width of the GCL sheet a minimum of 1m (3-feet) wide in the machine direction. After cutting, the GCL sample shall be manually rolled around a core at least 3 inches in diameter. The GCL shall be wound on the core without slack. Strapping tape a minimum of 2 inches in width shall then be wound around the sample in at least two places to secure the loose end. A minimum of two layers of plastic sheeting shall be used to wrap the GCL sample roll for shipment. A thin cellophane material which covers the entire sample a minimum of three times shall be used as the inner wrapping. The outer wrapping shall be at least 6 mils (0.25 inches) in thickness and shall be wrapped and fastened to minimize the amount of GCL shifting within the wrapping.

D. Provide the conformance tests samples to the QA laboratory to determine bentonite mass per unit area (ASTM 05993), peel strength (ASTM 06496), hydraulic conductivity (ASTM 5887), and internal and interface shear strength (ASTM 06243). Tests not meeting the requirements specified shall result in the rejection of applicable rolls. As a minimum, rolls produced immediately prior to and immediately after the failed roll shall be tested for the same failed parameter. Testing shall continue until rolls on both sides of the original failing roll pass the failed parameter. Additional testing required for failed tests shall be paid for by the Contractor.

PART 3- INSTALLATION

3.01 GENERAL

A. EXECUTION - The following installation procedures are as specific as possible while recognizing that the specific requirements of the project may necessitate minor modifications. Significant deviations from these procedures shall be pre-approved by the Engineer.

3.02 SUBGRADE PREPARATION

The subgrade upon which the GCL shall be suitable for the placement of GCL material, subject to the applicable section of this specification and Section 02200.

A. Earthen Subgrade - The surface upon which the GCL material will be installed shall be inspected by the CQA inspector and certified by the earthwork contractor to be in accordance with the requirements of this specification.
B. The surface upon which the GCL is installed should be smooth and free of wheel ruts, debris, roots, sticks, and rocks larger than 0.5 in. Site specific compaction requirements should be followed in accordance with the project plans and specifications. At a minimum, the site should be smooth rolled the level of compaction such that installation equipment and other construction vehicles traffic does not cause rutting greater than 0.5 in deep. Furthermore, all protrusions extending more than 0.5 in from the subgrade shall be removed from the subgrade.
C. The surfaces to be lined shall be maintained in this condition and free of standing water.
D. GCL can be deployed on a frozen subgrade, if the subgrade would meet all the conditions as previously outlined if unfrozen.
E. The subgrade surface and preparation should be inspected and certified by the CQA inspector prior to GCL placement. Upon approval by the CQA inspector, it is the geosynthetic installer's responsibility to communicate to the engineer of any changes in the condition of the subgrade that might render it out of compliance, with any of the requirements of the project specification or ASTM Standard D 6102.D.
F. The surfaces to be lined shall be smooth and free of any debris, vegetation, roots, sticks, sharp rocks, or other deleterious materials larger than 0.5 inches as well as free of any voids, large cracks or standing water or ice.
G. Subsequent to the CQA inspector's approval, it shall be the installer's responsibility to indicate to the Engineer any change in the subgrade condition that could cause it to be out of compliance with any of the requirements of this section or the project specification.

3.03 ANCHOR TRENCH

An anchor trench shall be excavated by the Contractor to the lines and grades shown on the project drawings at the top of slopes.

A. The anchor trench shall be constructed free of sharp edges or corners and maintained in a dry condition. No loose soil shall be permitted beneath the GCL within the trench.
B. The anchor trench shall be inspected and approved by the CQA inspector prior to GCL placement, back-filling and compaction of the anchor key material.
C. All GCL material installed on slopes shall be anchored to prevent potential GCL panel movement.
    1. Standard Anchor - The GCL shall be placed into and across the base of the excavated trench, stopping at the back wall of the excavation.

3.04 GCL PLACEMENT

A. GCL Material shall be placed in general accordance with the procedures specified below, or modified to account for site specific conditions.
    1. GCL Orientation - GCL panels are typically placed with the nonwoven side up (heat burnished side down) to maximize the shear strength characteristics. However, the heat burnished side up if it maximizes the shear strength characteristics of a site

specific interface. In base or flat areas, the GCL does not require any particular orientation.

2. GCL Panel Position - Where possible, all slope panels should be installed parallel to the maximum slope while panels installed in flat areas require no particular orientation.
3. Panel Deployment - GCL materials shall be installed in general accordance with the procedures set forth in this section, subject to site specific conditions which would necessitate modifications.
4. Deployment should proceed from the highest elevation to the lowest to facilitate drainage in the event of precipitation.
5. The GCL may be deployed on slopes by pulling the material from a suspended roll, or securing a roll end into an anchor trench and unrolling each panel as the handling equipment slowly moves backwards.
6. Deployment on flat areas shall be conducted in the same manner as that for the slopes, however, care should be taken to minimize "dragging" the GCL. Slip-sheet may be used to facilitate positioning of the liner while ensuring the GCL is not damaged from underlying sources.
7. The GCL will have seam overlaps a minimum of 6 inches for all woven/nonwoven GCLs. GCL's comprised of a nonwoven/nonwoven geotextiles will have a minimum seam overlap of 6 inches for scrim reinforced and 12 inches minimum for all non-scrim reinforced nonwoven GCLs. End of panel or butt end seams shall be a minimum of 12 inches for all woven/nonwoven GCLs, 12 inches for all scrim-reinforced double nonwoven GCLs, 24 inches for non-scrim reinforced double nonwoven GCLs, and be free of wrinkles, folds or "fish-mouths".
8. The contractor shall only install as much GCL that can be covered at the end of the day. No GCL shall be left exposed overnight. The exposed edge of the GCL shall be covered by a temporary tarpaulin or other such water resistant sheeting until the next working day.
9. Horizontal GCL seams on sideslopes greater than 5 percent shall be minimized. If horizontal seams are required due to the length of the sideslope, horizontal seams shall be bounded on each side by continuous panels and horizontal seams shall be staggered by a minimum distance of 25-feet. Overlap (shingle) the geomembrane panels such that any fluid flowing across the seams would flow from the top panel to the underlying panel. Panels shall be placed such that the up- slope panels overlie those down slope.

3.05 SEAMING

A. Overlap Line
   1. Woven/Nonwoven and Scrim Reinforced Nonwoven GCLs
      a. A 6 inch lap line and a 9 inch match line for scrim reinforced GCLs shall be imprinted on both edges of the upper geotextile component of the GCL to assist in installation overlap quality control. Lines shall be printed as continuous dashes in easily observable non-toxic ink.
   2. Non-Scrim Reinforced Nonwoven GCLs
      a. A 12 inch lap line and 15 inch match line for non-scrim reinforced GCLs shall be imprinted on both edges of the upper geotextile component of the GCL to assist in installation overlap quality control. Lines shall be printed as continuous dashes in easily observable non-toxic ink.

B. Seams
   1. Woven/Nonwoven and Scrim Reinforced Nonwoven GCLs
      a. Overlap seams shall be a minimum of six inches on panel edges and one foot on panel ends.
   2. Non-Scrim Reinforced Nonwoven GCLs
      a. Overlap seams shall be a minimum of 12 inches on panel edges and 2 foot on panel ends.
   3. Loose granular bentonite shall be placed between panel overlaps at a rate of 0.25 pound per lineal foot.

3.06 DETAILING

A. Detail work, defined as the sealing of the liner to pipe penetrations, shall be performed as recommended by the GCL Manufacturer.

3.07 DAMAGE REPAIR

A. Prior to cover material placement, damage to the GCL shall be identified and repaired by the installer. Damage is defined as any rips or tears in the geotextiles, delamination of geotextiles or a displaced panel.
B. Rip and Tear Repair (Flat Surfaces) - Rips or tears may be repaired by completely exposing the affected area, removing all foreign objects or soil, and by then placing a patch cut from unused GCL over the damage (damaged material may be left in place), with a minimum overlap of 12 inches on all edges. Accessory bentonite should be placed between the patch edges and the repaired material at a rate of a quarter pound per lineal foot of edge spread in a continuous six inch fillet.
C. Rip and Tear Repair (Slopes) - Damaged GCL material on slopes shall be repaired by the same procedures above, however, the edges of the patch should also be adhered to the repaired liner with an adhesive to keep the patch in position during backfill or cover operations.

3.08 DISPLACED PANELS

A. Displaced panels shall be adjusted to the correct position and orientation. The adjusted panel shall then be inspected for any geotextile damage or bentonite loss. Damage shall be repaired by the above procedure.

3.09 PREMATURE HYDRATION

A. If the GCL is prematurely hydrated greater than 30% moisture, installer shall notify the QA/QC technician and project engineer for a site specific determination as to whether the material is acceptable or if alternative measures must be taken to ensure the quality of the design.

3.10 COVER MATERIAL

A. The cover materials shall be compatible as well as suitable for use over the GCL, and placed in a manner appropriate to the particular subgrade. Regardless of the cover

material, the uncovered edge of GCL panels shall be protected at the end of the working day with a waterproof sheet which is secured adequately with ballast.

B. Geosynthetic Cover - Precautions shall be taken to prevent damage to the GCL by restricting the use of heavy equipment over the liner system.
   1. Equipment - Installation of the overlying geosynthetic component can be accomplished through the use of lightweight, rubber-tired equipment such as a 4-wheel all-terrain vehicle (ATV). This vehicle can be driven directly on the GCL, provided the ATV makes no sudden stops, starts, or turns.
   2. Placement - Smooth HDPE may be dragged across the GCL surface with equipment or by hand labor during positioning. Similarly, the HDPE may be unrolled with the use of low ground pressure equipment.
   3. Use of Textured Liners - If a textured geomembrane is placed over the GCL, a slip sheet (such as 20-mil smooth HDPE) may first be placed over the GCL in order to allow the geomembrane to slide into its proper position. Once the overlying geomembrane is properly positioned, the slip-sheet shall be carefully removed paying close attention to avoiding any movement to the geomembrane.

END OF SECTION

SECTION 02230
GRANULAR DRAINAGE MATERIAL

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:
   1. Material and equipment requirements for placement of granular drainage materials
   2. CQA sample requirements

1.02 RELATED SECTIONS

A. 02200 – Earthwork

1.03 UNIT PRICES

Refer to Section 01025 MEASUREMENT AND PAYMENT.

1.04 REFERENCED STANDARDS

Unless otherwise specified, the work for this Section shall conform to the applicable portions of the following Standard Specifications:

ASTM - American Society for Testing and Materials
MDOT - Michigan Department of Transportation
OSHA - Occupational Health and Safety Association

A. The latest version of the following ASTM standards shall be used:

1. ASTM D422 – Standard Test Method for Particle Size Analysis of Soils. (Withdrawn 2016)
2. ASTM D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3)
3. ASTM D1556 – Test Methods for Density and Unit Weight of Soil in Place by Sand-Cone Method.
4. ASTM D1557- Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3).
5. ASTM D2216 – Standard Method for Laboratory Determination of Water (moisture) Content of Soil and Rock by Mass.
6. ASTM D2434 – Standard Test Methods for Permeability of Granular Soils (Constant Head). (Withdrawn 2015).
7. ASTM D2487 – Standard Test Methods for Classification of Soils for Engineering Purposes.
8. ASTM D6938 – Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

9. ASTM D4318 – Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soil.
10. ASTM D4373 – Standard Test Method for Rapid Determination of Carbonate Content of Soils.
11. ASTM D5084 – Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.
12. ASTM D1140 – Standard Test Methods for Determining the Amount of Material Finer than 75-µm (No. 200) Sieve in Soils by Washing.

1.07 SUBMITTALS

A. The Contractor shall submit dust control procedures, location of off-site material sources, and test samples of proposed material samples (off and on-site) for analysis by Engineer to confirm compliance with specified requirements

B. Earthwork procedures, material handling and stockpiling procedures and locations shall be detailed by the Contractor in the Work Plan, as required by the Owner and the Engineer.

C. At least 30 days prior to commencing filling operations, the Contractor shall submit to the Engineer samples for laboratory testing to be performed on representative samples of soil materials from the proposed sources. The test results shall demonstrate compliance of each material with the properties required in these specifications.

D. If the Contractor's test samples fully satisfy the specification requirements, the test results may be counted by the Engineer as the first conformance test for the subject material.

E. The Contractor shall submit all other documents required herein for review and acceptance in accordance with this specification.

F. The Contractor shall sample and test the material from the borrow source at least 30 days weeks prior to construction. The Engineer shall develop moisture-density-permeability relationships for the proposed soils to determine field control parameters for in-place density tests and determine that proposed soils will satisfy permeability required at the specified moisture contents and densities for placement and compaction.

G. Pre-construction testing of the soil drainage layer materials shall be completed at the minimum frequency specified in the following table for each borrow source:

Test	Minimum Frequency	Requirements
Soil Classification, ASTM D2487	1 per 1,000 cubic yards placed	Sand – See chart in 2.01A Course Aggregate – See chart in 2.02B

Hydraulic Conductivity ASTM D2434	1 per 2,500 cubic yards placed; min. 3 per borrow source	Primary Sand $\geq 1.0x10^{-3}$ cm/sec
		Secondary Sand $\geq 1.0x10^{-2}$ cm/sec
		Aggregate $\geq 1.0x10^{-2}$ cm/sec
Carbonate Content	1 per 2,500 cubic yards	No greater than 10%

PART 2 PRODUCTS

2.01 MATERIALS, Sand Drainage Layer:

A. The materials to be used for the Sand Drainage Layer shall contain no sharp angular stone or other material capable of penetrating the geomembrane(s); shall be selected pervious mixtures of sand and gravel having a permeability greater than $1x10^{-3}$ cm/sec when tested in accordance with ASTM D2434 at 95 percent maximum dry density as determined by ASTM D1557; and shall be reasonably well graded within the following limits:

SEIVE DESIGNATION	% PASSING BY WEIGHT
1-inch	100
½-inch	85-100
No. 4	75-100
No. 10	60-95
No. 40	0-45
No. 100	0-15
No. 200	0-5

2.02 MATERIALS, Coarse Aggregate:

A. Coarse Aggregate shall be provided by the Contractor from a MDOT approved source or from an approved onsite source.

B. Coarse Aggregate shall be rounded, or sub rounded that is free of clay, organics, snow, ice and friable or deleterious particles, and shall meet the material requirements of MDOT Standard Specifications, Section 902.07, coarse aggregate class 6A and meet the following gradation requirements:

SEIVE DESIGNATION	% PASSING BY WEIGHT
1 ½ - inch	100
1 – inch	95-100
½ - inch	30-60
No. 4	0-8
No. 200	Maximum of 1

1. The material shall consist of a maximum of 20 percent limestone by weight, peastone or EJIW "popcorn slag" or other approved equal.
2. Coarse aggregate shall have a minimum permeability of $1x10^{-2}$ cm/sec when tested in accordance with ASTM D2434.
3. Contractor to submit samples for gradation and limestone content testing for every 2,500 cubic yards of coarse aggregate and for every change material source.
4. Payment for coarse aggregate shall be included with the HDPE pipe pay items.

PART 3 EXECUTION

3.01 Sand Drainage Layers:

1. General

   a. Sand Drainage Layer material shall be furnished and placed to the lines and dimensions shown on the Drawings to provide a protection and drainage blanket between and/or above the liner components.

2. Placement:

   a. The Sand Drainage Layer shall be provided, delivered, and stockpiled by the Contractor. The Sand Drainage Layer material shall be handled and placed in such a manner as to prevent segregation.

   b. The method of placing the Sand Drainage Layer shall be subject to approval by the Engineer, and as follows. Sand Drainage Layer placed over geomembranes shall be placed in lifts not to exceed 12 inches (loose), using a low ground pressure bulldozer having a maximum ground pressure of 5.0 pounds per square inch.

   c. The Sand Drainage Layer shall consist of the minimum thickness as shown on the Drawings compacted to a minimum of 95% of maximum dry density. The sand shall be compacted at a moisture content which is not dryer than three percentage points below, nor wetter than two percentage points above optimum moisture content.

   d. The Contractor shall verify that the in-place thickness of the Sand Drainage Layers are as specified on the Drawings. This shall be done by survey, at stations approximately 50 feet on center, or by using alternate methods, such as cardboard tubes, as approved by the Engineer.

   e. The Contractor shall stage his work and access the work area in such a manner as to minimize the possibility of damage to the geomembrane. Damage to the geomembrane resulting from the Contractor's construction activities shall be repaired at the Contractor's expense. Formation of a wrinkle of the underlying

HDPE geomembrane during placement of the Sand Drainage Layers shall be avoided.

f. In no instance shall the Contractor operate any earthmoving or other heavy equipment directly on the geomembrane. Low-ground-pressure equipment having a maximum ground pressure of 5.0 pounds per square inch may operate, with care, on a minimum thickness of 12 inches of soil overlying the geomembrane as approved by the Engineer. All other equipment traversing a geomembrane shall be on a minimum thickness of 3 feet of approved soil overlying the geomembrane.

3.02 Coarse Aggregate

1. Coarse aggregate for surrounding the leachate and secondary collection pipes shall be placed to the lines and levels shown on the drawings and in a manner, that will preclude displacement of the pipes or damage to the HDPE geomembrane or drainage geocomposites. Coarse aggregate placed atop the geocomposites shall not be dropped from a height exceeding 2 feet.

2. After the leachate and secondary collection pipe installations have been observed and approved, and checked for grade by the Engineer, coarse aggregate shall be placed around and over the pipes.

3.03 TESTING

A. General:

1. The Engineer will measure the actual in-place moisture and density of fill materials using field tests. Costs for initial tests will be paid by Owner. The Contractor shall perform, at no additional cost to the Owner, additional work to obtain proper compaction if in—place moisture or density do not meet specifications.

2. The Engineer will observe construction and perform testing and at locations that he will select. The results of these tests will be made available to the Contractor on a timely basis, so the Contractor can take such actions as are required to remedy indicated deficiencies.

3. Removal of non-conforming drainage sand could damage components of the liner system. For this reason, conformance testing of these materials (i.e. grain size distribution, etc.) will be performed on samples obtained by the Engineer at either the borrow pit or from on—site stockpiles. Placement of these materials shall not commence until satisfactory test results are received and approval to place the fill material is given to the Contractor by the Engineer.

4. Delivery and compaction of fill materials shall be made during the presence of the Engineer and shall be subject to testing to determine compliance with material, placement, and compaction specifications. The Engineer 's presence does not include supervision or direction of the actual work by the Contractor, his employees, or agents. Neither the

presence of the Engineer, nor any observations and testing performed by him, shall excuse the Contractor from defects discovered in his work.

3 .04 MAINTENANCE

A. Protection of Graded Areas: The Contractor shall protect newly graded areas from traffic or erosion, and keep free of trash and debris. The Contractor shall repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

B. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, the Contractor shall scarify the surface, re-shape, and compact to the required moisture and density at no additional cost to the Owner.

END OF SECTION

SECTION 02270
EROSION CONTROL

PART 1 GENERAL

1.01 SUMMARY

A. Section includes work necessary for effective temporary and permanent soil erosion and sedimentation control.

B. Related Sections:
   1. Section 02200 EARTHWORK
   2. Section 02900 SITE RESTORATION

1.02 SCOPE OF WORK

A. Due to the nature of the work and site soils, the CONTRACTOR shall implement strict erosion and sedimentation control measures throughout the duration of the work. A preventative approach to sedimentation control shall be implemented by the CONTRACTOR in that multiple measures shall be installed and maintained to prevent sedimentation and/or erosion of exposed soils. The CONTRACTOR shall furnish all labor, materials, tools, and equipment, and perform all operations necessary to provide and maintain erosion control devices to limit erosion, control sedimentation that occurs during construction operations, and contain runoff within the work area. This shall include a stockpile, laydown, and borrow areas. Such control shall be implemented and maintained throughout the construction until the stabilization of permanent erosion control devices.

B. Regardless of any minimum requirements set forth in this section, it is the CONTRACTOR's sole responsibility to select, implement, and maintain proper and fully adequate erosion and sediment controls at all times (24 hours a day on all days) throughout the project. Repair of any damage and all restitution for liabilities resulting from improper erosion and sediment control shall be at the CONTRACTOR's expense.

C. The Contractor is responsible to protect constructed liner and drainage components from erosion and restore any areas damaged to the satisfaction of the Engineer.

1.02 UNIT PRICES

Temporary and permanent erosion control measures will be considered incidental to the construction.

1.03 QUALITY ASSURANCES

Perform all Work in accordance with the Michigan Soil Erosion and Sedimentation Control Act, Part 91 of Act 451, P.A. 1994, and with the requirements of the local agencies having jurisdiction over the Work.

PART 2 PRODUCTS

2.01 MATERIALS

A. Seed, fertilizer, and mulch: Provide as specified in Section 02900 SITE RESTORATION.

B. Provide temporary and permanent structures and materials in accordance with the Michigan Department of Management and Budget Keying System. See Keying System at the end of this section.

C. Mulch blanket:
   1. Materials: 100% straw sewn into a lightweight, photo degradable netting.
   2. Model: S150.
   3. Straw content: 0.5 pounds per square yard.
   4. Manufacturer: North American Green.
   5. Or Engineer Approved Alternate.

D. Geotextile filter fabric:
   1. Materials: Mechanically bonded, non-woven geotextile.
   2. Manufacturer: Amoco
   3. Model: CEF 4553
   4. Tensile strength: 203 lbs. (ASTM D-4632).
   5. Tensile elongation: 50% min. (ASTM D-4632).
   6. Tear strength: 80 lbs. (ASTM D-4533).
   7. Puncture strength: 130 lbs. (ASTM D-4833).
   8. Apparent opening size: 100 sieve (ASTM D-4751).
   9. Or Engineer Approved Alternate.

E. Silt fence:
   1. Conforming to Michigan Department of Transportation Standard Specifications.

PART 3 EXECUTION

3.01 GENERAL

Conduct site evaluation with the Engineer and the soil erosion control officer prior to starting work.

3.02 TEMPORARY EROSION CONTROL

A. Minimize the area of earth disturbed at any one time.

B. Provide berms or ditches to divert storm runoff from the construction area when steep slopes or highly erodible soils are present.

C. Contain all sedimentation on site by using straw bales, filter fence, or sedimentation basins.

3.03 PERMANENT EROSION CONTROL

A. When final grades have been established, scarify/roughen slopes by tracking a bulldozer up and down the constructed slopes to minimize runoff velocities and facilitate vegetative growth.

B. Water all seeded areas as necessary to establish proper vegetative cover.

3.04 MULCH BLANKET

A. Provide mulch blanket on all slopes 2:1 or steeper, that are disturbed during construction or as indicated on the plans.

B. Prepare soil prior to placing mulch blanket with topsoil, seed and fertilizer.

C. Place mulch blanket from top of slope down so overlap seams run parallel to slope.

D. Overlap seams a minimum of 2" on parallel seams, and six inches, shingle style, on perpendicular splices.

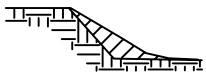
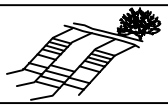
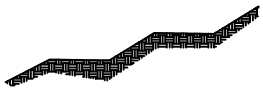
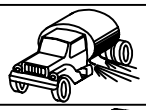
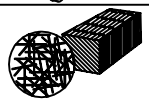
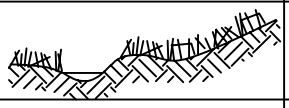
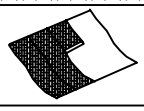
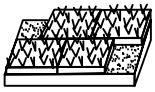
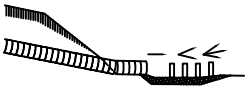
3.05 MAINTENANCE

A. All temporary erosion control measures shall be maintained by the CONTRACOR throughout the course of site construction activities until final acceptance of the site vegetation by the ENGINEER.

END OF SECTION

MICHIGAN DEPARTMENT OF MANAGEMENT AND BUDGET

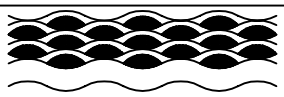
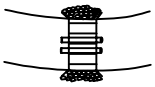
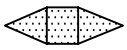
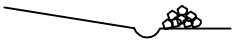
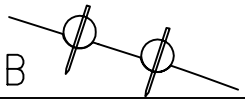
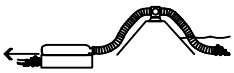
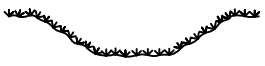
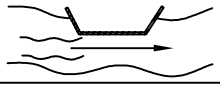
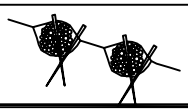
S–E–S–C KEYING SYSTEM

KEY	BEST MANAGEMENT PRACTICES	SYMBOL	WHERE USED
EROSION CONTROLS			
E1	SELECTIVE GRADING AND SHAPING		To reduce steep slopes and erosive velocities.
E2	GRUBBING OMITTED		For use on steep slopes to prevent rilling, gullying, and reduce sheet flow velocity or where clear vision corridors are necessary.
E3	SLOPE ROUGHENING AND SCARIFICATION		Where created grades cause increased erosive velocites. Promotes infiltration and reduces runoff velocity.
E4	TERRACES		On relatively long slopes up to 8% grades with fairly stable soils.
E5	DUST CONTROL		For use on construction sites, unpaved roads, etc. to reduce dust and sedimentation from wind and construction activities.
E6	MULCH		For use in areas subject to erosive surface flows or severe wind or on newly seeded areas.
E7	TEMPORARY SEEDING		Stabilization method utilized on construction sites where earth change has been initiated but not completed within a 2 week period.
E8	PERMANENT SEEDING		Stabilization method utilized on sites where earth change has been completed (final grading attained).
E9	MULCH BLANKETS		On exposed slopes, newly seeded areas, new ditch bottoms, or areas subject to erosion.
E10	SODDING		On areas and slopes where immediate stabilization is required.
E11	VEGETATED CHANNELS		For use in created stormwater channels. Vegetation is used to slow water velocity and reduce erosion within the channel.
E12	RIPRAP		Use along shorelines, waterways, or where concentrated flows occur. Slows velocity, reduces sediment load, and reduces erosion.
E13	GABION WALLS		On newly created or denuded stream banks to reduce velocity until permanent stabilization is achieved or on existing banks to retard erosive velocities.
E14	ENERGY DISSIPATOR		Where the energy transmitted from a concentrated flow of surface runoff is sufficient to erode receiving area or watercourse.
E15	TEMPORARY SLOPE DRAIN		Where surface runoff temporarily accumulates or sheet flows over the top of a slope and must be conveyed down a slope in order to prevent erosion.
E16	SLOPE DRAIN		Where concentrated flow of surface runoff must be permanently conveyed down a slope in order to prevent erosion.

B = BIOENGINEERING

MICHIGAN DEPARTMENT OF MANAGEMENT AND BUDGET

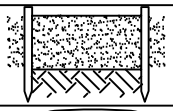
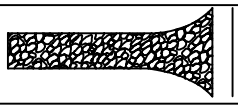
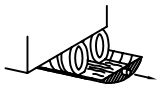
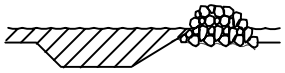
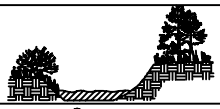
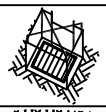
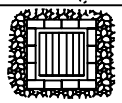
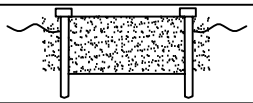
S–E–S–C KEYING SYSTEM

KEY	BEST MANAGEMENT PRACTICES	SYMBOL	WHERE USED
E17	CELLULAR CONFINEMENT SYSTEMS		Used on steep slopes and high velocity channels.
E18	PLASTIC SHEETS		Used on exposed slopes, seeded areas, new ditch bottoms, and areas subject to surface runoff and erosion. Used as a liner in temporary channels and to stabilize stockpiles.
E19	TEMPORARY DRAINAGEWAY/ STREAM CROSSING		Use on construction sites where stream/drainageway crossings are required.
E20	TEMPORARY BYPASS CHANNEL		Use within existing stream corridors when existing flow cannot be interrupted, and at culvert and bridge repair sites
E21	LIVE STAKING	B	In areas requiring protection of slopes against surface erosion and shallow mass wasting.
	EROSION / SEDIMENT CONTROLS		
ES31	CHECK DAM		Used to reduce surface flow velocities within constructed and existing flow corridors.
ES32	STONE FILTER BERM		Use primarily in areas where sheet or rill flow occurs and to accommodate dewatering flow.
ES33	FILTER ROLLS	 B	In areas requiring immediate protection of slopes against surface erosion and gully formation and for perimeter sediment control.
ES34	SAND FENCE		For use in areas susceptible to wind erosion, especially where the ground has not yet been stabilized by other means.
ES35	DEWATERING		Use where construction activities are limited by the presence of water and dry work is required.
ES36	DIVERSION DIKE/BERM		Within existing flow corridors to address or prevent erosion and sedimentation, or on disturbed or unstable slopes subject to erosive surface water velocities.
ES37	DIVERSION DITCH		In conjunction with a diversion dike, or where diversion of upslope runoff is necessary to prevent damage to unstabilized or disturbed construction areas.
ES38	COFFERDAM/SHEET PILINGS		Constructed along or within water corridor or waterbody to provide dry construction area.
ES39	STREAMBANK BIOSTABILIZATION	B	For use along banks where stream and riparian zones may have difficulty recovering from the long–term effects of erosion.
ES40	POLYMERS		To minimize soil erosion and reduce sedimentation in water bodies by increasing soil particle size.
ES41	WATTLES	 B	In areas requiring protection of slopes against surface erosion and gully formation.

B = BIOENGINEERING

MICHIGAN DEPARTMENT OF MANAGEMENT AND BUDGET

S–E–S–C KEYING SYSTEM

KEY	BEST MANAGEMENT PRACTICES	SYMBOL	WHERE USED
	SEDIMENT CONTROLS		
S51	SILT FENCE		Use adjacent to critical areas, to prevent sediment laden sheet flow from entering these areas.
S52	CATCH BASIN SEDIMENT GUARD		Use in or at stormwater inlets, especially at construction sites.
S53	STABILIZED CONSTRUCTION ACCESS		Used at every point where construction traffic enters or leaves a construction site.
S54	TIRE WASH		For use on construction sites where vehicular traffic requires sediment removed from its tires in highly erosive areas.
S55	SEDIMENT BASIN		At the outlet of disturbed areas and at the location of a permanent detention basin.
S56	SEDIMENT TRAP		In small drainage areas, along construction site perimeters, and above check dams or drain inlets.
S57	VEGETATED BUFFER/FILTER STRIP		Use along shorelines, waterways, or other sensitive areas. Slows velocity, reduces sediment load, and reduces erosion in areas of sheet flow.
S58	INLET PROTECTION FABRIC DROP		Use at stormwater inlets, especially at construction sites.
S59	INLET PROTECTION FABRIC FENCE		Use at stormwater inlets, especially at construction sites.
S60	INLET PROTECTION STONE		Use around urban stormwater inlets.
S61	TURBIDITY CURTAIN		Use during construction adjacent to a water esource, to contain sediment within the work area when other BMP's cannot be used.

B = BIOENGINEERING

SECTION 02300

GEOSYNTHETICS, GENERAL

PART 1 – GENERAL

1.01 DESCRIPTION:

A. This section provides general material and construction requirements for geosynthetic components of the landfill liner system:
   1. GEONET Drainage Geocomposite (Geotextile Encapsulated Geonet)
   2. Geomembrane (High Density Polyethylene — HDPE, Smooth and Textured)
   3. Geosynthetic Clay Liner (GCL)
   4. Geotextile
B. Related work specified elsewhere:
   1. Earthwork – Section 02200
   2. Geosynthetic Clay Liner – Section 02220
   3. Geomembranes – Section 02310
   4. Geocomposite – Section 02320

1.02 DEFINITIONS

A. Drainage geocomposites (i.e. geonet) are the geotextile encapsulated geonet material to be installed as part of the leachate and secondary collection systems.
B. Geomembrane is the 60 mil (min.) textured high-density polyethylene (HDPE) liner, to be installed atop the GCL layers.
C. Geosynthetic Clay Liner (GCL) is a manufactured flexible hydraulic barrier consisting of sodium bentonite sandwiched between woven and nonwoven carrier geotextiles and reinforced with needle-punched fibers. The GCL will be installed atop the GEONET Drainage Geocomposite along the sloped portion of the primary liner system only. Only one type of GCL shall be used for the project
D. Geotextiles are the (nominal 8 oz/yd^2) nonwoven filter fabric used as the final cover for the uppermost leachate drainage layer.

1.03 JOB CONDITIONS

A. The Contractor shall coordinate with any Subcontractors, the Owner and the Engineer to properly schedule pre-construction testing, delivery and installation of geosynthetics to avoid delays in construction.

1.04 SUBMITTALS:

A. General: Make all submittals in accordance with Section 700, Article 7.16 and Section 01300 - SUBMITTALS

B. The Contractor shall submit to the Owner and the Engineer, prior to product acceptance, shipping, or delivery, the following:
    1. Geotextiles:
        a. Geotextile supplier/manufacturer.
        b. Manufacturer's product specifications that include the properties listed in 2.01A and measured using the appropriate test methods.
        c. Manufacturer's recommendations for installation and anchoring as appropriate for the intended use and application.
        d. Manufacturer's written certification that minimum values given in manufacturer's specification are guaranteed.
        e. Manufacturer's written certification that the installer is approved by the manufacturer and the manufacturer will warranty the installers work.
    2. Required submittals for the Geocomposite, Geomembrane, and Geosynthetic Clay Liner are listed in their respective sections.

C. The Contractor shall submit to the Owner and the Engineer, a minimum of 2 weeks prior to product delivery to the site the following:
    1. For all Geosynthetic Products
        a. Manufacturer's quality control test data, as specified herein, traceable to the lot numbers and roll numbers of geosynthetic material delivered to the project site.
        b. Manufacturer's certificate or statement of compliance in accordance with Section 01400 of these specifications.

D. The above geomembrane submittals shall be made, and the data accepted by the Engineer prior to placement of any overlying materials over the geosynthetics. As installation progresses, the Contractor shall submit certificates of subgrade acceptance signed by the Contractor and Engineer for each area that is covered by the Geosynthetic products.

PART 2 - PRODUCTS

2.01 Geotextiles

A. Filter Geotextile:
Filter Geotextile shall be a non—woven, needle punched polypropylene, continuous filament material meeting or exceeding the following minimum requirements:

FABRIC PROPERTY	TEST METHOD	MIN. AVE ROLL VALUE
Unit Weight, oz/yd^2	ASTM D5261	8
Grab Tensile Strength, lbs	ASTM D4632 (Diaphragm Method)	120

Grab Tensile Elongation, %	ASTM D4632	50
Burst Strength, psi	ASTM D3786	210
Trapezoidal Tear Strength, lbs	ASTM D4533	40
Apparent Opening Size (O_{95}), mm	ASTM D4751	0.210
Cross-Plane Permeability, cm/sec (Product of permittivity and thickness)	ASTM D4491	1.4 x 10-4
Puncture Strength, lbs	ASTM D4833	110

B. Other Geosynthetics

Product requirements for all other geosynthetics shall meet the requirements of their respective specification.

2.02 Interface Friction Testing of Liner System Components

The Contractor shall demonstrate through direct shear testing completed at the frequencies stated below that each interface within the liner system, and the internal shear resistance of the GCL meets or exceeds the following criteria. The interface friction between the liner system components and the internal shear resistance of the assembled GCL product will be determined by the Engineer based on laboratory test results provided by the Contractor from a pre-approved independent testing laboratory and using the strength relationship: $\tau=\sigma_n TAN\phi+a$, where τ is the shear resistance (strength), σ_n is the applied normal load, ϕ is the friction angle, and a is the adhesion.

When tested in accordance with ASTM D5321 (for interfaces not containing a GCL) or ASTM D6243 (for interfaces containing a GCL) using the project-specific test parameters set forth below, interface friction between the liner system components shall have a peak internal shear resistance that is greater than or equal to the calculated shear strength (τ) when ϕ= 20 deg. and a = 0 psf.

When tested in accordance with ASTM D6243 using the project-specific test parameters set forth below, the assembled GCL product shall have a peak internal shear resistance that is greater than or equal to the calculated shear strength (τ) when ϕ = 20 deg. and a = 0 psf.

Tests shall be completed, and test results provided to the Engineer at least five (5) working days prior to shipping materials from the manufacturer to the site.

The Contractor shall coordinate with the geosynthetic manufacturers/suppliers to conduct interface friction testing for the following interfaces:

a. Leachate Drainage Sand / Textured Geomembrane
b. Textured Geomembrane / Geosynthetic Clay Liner
c. Geosynthetic Clay Liner / Geocomposite
d. Geocomposite / Textured Geomembrane
e. Textured Geomembrane / Low Permeability Soil

Actual geosynthetic and soil materials proposed for use on the project shall be utilized for the testing. Lot and roll numbers for the geosynthetic materials shall be documented. The soil borrow source shall also be documented.

The project-specific test parameters are as follows:

a. Saturation for interfaces containing a GCL: soak for 24 hours under each test (applied) normal load.
b. Saturation for interfaces not containing a GCL: wet prior to testing
c. Strain Rate: 0.04 inch/minute
d. Total displacement (defines residual or large displacement): 2.5 inches
e. Normal loads: 1,000 psf, 5,000 psf, and 10,000 psf

PART 3 - EXECUTION

3.01 Geosynthetics shall be installed per their respective specification section in a logic sequence in order to provide the liner system shown in the plans. Construction of subsequent portions of the liner system shall not begin until previous (i.e. lower) liner systems are completed and accepted by the Engineer and Contractor.

END OF SECTION

SECTION 02310
GEOMEMBRANES

PART 1- GENERAL

1.01 SCOPE

This specification covers the technical requirements for the Manufacturing and Installation of the geomembrane. All materials shall meet or exceed the requirements of this specification, and all work will be performed in accordance with the procedures provided in these project specifications

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. D 1004 Test Method for Initial Tear Resistance of Plastic Film and Sheeting
2. D 1238 Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer
3. D 1505 Test Method for Density of Plastics by the Density-Gradient Technique
4. D 1603 Test Method for Carbon Black in Olefin Plastics
5. D 3895 Standard Test Method for Oxidative-Induction Time of Polyolefins by Differential Scanning Calorimetry
6. D 4218 Standard Test Method for Determination of Carbon Black in Polyethylene Compounds
7. D 4833 Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
8. D 5199 Standard Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes
9. D 5397 Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test
10. D 5596 Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics
11. D 5994 Standard Test Method for Measuring Core Thickness of Textured Geomembranes
12. D 6392 Standard Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods
13. D 6693 Standard Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes

B. Geosynthetic Research Institute

1. GRI GM 13 Test Properties, Testing Frequency and Recommended Warranty for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes
2. GRI GM 17 Test Properties, Testing Frequency and Recommended Warranty for Linear Low Density Polyethylene (LLDPE) Smooth and Textured Geomembranes

1.03 DEFINITIONS

A. Lot - A quantity of resin used in the manufacture of geomembranes. Finished roll will be identified by a roll number traceable to the resin lot used.
B. Geomembrane Manufacturer (Manufacturer) - The party responsible for manufacturing the geomembrane rolls.
C. Geosynthetic Quality Assurance Laboratory (TESTING LABORATORY) - Party, independent from the Owner, Manufacturer and Installer, responsible for conducting laboratory tests on samples of geosynthetics obtained at the site or during manufacturing.
F. Contractor - Party responsible for field handling, transporting, storing, deploying, seaming and testing of the geomembrane seams. This work may be subcontracted to an approved Installer who will work under the supervision of the Contractor.
G. Panel- Unit area of a geomembrane that will be seamed in the field that is larger than 100 ft^2.
H. Patch - Unit area of a geomembrane that will be seamed in the field that is less than 100 ft^2.
I. Subgrade Surface - Soil layer surface which immediately underlies the geosynthetic material(s).

1.04 SUBMITTALS

A. Furnish the following product data, in writing, to Engineer at least 14 days prior to delivery:
    1. Resin Data shall include the following.
        a. Certification stating that the resin meets the specification requirements (see Table 1.9B).
        b. Origin (resin supplier's name, resin production plant) and identification (brand name, number) of the polyethylene resin used.
    2. Geomembrane Roll
        a. Statement certifying no recycled polymer and no more than 10% rework of the same type of material is added to the resin (product run may be recycled).
    3. Welding Rod
        a. Certification that the welding rod is compatible with the specifications and consisted of the same resin as the geomembrane
B. The Contractor shall furnish the following information to the Engineer and Owner at least 14 days prior to installation:
    1. Installation layout drawings
        a. Must show proposed panel layout including field seams and details
        b. Must be approved prior to installing the geomembrane
    2. Approved drawings will be for concept only and actual panel placement will be determined by site conditions.
    3. Installer’s Geosynthetic Field Installation Quality Assurance Plan
C. The Contractor will submit the following to the Engineer upon completion of installation:
    1. Certificate stating the geomembrane has been installed in accordance with the Contract Documents
    2. Material and installation warranties

3. As-built drawings showing actual geomembrane placement and seams including typical anchor trench detail

1.05 QUALITY ASSURANCE & QUALITY CONTROL

A. Resin
   1. Sample and test resin at a minimum frequency of one test per lot to demonstrate that the resin complies with the requirements of Table 1.9B. Perform tests on resin after the addition of additives to the virgin resin. Certify in writing that the resin meets the requirements of this Section.
   2. Do not use any nonconforming resin.

B. Rolls
   1. Continuously monitor for geomembrane defects during manufacture.
   2. Do not supply geomembrane that exhibits any defects.
   3. Regularly monitor for geomembrane thickness during manufacture.
   4. Do not supply geomembrane that fails to meet the specified thickness.
   5. Sample and test the geomembrane, to demonstrate that its properties conform to
      the values specified in Table 1.9D
   6. If a geomembrane sample fails to meet the quality control requirements of this Section, sample and test rolls manufactured, in the same resin batch, or at the same time, as the failing roll. Continue to sample and test the rolls until the extent of the failing rolls are bracketed by passing rolls. Do not supply any failing rolls.

C. CQA
   1. The Owner will engage and pay for the services of a Construction Quality Assurance Consultant (Engineer) and Laboratory to monitor geomembrane installation.
   2. Contractor and Manufacturer shall permit the Engineer and/or Owner to visit the manufacturing plant for project specific visits. If possible, such visits will be prior to, or during, the manufacturing of the geomembrane rolls for this project.
   3. Testing required by 1.5 A and 1.5 B shall be incidental to project and will not be paid by Owner or Engineer.

1.06 QUALIFICATIONS

A. MANUFACTURER
   1. Manufacturer shall have manufactured a minimum of 10,000,000 square feet of polyethylene geomembrane.

B. INSTALLER
1. Installation shall be performed by a Contractor (or their approved-Subcontractor) that is approved by the Manufacturer to install the HDPE geomembrane.
2. Installer shall have installed a minimum of 3,000,000 square feet of HDPE geomembrane during the 5 last years.

3. Installer shall have worked in a similar capacity on at least 3 projects similar in complexity to the project described in the contract documents, and with at least 500,000 square feet of HDPE geomembrane installation on each project.
4. The Installation Supervisor shall have worked in a similar capacity on projects similar in size and complexity to the project described in the Contract Documents.
5. The Installer shall provide a minimum of one Master Seamer for work on the project.
    a. Must have completed a minimum of 1,000,000 square feet of geomembrane seaming work using the type of seaming apparatus proposed for use on this Project.

1.07 MATERIAL LABELING, DELIVERY, STORAGE AND HANDLING

A. Labeling - Each roll of geomembrane delivered to the site shall be labeled by the Manufacturer. The label will identify:
    a. manufacturer's name
    b. product identification
    c. thickness
    d. length
    e. width
    f. roll number
    g. Lot number and designation identifying the date of manufacture and production run

B. Delivery- Rolls of liner will be prepared to ship by appropriate means to prevent damage to the material and to facilitate off-loading.

C. Storage- The on-site storage location for geomembrane material, provided by the Contractor to protect the geomembrane from punctures, abrasions and excessive dirt and moisture for should have the following characteristics:
    a. level (no wooden pallets)
    b. smooth
    c. dry
    d. protected from theft and vandalism
    e. as close as practical to the area being lined

D. Handling- Materials are to be handled so as to prevent damage.

1.08 WARRANTY

A. Material shall be warranted, on a pro-rata basis against Manufacturer's defects for a period of 5 years from the date of geomembrane installation.

B. Installation shall be warranted against defects in workmanship for a period of 1 year from the date of geomembrane completion.

1.09 GEOMEMBRANE PROPERTIES

A. Material shall be smooth/textured polyethylene geomembrane as shown on the drawings.

B. Resin
    1. Resin shall be new, first quality, compounded and manufactured specifically for producing geomembrane.

2. Natural resin (without carbon black) shall meet the following requirements:

Table 1.9B: Raw Material Properties

Property	Test Method	HDPE
Density (g/cm^3)	ASTM D 1505	≥0.932
Melt Flow Index (g/10 min)	ASTM D 1238 (190/2.16)	≤1.0
Oxidative Induction Time (OIT, minutes)	ASTM D 3895 (1 atm/200^{0}C)	≥100

C. Geomembrane Rolls

1. Do not exceed a combined maximum total of 1 percent by weight of additives other than carbon black.
2. Geomembrane shall be free of holes, bubbles, blisters, excessive contamination by foreign matter, and nicks and cuts on roll edges.
3. Geomembrane material is to be supplied in roll form. Each roll is to be identified with information required in 1.07 A.
4. All liner sheets produced at the factory shall be inspected prior to shipment for compliance with the physical property requirements listed in section 1.09 D and be tested by an acceptable method of inspecting for pinholes. If pinholes are located, identified and indicated during manufacturing, these pinholes may be corrected during installation.

D. HDPE geomembrane shall meet the requirements shown in Table 1.9D

Table 1.9D: Black 60 mil HDPE Geomembrane Properties

Tested Property	Test Method	Frequency	Minimum Average Values
			Textured, Both Sides
Thickness, mil Lowest individual reading	ASTM D5199 (smooth) ASTM D5994 (textured)	every roll	60 54
Density, g/cm^3, (min.)	ASTM D 1505	200,000 lbs	0.940
Tensile Properties (each direction)			
Strength at Break, lb/in-width	ASTM D 6693, Type IV	20,000 lbs	90
Strength at Yield, lb/in-width	Dumbbell, 2 ipm	20,000 lbs	126
Elongation at Break, %	G.L. 2.0 in	20,000 lbs	100
Elongation at Yield, %	G.L. 1.3 in	20,000 lbs	12

Tear Resistance, lb	ASTM D 1004	45,000 lbs	42
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	90
Carbon Black Content, % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note(1)
Asperity Height, mil (min. average)	ASTM D 7466	second roll	16
Notch Constant Tensile Load, hr	ASTM D 5397, Appendix	200,000 lbs	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100

E. Extrudate Rod or Bead

1. Extrudate material shall be made from same type resin as the geomembrane.
2. Additives shall be thoroughly dispersed.
3. Materials shall be free of contamination by moisture or foreign matter.

1.10 EQUIPMENT

A. Use extrusion welders and dual track fusion welders for field seaming.
B. Welding equipment and accessories shall meet the following requirements:
   1. Gauges showing temperatures in apparatus such as extrusion welder or fusion welder shall be present.
   2. An adequate number of welding apparatus shall be available to avoid delaying work.
C. Power source must be capable of providing constant voltage under combined line load.
D. Provide air pressure/vacuum pump, air pressure measuring devices, and vacuum, boxes with the capabilities for air pressure and vacuum box testing required.
E. Provide a coupon die and press to produce weld coupons in the field for shear and peel adhesion testing.
F. Protect geomembrane from damage that may be caused by equipment.

1.11 DEPLOYMENT

A. Assign each panel a simple and logical identifying code. The coding system shall be subject to approval and shall be determined at the job site.
B. Visually inspect the geomembrane during deployment for imperfections and mark faulty or suspect areas.
C. Deployment of geomembrane panels shall be performed in a manner that will comply with the following guidelines:
   1. Geomembranes shall be installed according to site-specific specifications.
   2. Unroll geomembrane using methods that will not damage geomembrane and will protect underlying surface from damage (spreader bar, protected equipment bucket).

3. Place ballast (commonly sandbags) on geomembrane which will not damage geomembrane to prevent wind uplift.
4. Personnel walking on geomembrane shall not engage in activities or wear shoes that could damage it. Smoking will not be permitted on the geomembrane.
5. Do not allow heavy vehicular traffic directly on geomembrane. Rubber-tired ATV's and trucks are not allowed on geomembrane.
6. Protect geomembrane in areas of heavy traffic by placing protective cover over the geomembrane.

D. Sufficient material (slack) shall be provided to allow for thermal expansion and contraction of the material.

1.12 FIELD SEAMING

A. Seams shall meet the following requirements:
1. To the maximum extent possible, orient seams parallel to line of slope, i.e., down and not across slope.
2. Minimize number of field seams in corners, odd-shaped geometric locations and outside corners.
3. Slope seams (panels) shall extend a minimum of five-feet beyond the grade break into the flat area.
4. Use a sequential seam numbering system compatible with panel numbering system that is agreeable to the Engineer and Contractor.
5. Align seam overlaps consistent with the requirements of the welding equipment being used. Generally, a minimum 3-inch overlap for extrusion welding and 4-inch overlap for fusion welding is suggested.

B. During Welding Operations
1. Provide at least one Master Seamer who shall provide direct supervision over other welders as necessary.

C. Extrusion Welding
1. Hot-air tack adjacent pieces together using procedures that do not damage the geomembrane.
2. Clean geomembrane surfaces by disc grinder or equivalent.
3. Purge welding apparatus of heat-degraded extrudate before welding.

D. Hot Wedge Welding
1. Welding apparatus shall be a self-propelled device equipped with an electronic controller which displays applicable temperatures.
2. Clean seam area of dust, mud, moisture and debris immediately ahead of hot wedge welder.
3. Protect against moisture build-up between sheets.

E. Trial Welds
1. Perform trial welds on geomembrane samples to verify welding equipment is operating properly.
2. Make trial welds under the same surface and environmental conditions as the production welds, i.e., in contact with subgrade and similar ambient temperature.
3. The trial weld shall be a minimum of 10-feet long for self-propelled seaming devices and a minimum of 3-feet long for hand-held devices.

4. Minimum of two trial welds per day, per welding apparatus, one made prior to the start of work, at least once each 5-hours or as directed by ENGINEER and one completed at end of shift.
5. Cut five, one-inch wide by six-inch long test strips from the trial weld.
6. Quantitatively test three specimens for peel adhesion, and then two specimens for shear strength using an onsite digital tensiometer provided by Contractor.
7. Trial weld specimens shall pass when the results shown in the following table for HDPE are achieved in both peel and shear test.

Table 1.12: Minimum Weld Values for 60 mil HDPE Geomembranes

Property	Test Method	Fusion	Extrusion
Shear Strength, lb-f per inch (ppi)	ASTM D 6392	120	120
Peel Strength, ppi	ASTM D 6392	98	78

a. The break, when peel testing, occurs in the liner material itself, not through peel separation (Breakcode FTB- Film Tear Bond).
b. The break is ductile.

7. Repeat the trial weld, in its entirety, when any of the trial weld samples fail in either peel or shear.
8. No welding equipment or welder shall be allowed to perform production welds until equipment and welders have successfully completed trial weld.

F. Seaming shall not proceed when ambient air temperature or adverse weather conditions jeopardize the integrity of the liner installation. Installer shall demonstrate that acceptable seaming can be performed by completing acceptable trial welds.

G. Defects and Repairs
1. Examine all seams and non-seam areas of the geomembrane for defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter.
2. Repair and non-destructively test each suspect location in both seam and non-seam areas. Do not cover geomembrane at locations that have been repaired until test results with passing values are available.

1.13 FIELD QUALITY ASSURANCE

A. Manufacturer and Installer shall participate in and conform to all terms and requirements of the Owner's quality assurance program. Contractor shall be responsible for assuring this participation.

B. Quality assurance requirements are as specified in this Section ~~and in the Field Installation Quality Assurance Manual if it is included in the contract.~~

C. Non-Destructive Field Testing
1. All seams shall be non-destructively tested by the Installer over their full length to verify the integrity of the seam.
2. Non-destructive testing shall be performed concurrently with field seaming.
3. All non-destructive testing shall be observed and documented by the Engineer.
a. Vacuum Testing

1) Use Vacuum Testing for extrusion welds, intersections of more than two panels (i.e. “Tees”), single track fusion welds, and where requested by Engineer.
2) Vacuum Testing shall be performed in accordance with ASTM D 5641, Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber.
3) Generally, a sudsy soap solution shall be applied to the test section and the vacuum box placed over the section. The bleed valve is then closed, and the vacuum valve opened. The vacuum box shall maintain at least 3 psig vacuum during the test. Once a tight seal has been established, the test section shall be visually examined for a period of not less than 10 seconds to determine whether bubbling of the soapy solution at the seam is occurring. The vacuum box is then moved, and the process is repeated on the next adjacent section. A minimum of 3 inches overlap shall be provided between all test sections. All locations where bubbling of the sudsy solution is observed shall be clearly marked for repairs with a high visibility marker and recorded by number on field test reports. Any failed portion of seam shall be repaired and retested.

b. Air Pressure Testing

1. Use Air Pressure Testing on all double track fusion welds.
2. Air Pressure Testing shall be performed in accordance with ASTM D 5820, Standard Practice for Pressurized Air Channel Evaluation of Dual Seamed Geomembranes.
3. Generally, double wedge welded seams shall be sealed off at both ends. If the end of a seam will be an integral part of the geomembrane, the sealing shall be done in such a way that it does not harm the function of the geomembrane. The pressure feed device shall be inserted into the air channel at one end of the seam and pressurized to a minimum 29 psig. The feed valve shall be closed, and the pressure sustained for a period of not less than 60 seconds. The pressure shall then be released by slitting the air channel at the opposite end of the seam. The Inspector shall observe the drop-in pressure on the manometer to verify the continuity of the air channel. If a pressure loss of greater than 2.9 psig is observed or if the required pressure cannot be reached, then the seam shall be rejected, and shall be either reconstructed in its entirety or the leak located and patched. The entire seam shall then be retested.

c. Other methods as approved by Engineer.

D. Destructive Testing

a. Location and Frequency of Testing

1) Collect at least one destructive test samples per day per seaming machine or crew, or at a frequency of one per every 500 lineal feet of seam length, whichever is greater.
2) Test locations will be determined by Engineer after seaming.

b. Sampling Procedures are performed as follows:

1) Contractor shall cut samples at locations designated by the Engineer as the seaming progresses in order to obtain field laboratory test results before the geomembrane is covered.

2) Engineer will number each sample, and the location will be noted on the installation as-built by the Contractor.
3) Samples shall be nominally twelve (12) inches wide by forty-six (46) inches minimal length with the seam centered lengthwise.
4) Cut a 2-inch wide strip from each end of the sample for field-testing by Contractor in accordance with the methods for field trial seams (1.12E).
5) Cut the remaining sample into three parts for distribution as follows:
a) One portion for Contractor, 12-inches by 12 inches
b) One portion for the Third-Party laboratory, 12-inches by 18-inches
c) Additional 12-inch sample to be archived by Engineer.
6) Destructive testing shall be performed in accordance with ASTM D 6392, Standard Test Method to Determine the Integrity of Non-Reinforced Geomembrane Seams Produced Using Thermo-Fusion Methods.
7) Five strips will be tested for peel strength and five for shear strength by the Third-Party (paid for by Engineer). All strips must fail in film tear bond (FTB) and must satisfy the minimum criteria for a destructive sample to be considered acceptable. Shear test results, for smooth or textured geomembrane, must be greater than or equal to 120 pounds per inch (ppi) at yield of the parent sheets and break strain for the seam is at least 50 percent. Peel test results, for smooth or textured geomembrane, must be greater than or equal to 91 ppi at yield of the parent sheet and no greater than 10 percent of the seam width peels (separates) at any point. Any sample (Contractor's Lab or the Third-Party Independent Laboratory samples) that does not meet test requirements will result in the sample being considered a failed seam sample.
8) Installer shall repair all holes in the geomembrane resulting from destructive sampling.
9) Repair and test the continuity of the repair in accordance with these Specifications.

3. Failed Seam Procedures
a) If the seam fails, Installer shall follow one of two options:
1) Reconstruct the seam between any two passed test locations.
2) Trace the weld to an intermediate location, at least 10 feet minimum, or where the seam ends in both directions from the location of the failed test.
b) The next seam welded using the same welding device is required to obtain an additional sample, i.e., if one side of the seam is less than 10 feet long.
c) If sample passes, then the seam shall be reconstructed or capped between the test sample locations.
d) If any sample fails, the process shall be repeated to establish the zone in which the seam shall be reconstructed.

1.14 REPAIR PROCEDURES

A. Remove damaged geomembrane and replace with acceptable geomembrane materials if damage cannot be satisfactorily repaired.
B. Repair any portion of unsatisfactory geomembrane or seam area failing a destructive or non-destructive test.

C. Installer shall be responsible for repair of defective areas.
D. Agreement upon the appropriate repair method shall be decided between Engineer and Contractor by using one of the following repair methods:
   1. Patching- Used to repair large holes, tears, undispersed raw materials and contamination by foreign matter.
   2. Abrading and Re-welding- Used to repair short section of a seam.
   3. Spot Welding- Used to repair pinholes or other minor, localized flaws or where geomembrane thickness has been reduced.
   4. Capping- Used to repair long lengths of failed seams.
   5. Flap Welding- Used to extrusion weld the flap (excess outer portion) of a fusion weld in lieu of a full cap.
   6. Remove the unacceptable seam and replace with new material.
E. The following procedures shall be observed when a repair method is used:
   1. All geomembrane surfaces shall be clean and dry at the time of repair.
   2. Surfaces of the polyethylene which are to be repaired by extrusion welds shall be lightly abraded to assure cleanliness.
   3. Extend patches or caps at least 6 inches for extrusion welds and 4 inches for wedge welds beyond the edge of the defect, and around all corners of patch material.
F. Repair Verification
   1. Number and log each patch repair.
   2. Non-destructively test each repair using methods specified in this Specification.

END OF SECTION

SECTION 02320
GEOCOMPOSITES

PART 1- GENERAL

1.01 SCOPE

This specification covers the technical requirements for the manufacturing and installation of the geonet drainage layer. All materials meet or exceed the requirements of this specification, and all work will be performed in accordance with the procedures provided in these project specifications.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. ASTM D1238 Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer
2. ASTM D1505 Standard Test Method for Density of Plastics by the Density-Gradient Technique.
3. ASTM D4218 Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle Furnace Technique
4. ASTM D4716 Standard Test Method for Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head
5. ASTM D7179 Standard Test Method for Determining Geonet Breaking Force
6. ASTM D5199 Standard Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes

1.03 DEFINITIONS

A. Geonet Manufacturer (MANUFACTURER) - The party responsible for manufacturing the geonet rolls.
B. Geosynthetic Quality Assurance Laboratory (TESTING LABORATORY) - Party, independent from the Manufacture and Contractor, responsible for conducting laboratory tests on samples of geosynthetics obtained at the site or during manufacturing.
C. Contractor - Party responsible for field handling, transporting, storing and deploying the geonet. Party responsible for field handling, transporting, storing, deploying, seaming and testing of the geomembrane seams. This work may be subcontracted to an approved Installer who will work under the supervision of the Contractor.
D. Lot - A quantity of resin (usually the capacity of one rail car) used to manufacture polyethylene geonet rolls. The finished rolls will be identified by a roll number traceable to the resin lot.

1.04 MATERIAL LABELING, DELIVERY, STORAGE AND HANDLING

A. Labeling - Each roll of geonet delivered to the site shall be labeled by the Manufacturer. The label will identify:

1. manufacturer’s name

2. product identification
3. length
4. width
5. roll number

B. Delivery - Rolls of geonet will be prepared to ship by appropriate means to prevent damage to the material and to facilitate off-loading.

C. Storage - The on-site storage location for the geonet, provided by the Contractor to protect the geonet from abrasions, excessive dirt and moisture shall have the following characteristics:

1. level (no wooden pallets)
2. smooth
3. protected from theft and vandalism
4. as close as practical to the area being lined.

D. Handling

1. The Contractor and Installer shall handle all geonet in such a manner as to ensure it is not damaged in any way.
2. The Installer shall take any necessary precautions to prevent damage to underlying layers during placement of the geonet.

1.05 WARRANTY

A. Material shall be warranted, on a pro-rata basis against defects for a period of 1-year from the date of the geonet installation.

B. Installation shall be warranted against defects in workmanship for a period of 1-year from the date of geonet completion.

2 PRODUCTS

2.01 GEONET PROPERTIES

A. The drainage geocomposite used for the leachate collection and leak detection system shall be non-woven, needle-punched, polypropylene continuous filament geotextile thermally bonded to both sides of a high density polyethylene (HDPE) geonet meeting or exceeding the following requirements.

B. The geotextile shall have properties that meet or exceed the values listed in Table 1B

Table 1B: Geotextile Properties

Property	Test Method	Test Frequency	Value
Mass Per Unit Area (oz/yd^2)	ASTM D5261	1/90,000 ft^2	8.0
Grab Tensile Strength (lbs)	ASTM D4632	1/90,000 ft^2	200
Trapezoidal Tear Strength (lbs)	ASTM D4533	1/90,000 ft^2	80
Apparent Opening Size (mm)	ASTM 4751	1/540,000 ft^2	0.18
Permittivity (sec^{-1})	ASTM D4491	1/540,000 ft^2	1.3

C. A geonet shall be manufactured by extruding two crossing strands to form a

bi-planar drainage net structure.

D. The geonet specified shall have properties that meet or exceed the values listed in Table 1D below.

Table 1D: Geonet Properties

Property	Test Method	Test Frequency	Value
Thickness	ASTM D5199	1/100,000 ft^2	300 mils
Carbon Black	ASTM D1603	1/100,000 ft^2	2 -3%
Tensile Strength (MD)	ASTM D5035	1/100,000 ft^2	100 lb/in
Transmissivity	ASTM D4716	1/540,000 ft^2, min. 1	$\geq 5.4x10^{-4}$ m^2/sec
Compressive Strength	ASTM D6364	1/540,000 ft^2	50,000
Density (g/cm^3)	ASTM D 1505	Once Per Resin Lot	>0.94
Melt Flow Index (g/10 min)	ASTM D 1238	Once Per Resin Lot	$\leq$ 1.0

E. The combined geocomposite specified shall have properties that meet or exceed the values listed in Table 1E below.

2.02 MANUFACTURING QUALITY CONTROL

A. The geonet shall be manufactured in accordance with the Manufacturer's Quality Control Plan submitted to and approved by the Engineer.

B. The geonet shall be tested according to the test methods and frequencies listed in Table 1 by the Manufacture or an independent lab contracted by the Manufacture.

3 EXECUTION

3.01 FAMILIARIZATION

A. Inspection

1. Prior to implementing any of the work in the Section to be lined, the Contractor shall carefully inspect the installed work of all other Sections and verify that all work is complete to the point where the installation of the Section may properly commence without adverse impact.
2. If the Contractor has any concerns regarding the installed work of other Sections, he shall notify the Engineer.

3.02 MATERIAL PLACEMENT

A. The geonet roll should be installed in the direction of the slope and in the intended direction of flow unless otherwise specified by the Engineer.

B. If the project contains long, steep slopes, special care should be taken so that only full-length rolls are used at the top of the slope.

C. In the presence of wind, all geonets shall be weighted down with sandbags or the equivalent. Such sandbags shall be used during placement and remain until replaced with cover material.

D. The geonet shall be properly anchored to resist sliding. Anchor trench compacting equipment shall not come into direct contact with the geonet.
E. No equipment can drive directly across the geonet. The specified fill material shall be placed and spread utilizing vehicles with a low ground pressure.
F. The cover soil shall be placed in the geonet in a manner that prevents damage to the geonet. Placement of the cover soil shall proceed immediately following the placement and inspection of the geonet.

3.03 SEAMS AND OVERLAPS

A. Each component of the geonet will be secured to the like component at overlaps.
B. Geonet Components
1. Adjacent edges along the length of the geonet roll shall be overlapped a minimum of 6” or as recommended by the engineer.
2. The overlapped edges shall be joined by tying the geonet structure with contrasting color (i.e. not black) plastic cable ties. These ties shall be spaced every 5 feet along the roll length.
3. Adjoining rolls across the roll width should be shingled down in the direction of the slope and joined together with cable ties spaced every foot along the roll width.

3.04 REPAIR

A. Prior to covering the deployed geonet, each roll shall be inspected for damage resulting from construction.

B. Any rips, tears or damaged areas on the deployed geonet shall be removed and patched. The patch shall be secured to the original geonet by tying every 6 inches with the approved tying devices. If the area to be repaired is more than 50 percent of the width of the panel, the damaged area shall be cut out and the two portions of the geonet shall be cut out and the two portions of the geonet shall be joined in accordance with Subsection 3.03.

END OF SECTION

SECTION 02900

SITE RESTORATION

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:
   1. Work necessary to restore all disturbed surfaces and facilities to equal or better condition.
   2. Provide, establish, and maintain seed, fertilizer, mulch, and erosion control materials.

B. Related Sections
   01025 MEASUREMENT AND PAYMENT
   02200 EARTHWORK
   02270 EROSION CONTROL

1.02 UNIT PRICES

All work under this Section shall be considered incidental to the work unless specifically indicated on the BID SCHEDULE and referred to in Section 01025 MEASUREMENT AND PAYMENT.

PART 2 PRODUCTS

2.01 MATERIALS

A. Topsoil: Provide topsoil as specified in Section 02200 EARTHWORK.

B. Seed: Provide seed mixture composed of the following proportion by weight:

Creeping Red Fescue	35%
Kentucky Blue Grass	15%
Perennial Rye Grass	50%

C. Fertilizer:
   1. Provide chemical fertilizer with a 12-12-12 mixture of Nitrogen (N), Phosphoric Acid (P_2O_5), and Potash (K_2O).
   2. Provide net weight of contents and guaranteed analysis.

D. Mulching: Provide material conforming to Section 02270, as approved by the Engineer.

PART 3 EXECUTION

3.01 CLEANUP

A. During the course of the work, the Contractor shall keep the site of his operations in as clean and neat as is possible. The Contractor shall dispose of all residue continuously throughout the construction and upon conclusion of the work. The Contractor shall dispose of surplus excavated material in a location approved by the Project Manager, and in accordance with Sections 02220. Lumber, equipment, temporary structures, and other refuse remaining from the construction operations shall be removed from the site. The Contractor shall leave the entire site of the work in a neat and orderly condition. The site shall include, but not necessarily be limited to, the project area, haul roads, stockpile areas, laydown areas, and borrow areas.

B. It shall be the Contractor's responsibility to dispose of all excess residue resulting from

construction operations. Excess trenching materials consisting of soil, rock, or boulders shall be disposed of by the Contractor in on—site areas designated by the Engineer.

3.02 TOPSOIL PREPARATION

A. General:
1. Prepare topsoil after finish grading of surfaces.
2. Prepare soil to a friable condition by discing, harrowing, or otherwise loosening the soil to a depth of 3 inches.
3 Break up all lumps of soil.
4. Rake out all rocks and debris.

3.03 FERTILIZING

A. Apply evenly on the prepared surface at a rate of 240 pounds per acre.

B. Drill or broadcast method, placed no deeper than 1 inch.

3.04 SOWING

A. Sow grass at a minimum rate of 100 pounds per acre.

B. Method:
1. Sow the seed following or in conjunction with the fertilizer.
2. Sow only while soil is in a friable condition.
3. Do not sow through mulch.
4. Sow seed mixture by drill or broadcast method.
5. Float seed sown by broadcast method so that 50% of the seed is mixed with the top 2 inch of the soil.

C. Hydroseeding:
1. Apply seed, fertilizer, and mulch in one application.
2. Mulch shall be a wood fiber material.
3. Apply at a rate of 1440 pounds per acre.

D. Watering:
1. Water all seeded areas to establish a smooth and full vegetative cover.
2. Should erosion occur, or the seed not grow within the guarantee period, regrade and reseed the disturbed area at no additional cost.

E. Erosion control:
1. Provide measures necessary to establish well rooted vegetation on slopes and ditch bottoms.
2. Protect seeded slopes with netted mulch blankets or other suitable methods.

F. Seasonal limitations:
1. Apply seed between May 1 and October 1.
2. Dormant seeding:
a. Permitted in limited areas to complete a project.
b. Apply after November 1, but not on frozen ground.

3.05 MULCHING

A. Apply at a rate of 2 bales per 1,000 square feet.

B. Method:

1. Apply immediately after seeding.
2. Apply evenly and loose enough to allow sunlight and air to penetrate, but thick enough to reduce the rate of evaporation and erosion.
3. Apply mulch adhesive as necessary at a rate of 150 gallons per acre.

END OF SECTION

SECTION 03101

CONCRETE FORMWORK (ACI)

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:
Construction and removal of all cast-in-place concrete forms.

B. Related Sections:
1. Section 01025 - MEASUREMENT AND PAYMENT
2. Section 03201 - CONCRETE REINFORCEMENT
3. Section 03251 - CONCRETE ACCESSORIES
4. Section 03301 - CAST-IN-PLACE CONCRETE

1.02 QUALITY ASSURANCE

A. Codes and standards:
Perform all work in accordance with ACI 301 and ACI 347 of the American Concrete Institute (ACI) unless otherwise indicated on the Plans or in this Section.

B. Design:
The design, engineering and construction of formwork shall be the responsibility of the Contractor.

C. Notifications:
Notify the Engineer at least 24 hours in advance of placing concrete.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Formwork facing materials:
1. "As cast, smooth form finish" on all surfaces except footings as described in ACI 301-84, 10.2.2 Smooth Form Finish.
   a. Clean plywood, tempered concrete-form-grade hardboard, metal, plastic, paper, or other approved material.
   b. Supports capable of preventing excess deflection (See Table 4.3.1 for tolerances)
   c. Completely removable materials.
2. Obtain approval on quality of form face from Engineer prior to installing.
3. Clean, reasonably straight earth cuts, which meet the required tolerances, may be used to form footings with approval of the Engineer.

B. Form accessories:
1. Partially or fully embedded
   a. Commercially manufactured
2. Do not use non-fabricated wire.

C. Form ties:
1. Exposed concrete work:
   a. Single rod ties equipped with tightly fitted washers at the midpoint.
   b. Assembly should provide cone-shaped depressions at the form/concrete surface interface at least one inch diameter and 1½ inches deep to permit filling and patching.
2. Manufacturers:
   a. Dayton Sure-Grip

b. Superior Concrete Accessories
c. Williams Form Engineering Corporation
d. or equal.

D. Form release agent:
1. Chemically neutral agent that will effectively prevent absorption of moisture and prevent bond with the concrete.
a. "Magic Kote" 43000 by Symons; or approved equal.
2. Non-toxic release agent for forms used on the interior surfaces of storage tanks designed to hold potable water supplies.
a. Amoco White Mineral Oil No. 31-USP, or equal.
3. Submit the name and sufficient documentation of the proposed form coating agent material to the Engineer for review.

PART 3 - EXECUTION

3.01 FORM CONSTRUCTION

A. General:
1. Provide all required materials in sufficient quantities so as not to delay the work.
2. Use forms rigid enough to maintain specified tolerances.
3. Design forms for the loads, lateral pressure, and allowable stresses outlined in ACI 347, Design of “Recommended Practice for Concrete Formwork” and in accordance with local building codes.

B. Formwork Facing
1. Arrange in an orderly and symmetrical manner
2. Keep the number of seams to a practical minimum

C. Form Ties
1. Construct to prevent appreciable spalling at the faces during removal of the end or end fasteners.
2. Terminate embedded ties at least twice the minimum dimension of the tie and never less than ¾ inch from the formed face.
3. Exposed Concrete
a. Do not leave any metal within 1½ inches of the surface for concrete exposed to water, weather, freeze/thaw and similar exposures.
4. Provide positive pressure at all joints to preclude mortar/grout leakage.

D. Forms
1. Install forms sufficiently tight to prevent loss of mortar from the concrete.
2. Permanently exposed surfaces
a. Provide 1" chamfer strips in the corners of forms.
b. Interior corners on such surfaces and the edges of formed joints will not require beveling.
c. Exposed surfaces include surfaces exposed to view or water.
3. Provide positive means of adjustment (wedge or jacks) of shores and struts.
a. Take up all settlement during the concrete placing operation.
b. Securely brace forms against lateral deflections.
c. Camber the formwork to compensate for anticipated deflection.
4. Temporary openings
a. Provide at the base of columns and wall forms for observation.
b. Where necessary to facilitate cleaning and observation.

5. Hold forms against the hardened concrete to maintain a true surface and to prevent offsets

or loss of mortar at the construction joint.

6. Construct wood forms for wall openings to facilitate loosening and counteract swelling of the forms.
7. Adjust wedges if necessary to align forms.
8. Anchor formwork to prevent upward or lateral movement .
9. Runways
   a. Place directly on the formwork or structural member
   b. Do not rest on the reinforcing steel.
10. Form surfaces:
    a. Cover with an approved coating material in accordance with the manufacturer's recommendations.
    b. Do not allow coating to come in contact with reinforcing steel or hardened concrete.
11. Coordinate work with other trades.

E. Tolerances:
   1. Construct formwork in conformance with the tolerance limits listed in Table 4.3.1 (ACI 301).

TABLE 4.3.1 - TOLERANCES FOR FORMED SURFACES

1. Variation from plumb:	
A. In the lines and surfaces of columns, piers, walls, and in arrises:	
In 10 ft of length	¼ in.
Maximum for the entire length	1 in.
B. For exposed corner columns, control-joint grooves, and other conspicuous lines:	
In any 20 ft length	¼ in.
Maximum for the entire length	½ in.
2. Variation from the level or from the grades specified in the contract documents:	
A. In slab soffits, ceilings, beam soffits and in arrises, measured before removal of supporting shores	
In any 10 ft of length	¼ in.
In any bay or in any 20 ft length	⅜ in.
Maximum for the entire length	¾ in.
B. In exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines:	
In any bay or in 20 ft length	¼ in.
Maximum for the entire length	½ in.
3. Variation of the linear building lines from established position in plan and related position of columns, walls, and partitions:	
In any bay	½ in.
In any 20 ft of length	½ in.
Maximum for the entire length	1 in.
4. Variation in the sizes and location of sleeves, floor openings, and wall openings	±¼ in.

5. Variation in cross-sectional dimensions of columns and beams and in the thickness of slabs and walls:

Minus	¼ in.
Plus	½ in.

6. Footings*

A. Variations in dimensions in plan:	
Minus	½ in.
Plus	2 in.
B. Misplacement or eccentricity:	
2 percent of the footing width in the direction of misplacement but not more than	2 in.
C. Thickness:	
Decrease in specified thickness	5%
Increase in specified thickness	No limit

7. Variation in steps:

A. In a flight of stairs:	
Rise	±⅛ in.
Tread	±¼ in.
B. In consecutive steps:	
Rise	$\pm 1/16$ in.
Tread	±⅛ in.

*Tolerances apply to concrete dimensions only, not to positioning of vertical reinforcing steel, dowels, or embedded items.

2. Maximum deflection of forms:
   a. $1/240$ of span or ¼ inch, whichever is less.
3. Establish and maintain control points and bench marks to check tolerances until final completion.

F. Inserts, embedded parts, and openings:
1. Coordinate the location of inserts, embedded parts, openings, and recesses with the respective trades.
2. Set and build into the work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete.
3. Use setting drawings, diagrams, instructions and directions provided by suppliers of the items.

G. Field quality control:
1. Clean and repair surfaces of forms to be re-used in the work.
2. Do not use "patched" forms for exposed concrete surfaces.
3 Inform Engineer 24 hours to placing concrete to allow for formwork inspection.

3.02 REMOVAL OF FORMS AND SUPPORTS

A. Forms not supporting the weight of the concrete:
   1. Remove when the concrete has hardened sufficiently to prevent damage.
B. Forms and shoring used to support the weight of structural members:
   1. Do not remove until the concrete has reached ___ % of the design strength.

C. If compression cylinder tests are not available, keep forms and supports in place for not less than the following periods of time:

Where design live load is:

	Less than dead load:	Greater than dead load:
Building walls: 12-24 hr		
Sides of beams and girders: 12-24 hr		
Floor slabs:		
Under 10 ft clear span between supports	4 days	3 days
10 to 20 ft clear span between supports	7 days	4 days
Over 20 ft clear span between supports	10 days	7 days

a. If high-early-strength concrete is used, or the ambient temperatures remain below 50°F, these periods may be modified at the discretion of the Engineer.

END OF SECTION

SECTION 03201 (ACI)

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
The furnishing and installation of all concrete reinforcement.

B. Related Sections:
1. Section 01025 - MEASUREMENT AND PAYMENT
2. Section 01300 - SUBMITTALS
3. Section 03101 - CONCRETE FORMWORK
4. Section 03251 - CONCRETE ACCESSORIES
5. Section 03301 - CAST-IN-PLACE CONCRETE

1.02 SUBMITTALS

A. Make all submittals in accordance with Section 01300 - SUBMITTALS

B. Shop Drawings:
1. Submit Shop Drawings showing the number, size, length, mark, location, and bending diagrams for all reinforcement.
2. Prepare Shop Drawings in accordance with "Manual of Standard Practice for Detailing Reinforced Concrete Structures" of the ACI.

1.03 DELIVERY AND STORAGE

A. Store bars on racks clear of the ground.

B. Protect bars from weather, dirt, grease, etc.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General:
1. All concrete reinforcement and accessories:
a. New, free from paint, oil, and structural defects.
2. Reinforcement with rust and/or mill scale which meets the applicable ASTM standard is acceptable.

B. Reinforcing bars:
1. ASTM A 615, Grade 60

C. Welded wire fabric:
1. ASTM A 185 F_y = 65,000 PSI
2. Plain, cold drawn, electrically welded fabric

D. Accessories:
1. In conformance with CRSI "Manual of Standard Practice for Reinforced Concrete

Construction".

2. Use plastic-tipped chairs and bolsters at exposed underside of concrete.

2.02 FABRICATION

A. General:
   1. Fabricate reinforcement accurately to the dimensions indicated on the Drawings and the approved Shop Drawings, in accordance with the tolerance given in ACI 315.
   2. Bend hooks in accordance with ACI 318.

PART 3 - EXECUTION

3.01 PLACING

A. Tolerances and clearance:
   1. See CRSI "Placing Reinforcing Bars," latest edition.
   2. Place bars to the following tolerances:

Clear Distance to Formed Surfaces:	±¼ inch
Minimum Spacing Between Bars:	±¼ inch
Top Bars in Slabs and Beams:	
Members 8 in. deep or less:	±¼ inch
Members More than 8 in. but not over 2 feet deep:	±½ inch
Members More than 2 ft deep:	±1 inch
Crosswise of Members: spaced evenly within 2 inches	
Lengthwise of Members:	±2 inches

   3. Move bars as necessary to avoid interference with other reinforcing steel or embedded items.
   4. Minimum concrete protective covering for reinforcement shall be as follows, unless shown otherwise on the Drawings:
      a. Concrete deposited against the ground: 3 inches
      b. Slabs poured over a mud mat: 2 inches
      c. Top steel in floor slabs exposed to water or wastewater
         i. interior surface: 2 inches
         ii. exterior surface: 2 inches
      d. Formed surfaces exposed to weather or in contact with the ground:
         i. reinforcing bars #6 or larger: 2 inches
         ii. reinforcing bars less than #6: 1½ inches
      e. Interior surfaces: 1½ inches for beams, girders, and columns; ¾ inches for slabs, wall and joists with #11 bars or smaller.

B. Installation:
   1. Clean reinforcement of materials which adversely affect or reduce the bond.
   2. Support and fasten reinforcement to prevent displacement beyond the tolerances of paragraph 3.01A.
   3. Supporting concrete blocks may be used on ground.
   4. Use metal, plastic or other approved bar chairs and spaces over formwork.
   5. Use plastic coated accessories within ½ inch of the formed concrete surface.
   6. Over-lapped welded wire fabric:
      a. The overlap measured between the outermost cross wires of each sheet should be 2 inches or greater.
      b. Extend fabric across supporting beams and walls to within 4 inches of concrete edges.

      c. Adequately support the fabric during placing in accordance with paragraph 3.01.B.2 or by laying it on a layer of fresh concrete of the correct depth before

placing the upper layer of the slab.

7. Offset vertical bars in columns at least one bar diameter at lapped splices.
8. Furnish template for all column dowels to insure proper placement.
9. Splices not shown in the Contract Documents must be approved by the Engineer.
10. Do not bend reinforcement embedded in hardened concrete.
11. Splice in conformance to "Reinforcing Bar Splices" latest edition by the Concrete Reinforcing Steel Institute and the "Building Code Requirements for Reinforced Concrete (ACI 318-83).
12. Circular ring tension steel laps: 40 bar diameters or greater
13. Place principal (moment-carrying) reinforcement in wall and slabs in the layer closest to the forms.
14. Place temperature steel at right angles to and in contact with the principal steel.

3.02 FIELD QUALITY CONTROL

A. Notify Engineer at least 24 hours prior to placement of concrete and when reinforcing is in place

END OF SECTION

SECTION 03251

CONCRETE ACCESSORIES (ACI)

PART 1 GENERAL

1.01 DESCRIPTION:

A. Section Includes:
Furnish and install all concrete accessories

B. Related Sections:
1. Section 01025 - MEASUREMENT AND PAYMENT
2. Section 01300 - SUBMITTTALS
3. Section 03101 - CONCRETE FORMWORK (ACI)
4. Section 03201 - CONCRETE REINFORCEMENT (ACI)
5. Section 03301 - CAST-IN-PLACE CONCRETE (ACI)

1.02 SUBMITTALS

A. Make submittals in accordance with Section 01300

PART 2 PRODUCTS

2.01 MATERIALS:

A. Water stops:
1. Polyvinyl chloride waterstops
a. 6 inches by ⅜ inches
b. ribbed or serrated with center bulb (1.2 lbs/ft minimum)
2. Meet or exceed the physical property requirements set forth in the U.S. Corps of Engineers specification CRD-C572-74, or latest revision.
3. Greenstreak 705; Vinylex RB6-38; A. C. Horn Type 5; or equal.

B. Inserts for general trades:
1. Malleable iron, strength as required.
2. Include bolts, nuts, and washers.
3. Heckman Building Products, Hohmann & Barnard, Inc.; or equal.

C. Premolded expansion strips:
1. W.R. Meadows, Inc.; Celotex Corporation; or equal.
2. Asphalt impregnated fiberboard, ASTM D-1751.

D. Expansion joint filler:
1. Neoprene NN2 semi-rigid closed cell
2. Use bond breaker between joint filler and joint sealant.
3. Williams Products Inc. Everlastic; or equal

E. Construction joint form for building floor slabs on grade:
1. Sixteen gauge, tongue and groove galvanized metal by Superior Concrete Accessories, Inc., Heckman Building Products Company; or equal.

F. Control joint form for building floor slabs on grade:
1. Twenty gauge galvanized steel.

2. Depth: ¼ the slab thickness or more.
3. Heckman Building Products Company, Superior Concrete Accessories, Inc.; or equal.

G. Concrete stair nosings on cast-in place concrete stairs:
1. Abrasive cast aluminum 4" wide, 6" shorter than tread
2. Wooster type 101 with cast on anchors; or equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. As indicated on the Drawings, specified in various other Sections, and as necessary for the proper and complete performance of this Work.

B. Waterstops:
1. Install according to manufacturer's recommendations.
2. Perform all splices in length or at intersections by heat sealing in accordance with manufacturer's recommendations.
3. Hold in place with hog rings and wire tie as required.

C. Piping, mechanical and electrical equipment support:
1. Inserts for hangers
   a. Supplied by the trade whose work is supported
2. Location
   a. Given to the General Contractor by the various trades.
3. Installation
   a. By the General Contractor.

END OF SECTION

SECTION 03301

CAST-IN-PLACE CONCRETE (ACI)

PART 1 - GENERAL

1.01 DESCRIPTION

A. Section Includes:
Furnish, place and finish all cast-in-place concrete and accessories.

B. Related Sections:
1. Section 01025 - MEASUREMENT AND PAYMENT
2. Section 01300 - SUBMITTALS
3. Section 01410 - TESTING LABORATORY SERVICES
4. Section 03101 - CONCRETE FORMWORK (ACI)
5. Section 03201 - CONCRETE REINFORCEMENT(ACI)
6. Section 03251 - CONCRETE ACCESSORIES (ACI)

1.02 QUALITY ASSURANCE

A. Codes and standards:
1. ACI 301 - "Specifications for Structural Concrete for Buildings"
2. ACI 350R - "Concrete Sanitary Engineering Structures"
3. ASTM C 94 - "Standard Specifications for Ready-Mixed Concrete"
4. ACI 318 - "Building Code Requirements for Reinforced Concrete”

B. Tests:
1. Performed in accordance with Section 01410 - TESTING LABORATORY SERVICES and this Section.
2. Slump tests
   a. Comply with ASTM C 143 and C 172
   b. Frequency: Once per truck
3. Compression cylinder tests
   a. Make and cure specimens conforming to ASTM C 31 requirements
   b. Four specimens per test
   c. Frequency: Once per day or every 50 cubic yards for each strength or type
4. Air-entraining test
   a. In accordance with ASTM C 231
   b. Frequency: Each truckload
5. Acceptance and evaluation
   a. Based on ACI 301 "Specifications for Structural Concrete for Buildings”
   b. Hardened Concrete Testing
      i. May be required by Owner or Engineer
      ii. Comply with ASTM C 42
      iii. In accordance with the ACI "Building Code for Reinforced Concrete" (ACI -318), Section 4.7.

1.03 SUBMITTALS

A. General
Make submittals in accordance with Section 01300.

B. Mix designs:
1. ACI 211.1 - “Recommended Practice for Selecting Proportions for Normal and

Heavyweight Concrete”
2. Furnish mix design(s) with test report(s) by an independent testing laboratory for each mix.
3. Furnish the following material content per cubic yard of each class of concrete furnished:
   a. Dry weight of cement.
   b. Saturated surface and dried weights of fine and course aggregates.
   c. Quantities, type and name of admixtures.
   d. Weight of water.
4. Provide product information on all components of mix design

C. Test reports:
1. Provide at 7 days and 28 days test reports in accordance with Section 01410.
2. Immediately notify the Engineer if any test specimen fails to meet the required specification tolerances.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cement:
1. Portland cement
2. ASTM, C150
3. Type I or IA

B. High early cement:
1. Portland cement
2. ASTM C150
3. Type III or IIIA

C. Aggregates:
1. Fine and coarse aggregates
   a. Conform to ASTM C 33.
2. Coarse aggregate
   a. 1 inch maximum.
3. Limit coarse aggregate as follows:
   a. Soft particles: 2.0%.
   b. Chert as a soft impurity (defined in Table 3 of ASTM C 33): 1.0%;
   c. Total of soft particles and chert as a soft impurity: 2.0%;
   d. Flat and elongated particles, long dimension more than five times short dimension: 15.0%.

D. Flyash: ASTM C 618

E. Water: Potable

F. Admixtures:
1. Air entrainment: ASTM C260
2. Water reducing agents: ASTM C 494
3. Retarding agent at Contractor's option: ASTM C 494
4. Accelerating agent at Contractor's option: ASTM C 494
5. No admixture shall contain calcium chloride.

G. Membrane curing compounds:
1. Moisture retention properties: ASTM C 309.
2. Material compatible with application of other surface materials.

H. Base plate and equipment grout:
1. ASTM C 1107, “Specification for Packaged Dry, Hydraulic Cement Grout (Nonshrink)”.
2. CRD-C 621, “Corps of Engineers Specification for Nonshrink Grout.”

I. Epoxy bonding agent:
Concressive 1001-LPL, Adhesive Engineering Company; or equal.

J Skid resistant topping:
1. Furnish where called for on the plans
2. Install in accordance with manufacturer’s recommendation
3. Euclid Chemical Company, Cleveland, OH; Sonneborn Building Products, Minneapolis; or equal

2.02 CONCRETE MIX

A. Proportioning:
1. In accordance with ACI 211.1 - "Standard Practice for Selecting Proportions for Normal, Heavy Weight and Mass Concrete"
2. Selected and documented in accordance with ACI-318 - "Building Code Requirements for Reinforced Concrete"
3. Provide mix design, test records, calculations and other documentation to Engineer in accordance with Section 01300 - Submittals

B. Specified compressive strength (f'c): 4000 psi.

C. Maximum water-cement ratio by weight:
1. 0.45 without superplasticizers
2. 0.40 with superplasticizers

D. Cement factor
Based upon required strength with W/C ratio per ACI 211.1

E. Air entrained concrete
1. Total air content:
a. 6% ± 1% for all concrete exposed to freezing and thawing, including all wastewater and potable water containment vessels
2. Total air content:
a. 3% ± 1% for all other concrete

F. Slump limits

	Max.	Min.
1. Reinforced foundation walls and footings	3"	1"
2. Unreinforced footings, caissons and substructure walls	3"	1"
3. Reinforced slabs, beams and walls	4"	1"
4. Building columns	4"	1"
5. Pavements	3"	1"
6. Sidewalks, driveways and slabs on ground	4"	2"

2.03 PRODUCTION AND MIXING

A. Production:
1. Ready mixed concrete
Batched, mixed, and transported in accordance with ASTM C 94.
2. Use only transit mixed concrete from NRCA certified mixing plants or plant approved by the Engineer.
3. Ready-mix delivery tickets: Furnish with each batch of concrete before unloading at the site with the following information:
a. Name of ready-mix batch plant

b. Serial number of ticket
c. Date and truck number
d. Name of Contractor
e. Job name and location
f. Specific class or designation of concrete
g. Amount of concrete (cubic yards)
h. Time loaded or of first mixing of cement and aggregates
I. Type, name and amount of admixture
j. Type, brand and amount of cement
k. Total water content by producer (or W/C ratio)
l. Maximum size of aggregate
m. Weights of fine and coarse aggregates

B. Mixing:
1. Add water at the job site only if the total amount of water is equal to or less than that specified by the concrete mix design and slump remains within allowable limits.
2. Mix 30 additional revolutions of the drum if water is added to mixed concrete at the job site.
3. Completely discharge the concrete within 1½ hours after introduction of mixing water to the cement or 1 hour after arriving at the site, whichever is sooner.
4. If the ambient air temperature exceeds 85°F, the time may be reduced by the Engineer as required.
5. Do not retemper concrete that has partially set.

C. Adjustments for weather conditions:
1. Cold weather:

Minimum Ambient Air Temperature (°F)	Minimum Concrete Temperature (°F)
30 to 45	60
15 to 30	65
below 15	no concrete placement permitted

Do not mix cement with water or aggregates above 100°F.
2. Hot weather (ambient temperature 90°F. or above)
a. Conform to "Recommended Practice for Hot Weather Concreting" ACI 305R.
b. An approved set retarder will be permitted under hot weather conditions

PART 3 - EXECUTION

3.01 PLACING

A. Pre-placement inspection:
1. Inspect and complete:
a. Formwork installation
b. Reinforcing Steel
c. Embedded or cast-in items
2. Notify and cooperate with other Contractors and trades
3. Notify Engineer at least 24 hours in advance of pouring
4. Thoroughly wet wood forms immediately before placing concrete as required where form coating is not used.
5. Clean all mixing and transporting equipment
6. Remove all debris, water and ice before placing concrete.

B. Handling:
Prevent separation or loss of ingredients while transporting concrete.

C. Method and rate:
1. Place all concrete in accordance with:
   a. ACI 304R - “Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete”
   b. CI 304.2R - “Placing Concrete by Pumping Method”
2. Place in a manner to avoid segregation.
3. Place concrete continuously until the panel or section is complete.
4. Do not deposit fresh concrete on hardened concrete, without a properly prepared cold joint.
5. Place horizontal layers with a maximum thickness of 18 inches.
6. Place concrete in columns, deep beams and walls with an elephant trunk or tremie to avoid segregation for vertical drops exceeding 3 feet.
7. Placing floors and slabs: Place evenly over the entire area.
8. Protect new concrete from rain until it has hardened sufficiently to prevent damage.

D. Compaction:
1. Mechanically vibrate as concrete is places for a sufficient duration to accomplish thorough compaction and complete embedment of reinforcement and fixtures.
2. Do not vibrate long enough to cause segregation of mix.
3. Vibrators: Comply with ACI 309 - “Standard Practice for Consolidation of Concrete”
4. Do not use vibrators to transport concrete inside of forms.
5. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than the visible effectiveness of the machine.
6. Do not insert vibrators into lower layers of concrete that have begun to set.
7. Make at least two vibrators, all in good working condition, available for use during all pouring operations.
8. For large pours in excess of 50 cubic yards, three vibrators shall be available.

3.02 PROTECTION AND CURING

A. General:
1. Prevent the concrete surface temperature from falling below 50°F
2. Prevent loss of moisture from the surface:
   a. Normal Portland Cement : 7 days.
   b. High-early-strength Portland Cement: 3 days.

B. Curing:
1. Treat all beams, columns, slabs and walls with a liquid membrane-forming curing compound as specified in 2.01 immediately after finishing or removing forms.
2. Apply in strict compliance with manufacturer's instructions.
3. Use alternate methods of curing such as ponding, continuous sprinkling, etc only with the prior approval of the Engineer.

C. Protection:
1. Protect all freshly placed concrete from damage due to low temperatures when the mean daily temperature is below 40°F (4.5°C) in accordance with ACI 306R.

3.03 JOINTS AND EMBEDDED ITEMS

A. Construction joints:
   1. Joints not shown in the Contract Documents must be approved by the Engineer.
   2. Continue all reinforcement across joints.
   3. Provide longitudinal keys at least 1½ inches deep:
      a. In all joints in walls
      b. Between walls and slabs or footings
   4. Before placing adjoining concrete:
      a. Thoroughly clean the joint surface
      b. Remove all laitance
   5. Roughen the concrete surface in an approved manner to obtain bond
   6. Refer to standard structural details for construction joint details.

B. Control joints:
   Construct control joints as outlined in Section 3.03A and as detailed on plans.

C. Expansion joints:
   1. Do not extend reinforcement or other embedded metal items bonded to the concrete (except dowels in floors, bonded on only one side of joints) continuously through any expansion joint.
   2. Premolded expansion joint filler
      a. Intersections of walls and slabs on grade unless otherwise shown
         i. "Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)" (ASTM D 994)
      b. Slabs on grade where slab to slab is jointed.
         i. "Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)" (ASTM D 1751)

D. Waterstops:
   1. At joints as called for on the construction plans.
   2. See Section 03251, 2.01A.

E. Other embedded items:
   1. Placement of all embedded pipe, conduit and other fixtures is the responsibility of the Contractor.
   2. Conform to ACI 318, Section 6.3
   3. Place all sleeves, inserts, anchors, and embedded items required for adjoining work or for its support prior to concreting.
   4. Position and support expansion joint material, waterstops, and other embedded items against displacement.
   5. Prevent the entry of concrete into sleeves, inserts, and anchor slots.

3.04 SURFACE TREATMENT

A. Patching:
   1. Patch all poor joints, voids, honeycomb, defective areas and tie holes immediately after stripping forms.
   2. Remove all laitance and foreign materials from areas to be patched by means of sandblasting.
   3. Patch material
   4. Mortar with the same proportions as the concrete to be patched
   5. Omit coarse aggregate.
      a. Bond patch material to concrete with a two-component liquid epoxy bonding agent in

accordance with manufacturer's instructions and recommendations.

b. Use an epoxy adhesive for bonding plastic concrete to hardened concrete in conformance with "Standard Specification for Bonding Plastic Concrete to Hardened Concrete with a Multi-Component Epoxy Adhesive" - ACI 503.2, except as modified by the requirements of this project specification.

B. Wall finishes:
1. Remove all fins.
2. Repair all damaged areas, including those discolored, spalled, cracked or non-uniform in texture to the satisfaction of the Engineer.
3. Concrete surfaces exposed to view
   a. Finish exterior walls down to a point one foot below finished grade
   b. Finish interior surfaces of tanks to a point one foot below the water line
4. After repairing defects, apply an Engineer approved waterproof coating in accordance with manufacturer’s recommendations.

C. Troweling floors:
1. Trowel finish all floors.
2. After screeding and as soon as concrete has set sufficiently:
   a. Float surface
   b. Steel trowel surface
   c. Provide smooth, hard, dense finish free from trowel marks, blemishes, and irregularities.
3. Finish platforms, walks, drives, and steps to a broom surface.
4. Leave a 2 inch border around panels in sidewalks and platforms.
5. Power float slab areas which receive a topping or grout base and tile.

D. Membrane curing and sealer compounds:
1. Apply curing compounds immediately after stripping forms.
2. Apply compound per manufacturer’s recommendations and in accordance with ASTM C 309.

E. Skid resistant topping:
Apply in accordance with manufacturer's recommendations.

3.05 SPECIFIC ITEMS OF CONSTRUCTION

A. Liquid containing concrete tank and channel walls:
1. Install waterstops in all joints below maximum water level.
2. Immediately remove All seepage through cracks in walls by epoxy injection.

B. Expansion strips:
1. Where indicated on the Drawings
2. At intersections of building floor slabs and vertical surfaces
3. Around columns

C. Slab Toppings:
1. Toppings are required where indicated on the Drawings.
2. Immediately before pouring topping, wet down surface of rough slab.
3. Where topping is poured over precast-prestressed concrete members, set screeds to give indicated slab thickness at center of span.

D. Stairs and platforms:

Place abrasive nosings on all concrete stairs.

E. Base plate and equipment grouting:
1. Add only water and use mechanical mixer for minimum of three minutes.
2. Protect from freezing.
3. Cure in accordance with manufacturer's recommendation.

F. Miscellaneous items:
1. Perform all concrete work for mechanical and electrical trades including but not limited to vaults, valve and meter pits, light pole bases, and machine bases.
2. Accessories such as manhole rings, ladder rings, pulling eyes, anchor bolts, etc., may be furnished by other trade but installed by the Contractor.

G. Chamfer:
Chamfer all exposed concrete edges 1" x 1" unless otherwise indicated on the Drawings.

H. Grout:
"Grout" as called for on the Drawings and used as a topping slab or shaped fill for water flow shall be a 3000 psi or greater concrete mix. Sections requiring less than 2" thick shall have a maximum aggregate size of ⅜ inch.

3.06 HYDROSTATIC LEAK TESTS FOR CAST-IN-PLACE CONCRETE TANKS

A. General:
Cast-in-place concrete structures which are designed to normally be filled with liquid will be subjected to a hydrostatic leak test.

B. Test procedure:
1. conduct the test before the tank is backfilled to allow visual observation of the floor slab - outer wall construction joint.
2. Fill each tank to its design liquid depth for a minimum period of 24 hours.
3. No visible leakage shall be allowed.
4. Any measurable loss of water over the 24 hour period shall be grounds for rejecting the test as unsatisfactory.
5. Empty, repair and retest the tank if the test fails.
6. All labor, equipment, and water required for testing each tank are the responsibility of the Contractor.

END OF SECTION

SECTION 06 11 00

General Carpentry Materials:

Lumber Standard: Am. Softwood Lumber Std. PS 20 (U.S. Dep. Comm.), S4S, 19% moisture at time of dressing, except as otherwise indicated.

Light Framing (4 x 4 Max.): "Standard" grade any species.

Structural Framing 2 x 6 to 4 x 14): "No. 2" grade, Fir or Hem-Fir.

Stress Grade: 1200 psi minimum, factor marked.

Exposed board Lumber: Select clear redwood of sizes noted on Drawings.

Concealed Board Lumber: Southern Pine "No. 3" (SPIB), any species "No. 4" (WCLIB) or any species "Standard" (WWPA).

Plywood Standard: Softwood plywood - Construction and Industrial PS 1 (U.S. Dep. Comm.), type and grade as indicated.

Provide plywood bearing DFPA grade - trade marks.

Plywood Sheathing: C/D,INT-APA, exterior glue or OSB (Oriented Slant Board).

Preservative pressure treated lumber and plywood with water-borne preservatives to comply with AWPA C2 and C9, respectively, and with requirements indicated below:

Kiln-dry to 15% moisture content after treatment, except for wood in contact with ground.

Wood for Above-Ground Use: AWPB LP-2.

Treat cants, nailers, blocking, furring, stripping and similar items in conjunction with roofing, flashing, vapor barriers, and waterproofing.

Treat sills, sleepers, blocking, furring, stripping and similar items in direct contact with masonry or concrete.

Treat ground-contact and water-immersed wood items in accordance with standard for ground contact.

Fire-Retardant Treated Wood: Where wood is indicted for fire-retardant treatment comply with AWPA C20 (lumber) and AWPA C27 (plywood). Provide UL label in each piece treated. Re-dry treated lumber.

Installation:

Install rough carpentry work to comply with "Manual of House Framing" by National Forest Products Assoc. (N.F.P.A.) and with recommendations of American Plywood Association (APA), unless otherwise indicated. For Sheathing, underlayment and other products not covered in above standards, comply with recommendations of manufacturer of product involved for use intended. Set carpentry work to required levels and lines, with members plumb and true and cut to fit.

Install finish carpentry work plumb, level, true and straight with no distortions. Shim as required using concealed shims. Scribe and cut finish carpentry items to fit adjoining work. Anchor finish carpentry work securely to supports and substrates, using concealed fasteners and blind nailing except as indicated, countersunk and filled flush with finished surface.

Trussed Rafters: Comply with “Light Metal Connected Wood Trusses” by Truss Plate Institute., and with “Nat. Design Specs. for Stress Graded Lumber and Its Fasteners” by NDMA.

Submit manufacturer’s Shop Drawings for approval with an engineer’s seal.

Glued Laminated Structural Units Standard: Comply with PS 56 “Structural Glued Laminated Timber” kk min. bending stress (FC) = 2400 psi; grade industrial.

Nail plywood or oriented strand board sheathing 6” o.c. at edges of panels, and 12” o.c. at intermediate supports. Leave space between panels as recommended by APA.

Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces from maximum length of lumber available. Cope at returns, miter at corners to produce tight fitting joints. Use scarf joints for end-to-end joints.

Securely attach carpentry work to substrates and supporting members using fastener of size that will not penetrate members where opposite side will be exposed to view or receive finish materials. Install fasteners without splitting wood; fasten panel products to allow for expansion at joints unless otherwise indicated.

END OF SECTION

SECTION 06 17 00
PREFABRICATED WOOD TRUSSES

General:

Standards: Comply with N.F.P.A. National Design Specification and with TPI standards including "Quality Standard for Metal Plate Connected Wood Trusses", "Commentary and Recommendations for Handling and Erecting Wood Trusses", Commentary and Recommendations for bracing Wood Trusses" and the following:

"Design Specification for Metal Plate Connected Wood Trusses".

Submittals: In addition to product data for truss components submit the following:

Shop drawings showing sizes, design values, materials, and dimensional relationships of components as well as bearing and anchorage details.

To extent engineering design considerations are fabricator's responsibility, submit design analysis and test reports indicating truss performance characteristics and compliance with requirements.

Provide shop drawings which have been signed and stamped be a structural engineer licensed to practice in jurisdiction where trusses will be installed.

Certification, signed by officer of fabricating firm, indicating trusses comply with project requirements.

Handle and store trusses with care and to comply with TPI recommendations to avoid damage form bending, overturning or other cause.

Products:

Lumber: Provide lumber S4S, S-Dry unless otherwise indicated grade marked, complying with PS 20 and requirements indicated.

Lumber Species: Any softwood, at Contractor's option, graded under WWPA, WCLB, SPIB or NLGA rules, which complies with other requirements.

Lumber Grade: Any grade fulfilling requirements indicated.

Stress Rating: Provide lumber which has been graded or tested and certified to comply with stress ratings indicated.

Metal Connector Plates: Metals and thickness as indicated, but not less than thickness indicated below:

Hot-Dip Galvanized Sheet Steel: ASTM A 446, Grade A, G60, 0.036" thick.

Fasteners and Anchorages: Of size, type, material and finish suited to application shown.

Fabrication: Fabricate and assemble trusses to provide units of configuration indicated, with closely fitted joints and connector plates securely fastened to wood members.

Installation:

Install trusses to comply with TPI referenced standards and other indicated requirements.

END OF SECTION

SECTION 06 83 16
FIBERGLASS REINFORCED PANELING

1 PART 1 GENERAL

1.01 SUMMARY

A. This section covers the materials to be provided and the methods to be used for interior paneling.

1.02 REFERENCES

A. American Plywood Association (APA)

B. West Coast Lumber Inspection Bureau (WCLIB)

C. American Wood Preservers Association (AWAPA)

D. Uniform Building Code (UBC)

1.03 SUBMITTALS

A. Laminated Fiberglass Panels, Fasteners, Trim, and Adhesive

2 PART 2 PRODUCTS

2.01 LAMINATED FIBERGLASS PANELS (Milk House Parlor Board or Sanitary Liner)

A. Fiberglass laminated to 3/8” CDX plywood as shown on plans.

B. Fiberglass thickness: 0.05”.

C. Color: White.

D. As supplied by Kinetics, Inc.; Madison, Wisconsin, or approved equal.

3 PART 3 – EXECUTION

3.01 WALLS AND CEILINGS

A. Install laminated fiberglass panels to walls and ceilings with custom fasteners and construction adhesives in accordance with manufacturers recommendations.

B. Seal all seams with flexible caulk and white vinyl trim.

C. Provide nailers/blocking and custom trim for panel edges, wall ceiling joint, and other unfinished edges.

D. Seal all penetrations of wall against air exchange.

E. Install wall collars where piping penetrates wall.

END OF SECTION

SECTION 07 21 00

THERMAL INSULATION

General:

Provide insulation thickness indicated, or provide combination of thickness and K-value required to yield the “R” value indicated.

Perimeter and Under Slab Insulation:

Extruded Polystyrene Insulation Board: FS HH-I-524C, Type IV, Class B, self-skinned, K-value of 0.20.

Provide:

“Dow Styrofoam” by Dow Chemical U.S.A.
“Formula R 250” by UC Industries

Vertical Application: Set in mastic adhesive as recommended by manufacturer.

Ceiling Insulation:

Faced Mineral Fiber Blanket/Batt Insulations: ASTM C 665 for Type III, Class A (blankets with reflective vapor-retarder membrane facing with flame spread of 25 or less; foil-scrim-kraft vapor-retarder membrane on one face, respectively; and as follows;

Mineral Fiber Type: Fibers manufactured from glass or slag.

Loose Organic Fiber Insulation: Cellulosic fibers (reprocessed newsprint or other) process with fire-retardant, vermin-resistant and neutralizing chemicals for blowing or pouring in place, complying with FS HH-I-515, Class 25, 2 lb. minimum in-place density, k-valve of 0.28; tested and labeled by UL for critical radiant flux of 12 W per q cm (CPSC 16CF-1209), 15% smoldering combustion, “Acceptable” for corrosiveness, moisture absorption, odor emission, fungal growth and permanence of flame-resistance, and “Negative” on starch content.

Loose Granular Masonry Cavity Insulation:

Granular Perlite Insulation: FS HH-I-574 or ASTM C 549, k-value of 0.33, silicone treated where used in exterior walls.

The insulation shall be installed in the cores of all exterior hollow masonry unit walls.

The insulation shall be poured directly into the wall at any convenient interval. Wall sections under doors and windows shall be filled before sills are placed.

All holes and openings in the wall through which insulation can escape shall be permanently sealed or caulked prior to installation of the insulation. Cooper, galvanized steel, or fiberglass screening shall be used in all weep holes.

Stud Partitions Interior and Exterior Walls:

Glass Fiber Blanket/Batt Insulation: Inorganic nonasbestos fibers formed with binders into resilient blankets or batts complying with HH-I-521, semi-rigid type where required for self support. (3-1/2 / 5-1/2 as indicated).

Installation, General:

Comply with insulation manufacturer's printed instructions and recommendations for the installation for each type of thermal insulation. Provide adequate anchorage or support for each unit. Insulate at all wood-on block plates, all possible openings in walls and ceilings (i.e., window and door frames, headers), around all inside plumbing lines and between plumbing lines and outside walls.

END OF SECTION

SECTION 07 25 00

VAPOR BARRIERS

General:

For use below all slabs and gypsum ceilings.

Elastic Sheet Vapor Barriers VB:

Polyethylene Vapor Barrier VB: 6-mil carbonated polyethylene film, rated 0.1 perms for less.

Installation:

Seal VB at seams, perimeter, obstruction and penetrations, with adhesive, sealant or tape recommended by manufacturer.

Anchorage: Install vapor barriers with adhesive or fasteners as appropriate for supporting substrate, and of type recommended by vapor barrier manufacturer.

Provide lapped seams and lap vapor barriers onto other work at edges of coverages and at penetrations of barriers by other work.

Seal lapped seams and laps onto other work with adhesive or self-adhesive tape of type recommended by vapor barrier manufacturer. Before covering over vapor barriers with other (concealing) work, patch punctures and tears with adhesively applied barrier material or tape with perm rating equal to barrier rating.

END OF SECTION

SECTION 07 41 00

METAL ROOFING

PART 1-GENERAL
1.01 DESCRIPTION

A. General

1. Furnish all labor, material, tools, equipment and services for all preformed roofing as indicated, in accord with the provisions of the Contract Documents. The Metal Roofing Manufacturer will provide all components required for a complete metal roofing system to include panels, panel clips, trim/flashing, fascias, ridge, closures, sealants, fillers and any other required items.
2. Completely coordinate with work of all other trades.

1.02 QUALITY ASSURANCE

A. Applicable standards

1. AISC 360, *Specification for Structural Steel Buildings*, American Institute of Steel Construction, Chicago, IL, 2010.
2. AISI D111, *Design Guide for Cold-Formed Steel Purlin Roof Framing Systems*, American Iron and Steel Institute, Washington, D.C., 2009.
3. AISI S100, *North American Specification for the Design of Cold-Formed Steel Structural Members*, Washington, D.C., 2007, with Supplement 1, dated 2010.
4. ADM1, *Aluminum Design Manual*, Aluminum Association, Arlington, VA, 2010.
5. ASTM A653, *Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process*, American Society for Testing and Materials, West Conshohocken, PA, 2008.
6. ASTM A792, *Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process*, American Society for Testing and Materials, West Conshohocken, PA, 2008.
7. ASTM E1514, *Standard Specification for Structural Standing Seam Steel Roof Panel Systems,* American Society for Testing and Materials, West Conshohocken, PA, 1998(2003). 8. ASTM E1592, *Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference*, American Society for Testing and Materials, West Conshohocken, PA, 2005.
9. ASTM E 1646, *Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference*, American Society for Testing and Materials, West Conshohocken, PA, 1995(2003).
10. ASTM E1680, *Standard Test Method for Rate of Air Leakage through Exterior Metal Roof Panel Systems*, American Society for Testing and Materials, West Conshohocken, PA, 1995(2003).
11. MBMA, *Metal Building Systems Manual*, Metal Building Manufacturers Association, Inc., Cleveland, OH, 2006 with 2010 Supplement (updated expected in 2012).
12. MBMA, *Metal Roofing Systems Design Manual,* Metal Building Manufacturers Association, Inc., Cleveland, OH, 2000 (update expected in 2012).
13. SJI K-1.0, *Standard Specification for Open Web Steel Joists, K-series*, Steel Joist Institute, Forest, VA, 2010.
14. UL 580, *Tests for Uplift Resistance of Roof Assemblies*, Underwriters Laboratories, Inc., Northbrook, IL, 2006, with Revisions through July, 2009.

B. Manufacturer’s qualifications

1. Manufacturer shall have a minimum of three years experience in manufacturing metal roofing systems [and shall be accredited under the International Accreditation Service, "Accreditation Criteria for Inspection Programs for Manufacturers of Cold-Formed Steel Structural and Nonstructural Components Not Requiring Welding (AC473)" or "Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems (AC472)"]. Panels specified in this section shall be produced in a permanent factory environment with fixed-base roll-forming equipment. A letter from the manufacturer certifying the manufacturer’s qualifications shall accompany the product material submittals.

C. The Installer shall meet the following minimum criteria
a. Maintain a minimum $250,000 general liability coverage for each loss.
b. Maintain worker's compensation coverage, as mandated by law.
c. Have no viable claims pending regarding negligent acts or defective workmanship on previously or current projects.
d. Have not filed for protection from creditors under any state or federal insolvency or debtor relief statutes or codes.
e. Have received specific training in the proper installation of the specified system and will be present to supervise whenever material is being installed.
f. Have installed five projects of similar scope and magnitude that have been in service for a minimum of two years with satisfactory performance of the roof system.

1.03 SYSTEM PERFORMANCE REQUIREMENTS

A. Performance Testing
1. Metal roofing systems shall be tested in accordance with UL580, Class 90 rating
2. Metal roof panel systems shall be tested in accordance with ASTM E1592 for negative loading. Capacity for gauge, span or loading other than those tested is permitted to be determined by interpolating between test values only.
3. Metal roof panel systems shall have a maximum air infiltration rate of 0.007 cfm/ft2 at a pressure differential of 6.24 psf. when tested in accordance with ASTM E1680.
4. Metal roof panel systems shall have no water leakage at a pressure differential of 6.24 psf when tested in accordance with ASTM E1646.
5. The panels and concealed anchor clips shall be capable of supporting a 300-pound temporary concentrated load at the panel mid-span in the installed condition. The load shall be applied over the entire panel width. The panels shall support this concentrated load without displaying permanent distortions that would affect the weather tightness of the SSSRS.

1.04 DESIGN REQUIREMENTS

A. General
1. The SSSRS shall be designed by the Manufacturer as a complete system. Members and connections not indicated on the drawings shall be the responsibility of the Contractor. All components of the system shall be supplied or specified by the same manufacturer.

B. Design Loads

1. Design load application shall be in accordance with 2015 Michigan Building Code.
2. Dead Loads
   a. The dead load shall be the weight of the SSSRS. Collateral Loads shall be as shown on the contract drawings. Collateral Loads shall not be applied to the roof panels.
3. Live Loads
   a. The panels and concealed anchor clips shall be capable of supporting a minimum uniform live load of 20 psf.
4. Snow Loads
   a. The design ground snow loads shall be as defined on the contract drawings.
5. Wind Loads
   a. The design wind speed for the metal roofing system shall be as defined on the contract documents.
6. Thermal Effects
   a. Roof panels shall be free to move in response to the expansion and contraction forces resulting from temperature variation, as specified in the MBMA *Metal Roofing Systems Design Manual.*
7. Rainfall Intensity
   a. All exterior gutters and downspouts shall be designed for rainfall intensity based upon a 5-year recurrence interval for a five-minute duration. All interior gutters, valleys and downspouts shall

be designed for rainfall intensity based upon a 25-year recurrence interval based on a five-minute duration.

C. Framing Members Supporting the SSSRS

1. Any additions/revisions to framing members supporting the SSSRS to accommodate the manufacturer/fabricator's design shall be the Contractor's responsibility, and shall be submitted for review and approval by the Engineer of Record. New or revised framing members and their connections shall be designed in accordance with [AISC 360] [AISI S100] [SJI K1.1] design specifications. Deflection requirements shall be in accordance with the applicable building code, or as a minimum, the provisions of the AISC Steel Guide Series 3 – *Serviceability Design Considerations for Steel Buildings, 2nd Edition.*

D. Roof Panels

1. Steel panels shall be designed in accordance with the AISI S100.
2. Aluminum panels shall be designed in accordance with the *Aluminum Design Manual*.
3. Deflection requirements shall be in accordance with the applicable building code, or as a minimum, L/180 for roof snow load (but not less than 20 psf).

E. Accessories and Their Fasteners

1. Accessories and their fasteners shall be capable of resisting the specified design wind uplift forces and shall allow for thermal movement of the roof panel system. Exposed fasteners shall not restrict free movement of the roof panel system resulting from thermal forces, except at designed points of roof panel fixity.

1.05 SUBMITTALS

A. Installation Drawings

1. Submit completed installation drawings and installation details by the manufacturer, to the architect (owner) for review. Do not proceed with manufacture prior to review and architectural approval of installation drawings. Do not use drawings prepared by the architect (owner) for installation drawings.
2. Installation drawings shall show methods of installation, elevations and plans of roof and wall panels, sections and details, specified loads, flashings, roof curbs, vents, sealants, interfaces with all materials not supplied by the metal roofing system manufacturer, and proposed identification of component parts and their finishes.

B. Calculations (All calculations noted below shall be reviewed and sealed by a Licensed Professional Engineer.)

1. Submit engineering calculations defining cladding loads for all roof areas based on specified building codes, allowable clip loads, and required number of fasteners to secure the panel clips to the designated substructure.
2. Compute uplift loads on clip fasteners with full recognition of prying forces and eccentric clip loading.
3. Calculate holding strength of fasteners in accordance with submitted test data provided by Fastener Manufacturer based on length of embedment and properties of materials.
4. Submit drainage calculations for valley, gutter, and downspout design.
5. Submit thermal calculations and details of floating clip, flashing attachments, and accessories, indicating the free movement in response to the expansion/contraction effects.

C. Physical Samples

1. Submit samples and color chips for all proposed finishes.
   a. Submit one 12-inch long sample of panel, including clips.
   b. Submit two 3-inch x 5-inch color chip samples in color selected by the architect .

D. Test Reports

1. Submit test report showing that metal panels have been tested in accordance with ASTM E1592.
2. Submit test report showing that metal panels meet the water penetration requirements of ASTM E1646.
3. Submit test report showing that metal panels meet the air infiltration requirements of ASTM E1680.

E. Metal Roofing System Fabrication Certification

1. Submit a letter from the SSSRS manufacturer verifying that the SSSRS has been produced in a plant

that is accredited under the IAS AC472 or AC473 program.

F. Installation contractor's qualifications

1.Submit a letter from the manufacturer identifying the installer of the metal roofing system as an authorized installer, approved by the manufacturer prior to the start of the installation of the metal roofing system.

G. Metal roofing system installation inspection reports

1. Submit written and photographic SSSRS installation inspection reports from the general contractor's third party metal roof consultant appraising the installation of the metal roofing system. The written and photographic inspection reports shall be submitted to the architect (owner), metal roofing system installation contractor and general contractor.
2. A separate report shall be submitted for each of the following stages of the metal roofing system installation

a. Prior to the installation of the metal roofing panels to verify the proper installation of the substrate. The roof consultant shall be only responsible for assuring that the substrate is in suitable condition for the installation of the SSSRS.
b. At final completion of all metal roofing system work.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery

Deliver metal roofing system to job site properly packaged to provide protection against transportation damage.

B. Handling

Exercise care in unloading, storing and installing metal roofing system to prevent bending, warping, twisting and surface damage.

C. Storage

Store all material and accessories above ground on well supported platforms. Store under waterproof covering. Provide proper ventilation of metal roofing system to prevent condensation build-up between each panel or trim/flashing component.

PART 2 – PRODUCTS

(Vertical Rib Structural Standing Seam, trapezoidal Rib Structural Standing Seam, Panel rib height not less than 2 inches)

2.01 MATERIALS

A. Metal roof panel

1. Profile: 1¾ inch high rib x 12 inch wide panel
2. Seam Type: [Interlocking / Snap Connection] [Mechanically Seamed]
3. Minimum Thickness: Panel to meet all specified design loads, but not less than 0.023 inches (24 Gauge).
4. Panel Base Material

a. Galvanized steel sheet, G90, conforming to ASTM A653
b. Galvalume® steel sheet, AZ50, conforming to ASTM A792 for painted and unpainted panels.
c. Galvalume® steel sheet, AZ55, conforming to ASTM A792 for unpainted panels.

5. Texture

a. Smooth.

6. Finish

a. Selected from manufacturer's standard offering.
b. Factory Color Finish.

Clear acrylic-coated Galvalume.

B. Concealed Anchor Clips

Concealed anchor clips shall be the same as those used during the testing of the roof system. Clip bases shall have factory punched or drilled holes for attachment. Clips shall be made from multiple pieces with the allowance for the total thermal movement required within the clip. Fixed clips are permitted when the manufacturer can substantiate that the system can accommodate the thermal cyclic movement under sustained live or snow loads.

2.02 Miscellaneous Materials

A. Fasteners

Fasteners for steel roof panels shall be zinc-coated steel, aluminum, corrosion resisting steel, or nylon-capped steel, type and size specified below, or as otherwise, approved for the applicable requirements. Fasteners for aluminum roof panels shall be aluminum or corrosion resisting steel. Fasteners for structural connections shall provide both tensile and shear ultimate strengths of not less than 750 pounds per fastener. Fasteners for accessories shall be the manufacturer's standard. Exposed roof fasteners shall be sealed or have sealed washers on the exterior side of the covering to waterproof the fastener penetration. Washer material shall be compatible with the screw head; have a minimum diameter of 3/8-inch for structural connections; and gasket portion of fasteners or washers shall be neoprene or other equally durable elastomeric material.]

B. Components

Components shall be compatible with the roof panel furnished. Flashing, trim, metal closure strips, caps, gutters, downspouts, roof curbs, and similar metal components shall not be less than the minimum thickness specified by the SSSRS Manufacturer. Exposed metal components shall be finished to match the panels or trim, as furnished. Molded closure strips shall be closed-cell or solid-cell synthetic rubber or neoprene, or polyvinyl chloride pre-molded to match configuration of the covering and shall not absorb or retain water. Thermal spacer blocks and other thermal barriers at concealed clip fasteners shall be as recommended by the SSSRS Manufacturer.

C. Sealants

All tape sealant shall be a pressure sensitive, 100 percent solid, sealing tape with a release paper backing. Provide permanently elastic, non-sagging, non-toxic, non-staining tape sealant approved by the SSSRS Manufacturer.

2. The SSSRS Manufacturer shall approve all joint sealant that will come into contact with the SSSRS.

2.03 FABRICATION

A. Panels shall be produced by a SSSRS Manufacturer meeting the requirements of section 1.02B.

B. Fabricate trim, flashing and accessories to Manufacturer's specified profiles.

2.04 PREFABRICATED CURBS AND EQUIPMENT SUPPORTS

A. General: Provide the SSSRS Manufacturer with the dimensions, weights and model number of the units to be supported by the curb(s).

B. Fabricate curbs of structural quality aluminum, Galvalume®, or hot-dipped galvanized sheet. Curbs shall have welded joints unless a two-piece curb is required. Provide integral base plates and water diverters/crickets. Front base plate shall be extended up-slope from the beginning of the water diverter. Curbs shall be designed for a compatible installation with the panel system.

C. Curbs shall be constructed to match the roof slope and provide a mounting surface as required by the rooftop unit manufacturer.

D. Submit roof curb manufacturer's shop drawings to SSSRS Manufacturer for approval before fabrication of curbs.

E. Any curb structural support system shall allow thermal movement of the curb with the roofing system.

2.05 PREFABRICATED PIPE FLASHINGS

A. Pipe flashings shall provide a weathertight joint at projections through the roof, taking into account the thermal movement of the roof and the service temperature of the projection. Pipe flashings shall have an aluminum-flanged base ring.

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

A. Examination
1. The Contractor shall verify installed work of other trades that such work is complete to a point where the roofing system installation may commence.
2. Verify that the substructure installation is in accordance with the approved shop drawings and SSSRS Manufacturer's requirements. This specifically includes verifying that secondary structural members and/or decking are installed to meet performance requirements. Coordinate with SSSRS Manufacturer to ensure that the substructure is installed to accommodate the appropriate clip spacing.

B. Discrepancies
1. In event of discrepancy, notify the architect (owner).
2. Do not proceed with installation until discrepancies have been resolved.

3.02 INSTALLATION

A. Install the SSSRS in accordance with manufacturer's instructions and approved installation drawings.
B. Install the SSSRS so that it is weathertight and allows for thermal movements.
C. Locate and space all exposed fasteners in accordance with the SSSRS Manufacturer's recommendations. Use torque settings to obtain controlled uniform compression for a positive seal without rupturing the neoprene washer.

D. Avoid placing pipe penetrations through the panel seams.

E. Do not allow panels or trim to come into contact with dissimilar materials (i.e. copper, lead, graphite, treated lumber, mortar, etc.). Water run-off from these materials is also prohibited.

F. Comply with SSSRS Manufacturer's approved installation drawings, instructions and recommendations for installation of roof curbs. Refer to SSSRS Manufacturer's standard installation details. Anchor curbs securely in place with provisions for thermal and structural movement.

3.03 CLEANING, PROTECTION

A. Dispose of excess roofing materials and remove debris from site.

B. Clean work in accordance with manufacturer's recommendations.

C. Protect work against damage until final acceptance. Replace or repair to the satisfaction of the architect (owner), any work that becomes damaged prior to final acceptance.

D. Touch up minor scratches and abrasions per the SSSRS Manufacturer's recommendations.

END OF SECTION

SECTION 07 46 00

PREFORMED SIDING

Performance Requirements: Provide preformed panel systems which comply with performance requirements indicated.

Submittals: Submit manufacturer's product data describing preformed siding panels and structural support system.

Submit samples of each exposed finish material.

Submit certification by manufacturer that products have been pretested and comply with performance requirements indicated.

Manufacturers: Provided the following or product meeting equal or better specifications.

Georgia-Pacific, Platinum plywood exterior siding.

LP Smartside Engineered Treated Wood Panel.

Color: Color to be selected. Submit standard samples to Engineer for approval.

Finish: Manufacturer's standard.

Warranty: Manufacturer's standard warranty.

Accessories: Provide manufacturer's standard and accessories as required for a complete installation including trim, flashing, corner units, clips, seam closures, battens, sealants, and similar items.

Comply with panel mfr.'s. instructions for anchorage, joint sealers, flashing and trim for the proper and permanent installation of panels, with provisions for thermal expansion, erected in panel pattern indicated.

Conceal fasteners by use of laps and joint clips.

END OF SECTION

SECTION 08 11 00
STEEL DOORS, FRAMES, AND WINDOWS

Standards: In addition to other specified requirements, comply with Steel Door Institute "Recommended Specifications for Standard Steel Doors and Frames" (SDI-100), for the following classifications:

Submittals: With manufacturer's standard details and specifications for steel doors and frames, submit shop drawingsshowing application to project, as required.

For door and frame assemblies required to be fire rated and exceeding sizes of tested assemblies, submit manufacturer's certification that each assembly has been constructed to conform to design, materials and construction equivalent to labeled construction requirements.

Manufacturer: One of the following:

Ceco Corp.
Curries Mfg., Inc
Steelcraft/Div American Standard Co.
Republic Builders Products Corp./Subs. Republic Steel.

Materials: Steel doors, frames and windows; hot-rolled, pickled and oiled per ASTM A 569 and A 568; cold-rolled per ASTM A 366 and A 568.

Anchors and Accessories: Manufacturer's standard units. Use galvanized items for units built into exterior walls, complying with ASTM A 153.

Fabrication: Fabricate units to be rigid, neat in appearance, and free from defects, warp, or buckle. Weld exposed joints continuously, grind, dress, and make smooth, flush and invisible.

Prepare Steel Doors and Frames to receive mortised and concealed finish hardware, including cutouts, reinforcing, drilling, and tapping, complying with ANSI A 115 "Specifications for Door and Frame Preparation for Hardware". Reinforce units to receive surface-applied finish hardware to be field applied.

Locate finish hardware as indicated or, if not indicated, per DHI "Recommended Locations for Builder's Hardware".

Shop Paint exposed surfaces of doors and frame units, including galvanized surfaces, using manufacturer's standard baked-on rust inhibitive primer.

Doors: Comply with SDI-100, of the types and styles indicated, for materials quality, metal gages, and construction details.

Exterior and Interior Doors: Grade II, heavy duty, Model 4, minimum 18 gauge faces. (exterior door to have steel top cap)

Thermal Rated (Insulating) Doors: Provide thermal insulating doors for all exterior steel doors. Doors shall be fabricated with a maximum apparent U factor of 0.24 BTU/hr (ft2) degrees F as tested in accordance with ASTM C236.

Frames: Comply with SDI-100, of the types and standards indicated, for materials quality, metal gages, and construction details.

Fabricate all frames from 16 gauge steel.

Provide standard hollow metal frames for doors, transoms, sidelights, borrowed lights, and other openings as indicated.

Prepare frames to receive 3 silencers on strike jambs of single-swing frames and on heads of double-swing frames. (Stick on silencers are not acceptable in lieu of drilled type.)

Provide 26-gage steel plaster guards on mortar boxes, welded to frame, at back of hardware cutouts where installed in concrete, masonry or plaster opening.

Protect inside faces of frames in plaster or masonry wall construction which are placed with anti-freeze additives, using high-built fibered asphalt emulsion coating.

Installation: Install hollow-metal units in accordance with manufacturer's instructions and final shop drawing (if any).

Fit doors to frames and floors with clearances specified in SDI-100.

Finish hardware is specified in another Section 08 70 00.

END OF SECTION

SECTION 08 70 00
BUILDERS HARDWARE

Description of work:

The extent of builders hardware is shown on the Drawing in schedules. Builders hardware is hereby defined to include all items known commercially as builders hardware, as required for swing and sliding doors, except special typed of unique and non-matching hardware specified in the same section as the door and door frame.

Steel Doors and Frames are specified in Section 08 10 00.

Quality Assurance

Acceptable Hardware Manufacturers:

General:

Listed herein are acceptable manufacturers for the primary items of builders hardware. Listed manufacturer's products which comply with the indicated requirements are acceptable for other items.

An asterisk (*) indicates which manufacturer's product numbers have been used in schedules and elsewhere to establish minimum requirements.

Obtain each kind of hardware (latch and lock sets, hinges, closures, etc.) from only one manufacturer, even though several may be indicated as acceptable manufacturers.

Listing of Acceptable Manufacturers:

A. Hinges.....McKinney, *Hager, *Stanley
B. Locksets & Latchsets.....Yale, Schlage, Sargent, *Cal Royal
C. Door Closures.....*LCN, *Norton, Sargent, Yale, Rixon
D. Pulls.....*Rockwood, Trimco, Ives, Hiawatha
E. Stops.....*Rockwood, Ives, Quality
F. Thresholds.....*National Guard, Pemko, Reese
G. Weatherstrip & Sweeps.....*National Guard, Pemko, Reese

Any substitute of a product not listed, without prior written approval, will be rejected.

Supplier:

A recognized builders hardware supplier who has been furnishing hardware in the same area of the project for a period of time of not less than two years, and who is, or has in employment, an experienced hardware consultant who is available at reasonable times during the course of work for project hardware consultation to the Owner, Architect and Contractor.

Installer:

Assign installation of hardware to experienced tradesmen, either at the door and frame fabrication plant or at the project site.

Departures from Scheduled Designations:

Except as otherwise indicated, the use of one manufacturer's numeric designation system in schedules does not imply that other listed acceptable manufacturer's products will not be acceptable, unless they are not acceptable in design, or not equal in size, weight, finish,

function, or other quality of significance. Do not change the selection after Architect's acceptance of hardware supplier's completed hardware schedule.

Submittal

Manufacturer's Data

Submit manufacturer's product data for each item of hardware. Include whatever information may be necessary to show compliance with requirements, and include instructions for installation and for maintenance of operating parts and exposed finishes. Whenever needed, furnish templates to fabricators of other work which is to receive finish hardware.

Samples:

Prior to submittal of the final hardware schedule and prior to delivery of hardware, submit one sample each exposed hardware unit, finished as required and tagged with full description for coordination with schedule. Sample will be reviewed by Architect for design, color, and texture only. Compliance with other requirements is the exclusive responsibility of the Contractor. Samples will be returned to supplier. Units which are acceptable and remain undamaged through submittal, review and operation, may be use in work, within limitations of keying coordination requirements.

HARDWARE SCHEDULE:

General:

Submit six (6) copies of the hardware schedule in the manner and format specified. Hardware schedules are intended for coordination of the work. Review and acceptance by the Architect or Owner does not relieve the Contractor of his exclusive responsibility to fulfill the requirements as shown and specified.

Include a separate key schedule, showing clearly how the Owner's final instruction on keying of locks have been fulfilled. Coordinate with existing keying system.

Hardware Schedule Format:

Submit hardware schedule in the same format (sets) as set forth in the specifications. Add additional information, such as door numbers, total quantities of each hardware item, etc., as may be deemed necessary for the Builder's hardware supplier.

Submit two (2) copies of catalog cuts of all hardware items proposed by listed acceptable manufacturers to be used in the project in lieu of each scheduled hardware item, including catalog cuts f the scheduled hardware item it is proposed to be substituted for. Mark-up choices and options in data on both proposed and scheduled hardware catalog cut sheets, as necessary to indicate characteristic of the actual product being provided for the project.

JOB CONDITIONS

Coordinate hardware with other work. Tag each item or package separately, with identification related to the final hardware schedule, and include basic installation instructions in the package. Furnish hardware items of proper design for use on doors and frames of the thicknesses, profile, swing, security and similar requirements indicated, as necessary for proper installation and function. Deliver individually packaged hardware items at the proper times to the proper locations (shop or project site) for installation.

Keying:

All locks and cylinders shall be keyed alike in sets and maser keyed at the direction of the Owner.

Furnish six (6) master keys and two (2) keys each lock, unless otherwise noted.

Miscellaneous Items:

Door Stripping:

Provide type indicated or, if not indicated, type recommended by manufacturer for condition of exposure, with
easily replaceable resilient stripping elements.

On fire-rated doors provide type approved for use with rating.

Provide weatherstripping at jambs and head of each exterior door.

Provide weatherstripping at sill of each exterior door, threshold-contact type except as otherwise indicated.

All weatherstripping and sweep strips to be supplied with self-drilling “tek” screws for installation on hollow
metal doors and frames.

EXECUTION

INSTALLATION

General:

Install each hardware item in compliance with manufacturers’ instructions and recommendations. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way, coordinated removal, storage, and reinstallation or application of surface projections with finishing work specified in Section 09 90 00. Do not install surface-mounted items, including silencers, until finishes have been completed on the substrate.

Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

Drill and countersink units which are not factory-prepared for anchorage fasteners. Space fasteners. Space fasteners and anchors in accordance with industry standards.

Mounting heights:

Mount hardware units at heights indicated in “Recommended Locations for Builders Hardware” by the Door and Hardware Institute (DHI), except as otherwise specifically indicated or required to comply with governing regulations.

Thresholds and Floor Covers:

Cut and fit to profile of door frames, with mitered corners and hairline joints.
Screw to substrate with No. 10 or larger screws, of the proper type for permanent anchorage and of bronze, stainless steel, or other materials which will not corrode in contact with the threshold metal.

At exterior doors, and elsewhere as indicated, set each edge of threshold in a seal strip of sealant. Remove excess sealant. See section 07 90 00 for type sealants required.

ADJUST AND CLEAN

General:

Hardware supplier shall, at completion of hardware installation, visit jobsite and adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Lubricate moving parts with type lubricant recommended by builders hardware manufacturer. Replace units which cannot be adjusted or lubricated to operate freely and smoothly as intended for the application made. Adjust door control devices to compensate for final operation of heating ventilating equipment. Hardware supplier shall notify Architect, in writing, as to any major hardware misinstallations and that adjustments have been made.

END OF SECTION

SECTION 11210

LEACHATE PUMPS AND EQUIPMENT

PART 1 GENERAL

1.01 DESCRIPTION

A. Work included:
   1. Provide all equipment, materials, parts, labor, testing, and start up services necessary for primary and secondary leachate collection and appurtenances for the management of leachate head level on the liner system.
   2. The equipment includes the following items:
      a. Submersible well pump
      b. Check valve
      c. Drop pipe
      d. Pitless adapter unit
      e. Electric cable
      f. Pressure transducer
      g. Wheeled-sump strainer

B. Well Pump selection:
   1. The pump specified is based on pumping heads determined from the best available estimates. Bid prices shall be based on the specified pump.
   2. The Owner or Engineer may modify the pump capacity and size of the related equipment for the leachate collection system based on the results of the pumping test. If the capacity of the final pump selected differs significantly from the specified pump, price adjustments will be negotiated.
   3. The Contractor shall not order or install any permanent pumping equipment until the Engineer has analyzed the pumping test data and authorizes the Contractor to proceed.

C. Related sections:
   1. 01300 - SUBMITTALS
   2. 01650 - START UP SERVICES

1.02 SUBMITTALS

A. Make submittals in accordance with Section 01300 - SUBMITTALS.

B. Provide shop drawings for the following equipment:
Leachate pumps and motor

C. Provide operation and maintenance manuals for all equipment.

D. Provide written guarantee for all equipment.

E. Provide well pump installation reports.

1.03 START UP SERVICES

A. Provide start up services as specified in section 01650 - START UP SERVICES, for all equipment provided.

1.04 WARRANTY

A. All pumps, motors, check valves, pipes and related equipment shall be warranted against defects in materials or workmanship for a period of one year from the date of installation.

PART 2 PRODUCTS

2.01 WELL PUMP AND APPURTENANCES

A. All materials, equipment, and methods shall comply with the Michigan Water Well Construction and Pump Installation Code, latest revision, and NSF 61

B. Submersible pump:
   1. Motor: Submersible, 0.50 horsepower, 3450 rpm, 230 volt, single phase.
   2. Pump: Submersible, capable of supplying 17.5 gpm at 100 feet TDH with adequate size and length of downhole wiring.
   3. Conform to AWWA E101 Part B unless modified below.
   4. A.Y. MacDonald (Baker Water Systems) 3132-004 (motor) and 26050M (wet end), or engineer approved equivalent

C. Transducer:
   1. EPG Level Master liquid level sensor or Engineer approved equivalent
      a. 316 stainless steel construction
      b. Compatible with EPG's Wheeled Sump Drainer
      c. 4-20 mA output
      d. Fully submersible to 30-feet

D. Drop pipe:
   1. 2 inch HDPE
   2. Continuous pipe with no splices or butt connections

E. Wheeled Sump Drainer:
   1. EPG wheeled sump drainer or Engineer approved equivalent
   2. 316 stainless steel construction
   3. Integral transducer mounting
   4. Provide 3/16" stainless steel safety cable to Cell C building bulkhead

PART 3 EXECUTION

3.01 LEACHATE PUMP INSTALLATION

A. Install pump and appurtenances in accordance with manufacturer's recommendations.

B. Set as follows:
   1. Pump and transducer shall be securely mounted within wheeled sump drainer
   2. Sump drainer shall be set at the toe of the slope in the 18" leachate pipes
   3. Estimated drop pipe length: 80 feet for each (primary and secondary).

3.02 PUMP PERFORMANCE TEST

A. Conduct a pump performance test after installation
   1. Notify Engineer 48 hours in advance of the pump performance testing.
   2. Verify the flow rate and discharge pressure
   3. Measure amperage on each leg of motor for compliance with manufacturer's specifications.
   4. Measure voltage for all phases.

5. Verify shut-off head.
6. Verify transducer readings
7. Summarize the performance test data and provide three copies to the Engineer.
8. Correct, repair, or adjust all faulty operating components and repeat test until acceptable.

END OF SECTION

SECTION 11306

FACTORY-BUILT ABOVE GROUND SUBMERSIBLE PUMP CONTROLLER

1.01 DESCRIPTION

A. Work included:
1. Provide all equipment, supplies, materials, parts, and labor necessary to furnish and install a complete factory built, leachate pump control panel as herein specified.

1.02 DESIGN AND PERFORMANCE REQUIREMENTS

A. Fluid to be pumped is landfill leachate.
B. Level control provided by system shall be capable of maintaining leachate at a head level of less than 1-foot on the primary liner system.

1.03 FUNCTIONAL INTENT OF CONTROL SYSTEM

A. General:
1. The control system shall be capable of operating manually or automatically.

2. The level control system shall start and stop the pump motor in response to changes in leachate level within the primary and secondary sumps when set in the automatic mode.

B. Sequence of operation:
1. Operation Mode:
Upon operator selection of this automatic operation, the "pump on" shall start the motor for one pump when the liquid level in the associated leach sump rises to the "pump start level". When the liquid is lowered to the "pump stop level", indication shall be relayed to the pump to stop. These actions shall constitute one pumping cycle. This operation shall be field adjusted during startup and approved by the OWNER and ENGINEER.

2. Manual operation:
The pump shall be capable of being operated manually, independent of level settings and water level.

C. High and low water alarms:
1. In the event that the leachate within the sump reaches a preset high or low water alarm level, the output relay shall energize a signal relay. The signal relay shall complete a 115-volt AC circuit for an external alarm light.

2. Activation of the low water alarm shall activate an emergency pump(s) shut off.

3. Either the high or low water alarm, power failure alarm, pump failure alarm, or pump seal failure alarms shall energize an alarm light and audio alarm on the master control panel.

D. Power failure:

1. The battery back-up system will activate the alarm light if an alarm condition occurs. The battery back-up shall be capable of operating the alarms for a minimum of one hour after normal power is interrupted.

2. The battery back-up system will also signal the actuator operated valve in MH-G to close.

E. Start Stop
1. The start and stop settings are adjustable in the pump control modules set-point units, mounted inside the panel. The start and stop, ramp up and down times settings are adjustable in the pump control settings within the new MCP control program.

1.04 SUBMITTALS

A. Provide submittals listed below.

B. Performance data:
Provide performance curves with pump efficiencies and horsepower requirements.

C. Shop drawings:
Submit Shop Drawings showing dimensions and details of construction and installation.

D. O & M manuals:
Submit operation and maintenance manuals for pumps and control panel.

E. Manufacturer's Guarantee:
1. Guarantee the equipment will perform its intended service and that any defective design or workmanship shall be corrected or replaced at no expense to the Owner.

2. The guarantee period of the manufacturer's guarantee shall be two-years or 1,000 hours of operation from the date of final acceptance of the project by the Owner, unless specified otherwise. Other than normal wear and tear items, the manufacturer's warranty shall cover failures due to defects and workmanship as noted in E.1 above.

1.05 QUALITY ASSURANCE

A. For installation of the work of this Section, use only personnel completely trained and experienced in installation of the materials and equipment, and thoroughly familiar with the design and approved Shop Drawings.

B. Pump manufacturer shall have a minimum of 10 years of experience in the manufacture of submersible wastewater pumps.

PART 2 PRODUCTS

2.01 MANUFACTURERS AND TYPES

A. Control Panel:
Furnish one EPG Companies Inc., UL listed 508A/698A, Series L975PT controller to operate of two pump motors and auxiliary equipment in manual or automatic mode. The control panel enclosure shall be NEMA type 4.

2.02 MATERIALS AND FABRICATION

A. Control panel and appurtenances:

1. The pump control panel shall be provided by the pump manufacturer @ 240V, 1∅.

2. The complete control circuitry and transformer shall operate on 120 Volt, 60 Hertz, capable of operating all controls plus 1-120v, 20A, duplex GFCI outlet.

3. The electrical control equipment shall be mounted within a Nema 4 stainless steel, dead front type control enclosure. The enclosure door shall be hinged and sealed with a neoprene gasket and include a window to view the controls. It shall include a removable plated steel back panel on which control components shall be mounted. Back panel shall be secured to enclosure with collar studs. Operator controls shall be mounted on the enclosure door. The enclosure shall be mounted externally from the Cell C building. The control panel shall be equipped with vapor emission type corrosion inhibitors. The control panel shall be lockable.

4. The control panel shall contain the following items:
   - Manual fused disconnect for each pump, or manual thermal magnetic molded case circuit breaker for each pump
   - Hand-Off-Automatic selector switch for each pump
   - Control circuit breaker
   - Automatic reset thermal overload shutdown switch
   - Seal failure light for each pump
   - Two- (2) float level intrinsically safe control system for high and low water alarms
   - Liquid Level Control System (level transducer or approved equal) to be submitted as part of shop drawings
   - Emergency pump(s) off at low water
   - Pump run light for each pump (green)
   - Elapsed time meter for pump, 6 digit, non-resettable, in hours and tenths of hours
   - Motor overload reset button (door mounted)

5. Red alarm light, exterior mount
   - Time delay relay to prevent simultaneous starting of pumps
   - Thermostatically controlled electric heater
   - Transient voltage surge suppressor

6. A terminal strip with box-type connector shall be supplied to make all power and control connections for the pump. All terminals shall be marked for each identification. A ground terminal strip shall also be provided.

7. Intrinsically safe relays shall be Warrick, Dennison or Engineer approved equal. DeLaval "Safe Paks" are not acceptable.

8. Toggle-type switches and miniature lights will not be acceptable for seal failure and pump running lights.

9. Electrical junction boxes, if required, shall be located outside of the leachate riser pipes and leachate building. A minimum 3-inch conduit shall be provided through the side of the basin for power cables. A gas tight electrical conduit seal meeting NEC requirements for Class 1, Division 1, Group D locations shall be provided between the basin and the electrical panel or any electrical junction boxes.

10. 1-120V GFCI weatherproof duplex outlet mounted per plan and powered through the control panel.

11. LevelMaster™ Level Controls:

The LevelMaster level control meters shall be mounted on the inner door. One level meter shall be provided for each pump. The meters shall have digital readouts and the capability to monitor and maintain pumping operations as well as output high level alarms. They shall also provide high-high level alarm fail-safe features that shut off the pump motors. Level control shall be accurate to within 0.1 inch.

12. Level Simulators:
The level simulators shall be mounted on the inner door. One level simulator shall be provided for each pump. The level simulators are built-in test circuits designed to simulate 4-20 mA loads to assist in level setup and troubleshooting.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:
Install all equipment in strict accordance with the manufacturer's recommendations and Shop Drawings as approved by the Engineer.

3.02 ELECTRICAL WORK

A. Power service:
CONTRACTOR is responsible for the coordination of the electrical service to the leachate building location.

3.03 MANUFACTURER'S FIELD SERVICES

A. The equipment manufacturer shall provide field services as needed or as specified in Section 01650. Minimum instruction time shall be six (6) hours. If all issues have not been resolved by that time, manufacturer’s representative shall provide additional time sufficient to resolve the issues at no additional cost to the Owner or the Engineer.

3.04 TESTING

A. Pump performance test:
1. After the pumping unit has been erected, performance tests shall be conducted.

2. The Contractor shall provide the electricity, lubricating oil, and the water for the test when these items are available.

3. The measurement of the quantity of water pumped is included in the performance test.

4. The performance tests shall be conducted under the observation of the Engineer and the supervision of the municipality or entity that will operate the completed installation and with the cooperation of the manufacturer's factory representative.

5. These tests shall be carried out by operating the pumping unit through the range specified for a continuous period of at least 2 hours, or until it is shown to the satisfaction of the Engineer that all of the equipment is in perfect condition and will meet the requirements specified.

END OF SECTION

SECTION 15480

PROCESS PIPING AND VALVES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Provide all labor, materials, tools, and equipment necessary for the installation of all interior and above grade exterior process piping, including valves and appurtenances.

B. Work includes, but is not necessarily limited to:
   1. Leachate force main
   2. Leachate transfer lines
   3. All process valves for both interior piping and yard piping (Section 02615)

1.02 RELATED WORK

A. Section 02615 YARD PIPING AND APPURTENANCES
   Section 09900 PAINTING
   Section 10400 SIGNS AND IDENTIFICATION DEVICES.

B. Division 15 – Mechanical

1.03 SUBMITTALS

A. Product data:
   Submit manufacturer's literature and test data demonstrating that materials comply with ASTM, ANSI, AWWA or other applicable standards.

B. Shop drawings:
   Submit Shop Drawings of adapters between pipes and fittings of different materials.

C. Guarantees:
   1 year guarantee for all valves.

PART 2 - PRODUCTS

2.01 PIPE AND FITTINGS

A. General:
   1. All process piping 3" or larger shall be high-density polyethylene (HDPE) unless otherwise specified or indicated in Drawings.
   2. All process piping smaller than 3" shall be Schedule 80 PVC unless otherwise specified or indicated in Drawings.

B. Polyvinyl chloride pipe (PVC):
   1. Materials:
      a. All PVC pipe, valves, and fittings: Manufactured from material which meets the requirements of Type 1, Grade 1 Polyvinyl chloride as outlined in ASTM D-1784.

b. Design stress rating: 2000 PSI at 73°F and 440 PSI at 140°F for water service.
c. All materials from which pipe, valves and fittings are manufactured must be tested and approved for conveying potable water.

2. Fittings:
a. Socket type fittings: ASTM D-2467.
b. Threaded type fittings: ASTM D-2464.

3. Installation:
a. Installation procedures, including support spacing, solvent welding, and allowance for expansion and contraction shall be in accordance with the manufacturer's recommendations.

2.02 SUPPORTS AND HANGERS

A. General:
1. Furnish factory fabricated hangers and supports complete with necessary inserts, clamps, bolts, nuts, washers, and accessories.
2. Design, layout, and spacing of the pipe supports shall be the responsibility of the Contractor.

B. Manufacturers and types:
1. Pipe hangers: Clevis or split ring type with adjustable threaded hanger rods.
2. Hangers and supports: Grinnell, Unistrut, Crane, or equal.

2.03 WALL SLEEVES

A. General:
1. The same material as the pipe, or standard weight steel pipe thimbles of at least one size larger than the pipe itself.
2. Iron pipe wall castings, wall pipe, transition sleeves and solid sleeves:
a. AWWA Specifications C100
b. Lightest class conforming to the pressure rating of the pipelines which they connect, but in no case shall be lighter than Class B.
3. Wall sleeves shall be schedule 40 steel pipe of suitable size for installation of casing seal having bolted links of size and number compatible with piping size.
4. Seal shall be modular mechanical type consisting of chemical resistant interlocking synthetic rubber links shaped to continuously fill the annular space between pipe and wall opening.
5. The rubber seals shall be expanded by tightening stainless steel bolts, with a pressure plate under each bolt head.
6. Upon expansion the seal assembly shall provide an absolutely watertight seal between pipe and wall.

B. Manufacturers and types:
Modular mechanical seal shall be "Link-Seal" by Thunderline Corporation, or equal.

2.04 VALVES

A. General:
1. Provide valves of the size and type as indicated on the Drawings and in these Specifications.
2. All valves of each type shall be the product of one manufacturer.
3. Valve joints shall match adjacent pipe. Generally, all valves with diameter of 3" and larger shall be flanged or grooved joints for above ground applications, and

mechanical joints for underground applications.

B. Gate valves:
1. All gate valves 3" or larger in size shall be resilient-seated gate valves meeting requirements of ANSI/AWWA C509-87.
2. Gate valves shall be designed for 150 psi working pressure.
3. Generally, end connections shall be flanged or grooved for all inside valves and mechanical joint for all exterior ground buried valves.
4. Gate valves shall be cast iron body, fully bronze mounted, bronze stem, o-ring stem seal, non-rising stem.
5. Gate valves shall have a clear waterway equivalent in area, when open, equal to that of the connecting pipe.
6. Valves shall be made to open when turned to the left, or counterclockwise, the direction being indicated by an arrow cast into the valve.
7. Valves shall be the product of one of the following manufacturers, or equal:
Clow Waterous.

C. Ball valves and ball check valves (2" and smaller diameter)
1. Provide PVC true union ball valves and PVC ball check valves of the same material as the pipe for the chemical piping systems.
2. Ball valves shall have teflon ball seats and viton stem and body seals.
3. Ball valves and check valves shall have a pressure rating of 150 psi CWP at 73 degrees.
4. Ball check valves shall have a viton-A "O" ring cap and ring seat seal.
5. Valve ends shall match adjacent pipe.
6. Ball valve operators shall be "Tee" handles.
7. All ball check valves shall be mounted vertically, with flow in the upward direction.
8. All ball check valves located on the discharge side of chemical pumps shall be mounted vertically as close to the pump discharge as possible. A union shall be installed between the pump and check valve.
9. Valves shall be manufactured by Hayward Industrial Products, or equal.

2.05 BOLTS

Use stainless steel bolts on all joints and fittings

2.06 FLOOR DRAIN

Neenah #R-4953-B Cast iron floor drain with grate, or equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:
1. Install all process piping and accessories in strict accordance with the manufacturer's recommendations as approved by the Engineer and as indicated on the Drawings.
2. Install items to be embedded before concrete is placed.
3. Fasten embedded items securely to prevent movement when concrete is placed.
4. Install items true to lines, grades, elevations, and locations as indicated on the Drawings and herein specified.

B. Hangers and supports:
1. Install hangers and supports at less than maximum spacing as recommended by pipe manufacturer.
2. Adjust hangers and supports to bring pipe lines to proper elevations.
3. Inserts installed in concrete shall be flush with the concrete surface and capable of developing the full strength of the bolt.

C. Wall sleeves:
1. Unless otherwise shown on the Drawings, at all points where pipes and duct must pass through walls, floors or roofs of structures, the Contractor shall furnish and install suitable sleeves or wall castings.
2. Unless otherwise shown or permitted, the space between the pipe and the sleeve shall be sealed at the inside and outside wall faces on walls exposed to earth or water/leachate, at one face of other walls, and at the top surface of floors and slabs.
3. After pipes have been placed through wall sleeves, clean the space between the pipe and the wall sleeve and install seal in accordance with the manufacturer's recommendations.

D. Pipes and fittings:
1. Install pipe and fittings with mechanical joints for underground locations and pipe and fittings with flanged or grooved joints in all other locations except as otherwise specified or indicated on the Drawings.
2. All piping and fittings under structures shall have mechanical joint retainer glands or be otherwise fully restrained. Encase in concrete as called for on the plans.
3. Pressure test all lines under structures before the pipe line becomes inaccessible.
4. Provide spare spool pieces at all meter locations.

E. Thrust blocks:
1. Place thrust blocks on underground pressure piping at all bends and angles in the piping.
2. Thrust blocks shall extend from the fitting to undisturbed side or end of trench.
3. Pipe and fittings shall be left accessible unless otherwise specified.
4. If undisturbed earth is not available for thrust blocking, provide fully restrained joints at least two pipe lengths either side of all bends.

F. Valves:
1. Refer to individual valve specifications in Part 2 above for special installation requirements on individual valves.
2. Check and adjust valves, operators and accessories for smooth operation.
3. Valve stem guides, supports, and extensions shall be furnished as required to provide convenient and positive valve operation.

3.02 TESTING

A. All pressure piping shall be subject to pressure testing.

END OF SECTION

High Density Polyethylene (HDPE)

Pipe and Fittings Specifications

PART 1 – GENERAL

1.01 SCOPE OF WORK

A. This specification covers the material (pipe and fittings), joining methods and general installation practice for high density polyethylene pipe (HDPE) piping systems for use as indicated on the Drawings.

1.02 SUBMITTALS

A. Submit product data to the Engineer for review in accordance with the Section 01300 for all pipe, fittings, and appurtenances.

B. Contractor shall also submit the following to the Engineer for approval:

1. Certified dimensional as-built drawings/profile of all installed pipe, specials and fittings.

2. Details of fittings and specials such as elbows, tees, outlets, connections, test bulkheads, nozzles or other special items where shown on the Construction Drawings. All connections to jointed gasketed pipe materials, valves or fire hydrants must be restrained and supported independently to withstand the pressure transients, soil settlement, and external loading conditions.

3. The Supplier of the material shall submit, through the Contractor, a Certificate of Compliance that the HDPE pipe and fittings furnished for this project meet or exceed the standards set forth in this specification. The Contractor shall submit these certificates to the Engineer prior to installation of the pipe materials.

4. Provide a certification that personnel responsible for fusing the pipe have been trained and qualified per ASTM F3190

C. For items that do not meet all of the requirements of this specification, the bid/submittal shall include a written description of the deviations, along with data that show the magnitude and the justification for the deviation from the specification. The decision to accept material deviating from this specification shall be the responsibility of the specifying engineer and must be approved in writing.

1.03 REFERENCE DOCUMENTS AND STANDARDS

The standards and documents listed below may apply to the materials and practices in this specification. In the event of a conflict, the requirements of this specification prevail. Unless otherwise specified, references to documents shall mean the latest published edition of the referenced document in effect at the project bid date.

ANSI/AWWA

- ANSI/AWWA C901 Polyethylene (PE) Pressure Pipe and Tubing, 3/4 in. (19 mm) Through 3 In. (76 mm) for Water Service
- ANSI/AWWA C906 Polyethylene (PE) Pressure Pipe and Fittings, 4 in. Through 65 in. (100 mm Through 1,650 mm) for Waterworks
- ANSI/AWWA C651 Standard for Disinfecting Water Mains
- AWWA M55 Manual of Water Supply Practices, PE Pipe–Design and Installation

PLASTICS PIPE INSTITUTE, PPI

- PPI Handbook of Polyethylene Pipe – 2009 (2ndEdition)
- PPI Municipal Advisory Board (MAB) MAB-01 Generic Electrofusion Procedure for Field Joining of 12 Inch and Smaller Polyethylene (PE) Pipe
- PPI Material Handling Guide for HDPE Pipe and Fittings
- PPI TR-33 Generic Butt Fusion Joining Procedure for Field Joining of Polyethylene Pipe
- PPI TR-34 Disinfection of Newly Constructed Polyethylene Water Mains
- PPI TN-38 Polyethylene Flanged Joints
- PPI TR-41 Generic Saddle Fusion Joining Procedure for Polyethylene Gas Piping
- PPI TR-46 Guidelines for Use of Mini-Horizontal Directional Drilling for Placement of High Density Polyethylene Pipe

ASTM

- ASTM D2321 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications

- ASTM D2683 Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter- Controlled Polyethylene Pipe and Tubing
- ASTM D2774 Standard Practice for Underground Installation of Thermoplastic Pressure Piping
- ASTM F2880 Standard Specification for Lap-Joint Type Flange Adapters for Polyethylene Pressure Pipe in Nominal Pipe Sizes 3⁄4 in. to 65 in.
- ASTM D3035 Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter
- ASTM D3261 Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing
- ASTM D3350 Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
- ASTM F585 Standard Guide for Insertion of Flexible Polyethylene Pipe Into Existing Sewers
- ASTM F714 Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter
- ASTM F1055 Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked Polyethylene (PEX) Pipe and Tubing
- ASTM F1417 Standard Practice for Installation Acceptance of Plastic Non-pressure Sewer Lines Using Low-Pressure Air
- ASTM F1962 Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit under Obstacles, Including River Crossings
- ASTM F2164 Standard Practice for Field Leak Testing of Polyethylene (PE) and Crosslinked Polyethylene (PEX) Pressure Piping Systems Using Hydrostatic Pressure
- ASTM F2206 Standard Specification for Fabricated Fittings of Butt-Fused Polyethylene (PE)
- ASTM F2620 Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings

• ASTM F3124 Standard Practice for Data Recording the Procedure Used to Produce Heat Butt Fusion Joints in Plastic Piping Systems or Fittings

• ASTM F3183 Standard Practice for Guided Side Bend Evaluation of Polyethylene Pipe Butt Fusion Joint

• ASTM F3190 Standard Practice for Heat Fusion Equipment (HFE) Operator Qualification on Polyethylene (PE) and Polyamide (PA) Pipe and Fittings

• ASTM F1804 Standard Practice for Determining Allowable Tensile Load for Polyethylene (PE)

Gas Pipe During Pull-In Installation

• ASTM B843 Standard Specification for Magnesium Alloy Anodes for Cathodic Protection

PART 2 – PRODUCTS

2.01 HIGH DENSITY POLYETHYLENE MATERIALS

A. RESIN AND MATERIAL REQUIREMENTS

1. All material shall be manufactured from a PE 4710 resin listed with the Plastic Pipe Institute (PPI) as TR-4. The resin material shall meet the specifications of ASTM D3350 with a minimum cell classification of 445474C or 445574C. HDPE pipe and fittings shall contain no recycled compounds except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. HDPE products shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions, voids, or other injurious defects.

B. HDPE PIPE

1. Pipe shall be made of HDPE material with a minimum material designation code of PE4710 and with a minimum Cell Classification as noted in 2.01.A. The polyethylene compound shall be suitably protected against degradation by ultraviolet light by means of carbon black of not less than 2 percent. The manufacturer of the HDPE resin shall certify the cell classification indicated.

2. Pipe sizes 3" DIPS/4" IPS and larger shall have a manufacturing standard of ASTM F714, while IPS pipe 3" and smaller shall be manufactured to the dimensional requirements listed in ASTM D3035. Dimension Ratio (DR) and Outside Diameter (IPS/DIPS) shall be as specified on plans.

3. Pipe shall be manufactured by an ISO 9001 certified manufacturer. The pipe manufacturer shall have an ongoing Quality Control program for incoming and outgoing materials, and shall assure that the pipe will meet the material requirements of this specification. HDPE resins for manufacturing of pipe shall be checked for density, melt flow rate, and contamination. For potable water systems the facility shall have the necessary testing equipment to verify that pipe meets the AWWA and NSF standards. Pipe shall be checked for outside diameter, wall thickness, length, and surface finish on the inside and outside. The Manufacturer's production facilities shall be open for inspection by the Owner or Engineer.

4. All pipe may be color coded for the intended service. When required, the color coding shall be permanently co-extruded stripes on the pipe outside surface as part of the pipe's manufacturing process. Painting HDPE pipe to accomplish color coding is not permitted.

C. HDPE FITTINGS

1. Butt Fusion Fittings - Fittings shall be made of HDPE material with a minimum material designation code of PE4710 and with a minimum Cell Classification as noted in 2.01.A. Fittings shall have a minimum pressure rating equal to or greater than the pipe to which they are joined unless otherwise specified on the plans or accepted by owner/engineer.

a. Molded fittings shall comply with the requirements of ASTM D3261.

b. All fabricated elbows, tees, reducing tees and end caps shall be produced and meet the requirements of ASTM F2206, as manufactured by ISCO Industries, Inc or other approved manufacturer holding an ISO 9001 quality system certificate. Each fitting will be marked per ASTM F2206 section 10 including the nominal size and fitting EDR, which will meet or exceed the pipe DR identified for the project. Fabricated fittings shall be manufactured using a data recording device to record fusion pressure and temperature, and shall be stamped with unique joint number that corresponds to the joint report. A graphic representation of the temperature and pressure data for all fusion joints made producing fittings shall be maintained for a minimum of 5 years as part of the quality control and will be available upon request of owner. Test results to validate ASTM F2206 section 7.3 and 9 shall be provided to owner or owner's representative upon request.

c. Socket fittings shall meet ASTM D2683.

Electrofusion Fittings - Fittings shall be made of HDPE material with a minimum material designation code of PE 4710 and with a minimum Cell Classification as noted in 2.01.A. Electrofusion Fittings shall have a manufacturing standard of ASTM F1055. Fittings shall have a minimum pressure rating equal to or greater than the pipe to which they are joined unless otherwise specified on the plans.

2. Bolted Connections – Flanged and Mechanical Joint Adapters can be made to ASTM 3261. Flange adapters, if machined, may also meet the requirements of ASTM F2880. Flanges and MJ Adapters shall be fused onto the pipe and have a minimum pressure rating equal to or greater than the pipe unless otherwise specified on the plans.

a. Metallic back-up rings (Van-Stone style lap joint flanges), shall have a radius on the inside diameter of the bore so as to be compatible with HDPE Flanges. Back up rings shall have bolt pattern that will mate with AWWA C207 Class D (or B or E), ASME/ANSI B 16.5 Class 150, ASME/ANSI B 16.1 Class 125, or ASME/ANSI B16.47cSeries A.

b. Flange assemblies shall be assembled and torqued according to PPI TN-38, “Bolt Torque for Polyethylene Flanged Joints.”

c. Where shown on the drawings, 4” and larger transitions to mechanical joint fittings and valves shall be accomplished using a MJ Adapter with kit. The D.I./HDPE mechanical joint adaptor shall consist of:

i. A molded or fabricated HDPE mechanical joint transition fitting.

ii. A rubber gasket.

iii. A mechanical joint backup drive ring.

iv. Corten mechanical joint tee bolts.

3. Mechanical Fittings: The use of mechanical coupling and saddles shall be approved by the owner or engineer prior to installation. Mechanical Fittings shall be designed for use and compatible with HDPE pipe. Mechanical fittings shall have a pressure rating equal to or greater than the pipe.

a. Couplings without self-restraining capabilities (integrated serrated teeth or grippers) shall include a plan for external restraint or isolation from pipeline generated forces.

b. Mechanical Saddles shall have wide straps for distribution of clamping loads. No U- bolts shall be allowed.

c. When required by mechanical coupling manufacturer, pipe stiffeners shall be employed to support thecinterior wall of the HDPE. The stiffeners shall support the pipe's end and control the "necking down" reaction to the pressure applied during normal installation. The pipe stiffeners shall be formed of 304 or 316 stainless steel, with a wedged style design to fit the HDPE manufacturers published average inside diameter of the specific size and DR of the HDPE.

D. FUSION UNIT REQUIREMENTS

1. All Fusion Equipment, whether new or used, rented or owned, shall comply with the requirements of ISO 12176-1 "Equipment for Fusion Jointing Polyethylene Systems".

2. Butt fusion equipment must be in satisfactory working order and the hydraulic system must be leak free. Heater plates shall be free from scrapes, gouges, and have a consistent clean coated surface. The pressure gauge and thermometer should be properly calibrated. When requested by the owner, records showing a maintenance service/inspection within 3 months prior to use for this project shall be provided.

3. Rental Butt Fusion Equipment must be maintained by a McElroy Authorized Service and Repair Center with at least one McElroy Certified Master Mechanic on staff. When requested by owner or his authority, an inspection report detailing the components inspected within 3 months prior to arrival at jobsite will be provided.

4. For 16" and larger pipe sizes, the butt fusion machine shall be capable of autonomously calculating the drag pressure and perform the shift sequence autonomously.

5. Electrofusion Processors shall be maintained and calibrated per manufacturer's requirements and recommendations.

E. APPROVED SUPPLIERS

1. All Pipe, Fittings, and Fusion Equipment shall be provided by one supplier. Approved suppliers are ISCO Industries, Inc. or approved equal.

2.02 PIPELINE LOCATING MATERIALS

A. Detectable Marker Tape - Plastic marker tape shall be 5 mil minimum thickness with a solid aluminum core of .35mil minimum thickness and a minimum width of 2". The background of the tape shall be colored based on pipe service with black lettering continuously printed. Marker tape shall have a minimum 35 lbs./inch tensile strength. The installation of the tape shall be at 18 inches below finish grade.

B. Tracer Wire - All HDPE pipe 4" and greater shall be installed with an extra high-strength, copper clad steel tracer wire including 45 mil HDPE jacket that has a minimum average break load of at least 1150 lbs. The jacket shall be colored based on pipe service, with blue for potable water or green for sewer. Tracer wire gauge shall be 12 AWG, 10 AWG, or 8 AWG depending upon application and installation procedure. This wire shall to be continuous and brought up in the valve boxes at the ends of each line segment with splices made only by methods per the equipment manufacturer's recommendation. All miscellaneous splicing components shall be furnished and installed by the Contractor.

PART 3 – EXECUTION

3.01 GENERAL

A. All HDPE pipe and fittings shall be cut, joined, and installed in accordance with the manufacturer's recommendations. Joining, laying, and pulling of polyethylene pipe shall be accomplished by personnel experienced in working with polyethylene pipe systems.

3.02 TRANSPORTATION, UNLOADING, AND STORAGE

A. The manufacturer shall package product in a manner designed to deliver the pipe and fittings to the project neatly, intact and without physical damage. During transportation each pipe shall rest on suitable pads, strips skids, or blocks securely wedged or tied in place.

B. During loading, transportation, and unloading, every precaution should be taken to prevent damage to the pipe. The handling of the pipeline shall be in such a manner that the pipe is not damaged by dragging it over sharp and cutting objects. Cuts or gouges that reduce the wall thickness by more than 10% are not acceptable and must be cut out and discarded.

C. Handle the pipe in accordance with the PPI Handbook of Polyethylene Pipe (2nd Edition), Chapter 2. All pipe and accessories shall be loaded and unloaded by lifting with hoists or by skidding in order to avoid shock or damage. Under no circumstances shall materials be dropped. Pipe handled on skidways shall not be rolled or skidded against pipe on the ground. Slings, hooks or pipe tongs shall be padded and used in such a manner as to prevent damage to the exterior surface or interior of the pipe. All pipe and fittings shall be

subjected to visual inspection at time of delivery and before they are lowered into the trench to be laid.

D. Materials, if stored, shall be kept safe from damage and shall not be stacked higher than the limits recommended by the manufacturer. The bottom tiers shall be kept off the ground on timbers, rails, or concrete. Pipe shall not be stored close to heat sources. The contractor shall be responsible for all security, damage and loss of pipe, excluding Acts of God.

E. The interior of the pipe as well as all sealing surfaces of mating components (i.e. flange faces) shall be kept free from dirt or foreign matter at all times. The open ends of all sections of joined and/or installed pipe (not in service) shall be plugged to prevent insects, animals, or foreign material from entering the pipe line or pipe section. The practice of stuffing cloth or paper in the open ends of the pipe will not be permitted. Use waterproof nightcaps to prevent the entrance of any type of natural precipitation into the carrier or containment pipe and secure to the pipe in such a manner that the wind cannot blow them loose. Where possible, the pipe shall be raised and supported at a suitable distance from the open end such that the open end will be below the level of the pipe at the point of support.

3.03 RECEIPT INSPECTION

A. All pipe and fittings shall be subjected to visual inspection at time of delivery and before they are installed or lowered into the trench to be laid. Defective, damaged, or unsound pipe will be rejected. Cuts, punctures, or gouges that penetrate or reduce the wall thickness by 10% or more are not acceptable and must be removed and discarded. Joints or fittings that do not conform to these specifications will be rejected and must be removed immediately by the Contractor.

3.04 FUSION AND JOINING

A. FUSION JOINING REQUIREMENTS:

1. All HDPE pipe shall be joined to by the heat fusion process which produces homogeneous, sealed, leak-tight joints. Tie-ins between sections of HDPE pipe shall be made by butt fusion whenever possible.

2. Butt Fusion: The pipe shall be joined by the butt fusion procedure outlined in ASTM F2620 or PPI TR-33. All fusion joints shall be made in compliance with the pipe or fitting manufacturer’s recommendations. Fusion joints shall be made by qualified fusion technicians per ASTM F3190. A record or certificate of training for the fusion operator must be provided that documents training to the fundamentals of ASTM F2620. Considerations should be given to and provisions made for adverse

weather conditions, such as temperatures below freezing, precipitation, or wind, which is accepted by the owner/engineer. The use of a controlled cooling cycle procedure to reduce cooling time is acceptable only as part of a controlled cooling cycle procedure where testing demonstrates that acceptable joints are produced using the controlled cooling cycle procedure.

3. Electrofusion: Electrofusion joining shall be done in accordance with the manufacturers recommended procedure. Other sources of electrofusion joining information are PPI TN 34 and PPI Municipal Advisory Board (MAB) Generic Electrofusion Procedure for Field Joining of 12 Inch and Smaller Polyethylene (PE) Pipe. The process of electrofusion requires an electric source, commonly called an electrofusion processor that has wire leads and a method to read electronically (by laser) or otherwise input the barcode of the fitting. The electrofusion processor must be capable of reading and storing the input parameters and the fusion results for later download to a record file. Qualification of the fusion technician shall be demonstrated by evidence electrofusion training within the past year on the equipment to be utilized for this project.

B. FUSION OPERATORS:

1. The employer of the fusion machine operator is responsible for the fusion joint quality of the fusion weld made by that individual. The employer is responsible for documenting all training and qualification records for that individual, including compliance to any code requirements for fusion/bonder operators.

2. All HDPE fusion equipment operators shall be qualified to the procedure used to perform pipe joining. Fusion equipment operators shall have current, formal training on all fusion equipment employed on the project. Training received more than two years prior to operation with no evidence of activity within the past 6 months shall not be considered current.

3. For Projects with at least 5,000 feet or with pipe larger than 24 inches, operators or their supervisor must have a current McElroy Fusion Training Certificate for the equipment to be used on the project.

4. When the fusion machine operator is employed by the HDPE pipe and fusion machine supplier, the supplier shall maintain an ISO 9001 Certified Quality Management System.

C. BUTT FUSION EQUIPMENT:

1. For 6” and larger pipe sizes, the pipe butt fusion machine shall be a self-contained hydraulic fusion machine capable of butt fusing HDPE pipe. The carriage must be removable from the chassis for in-ditch use. The machine must be compatible with an electronic data recording device.

Accessories will include all butt fusion inserts for the specified range of pipe sizes, a pyrometer kit for checking the surface temperature of the heater, extension cord of appropriate gauge (25’ minimum), and hydraulic extension hoses (minimum of four). The butt fusion machine will be McElroy, or approved equivalent.

2. For 16” and larger pipe sizes, the butt fusion machine shall be capable of autonomously calculating the drag pressure and perform the shift sequence autonomously.

3. In areas where there may be insufficient space for layout of the entire length of fused pipe to be pulled-back, the Contractor shall utilize a continuous HDPE pipe fusion equipment such as a PolyHorse by McElroy or other means in order to fuse the length of pipe necessary for the installation.

E. BUTT FUSION EXAMINATION AND TESTING:

1. Examinations

i. Visual: For pipe sections, examine the full exterior circumference for bead uniformity before cutting. After cutting the pipe section, review the interior bead. All beads should have visually acceptable bead formation as shown in Fig 4 and Appendix X2 of ASTM F2620. In addition, the following characteristics are expected:

1. There shall be no evidence of cracks or incomplete fusing

2. There shall be no evidence of captured objects (e.g., pipe shavings, facer ribbons) between bonded surfaces.

3. Variations in upset bead heights on opposite sides of the cleavage and around the circumference of fused pipe joints are acceptable.

4. The apex of the cleavage between the upset beads of the fused joint shall remain above the base material surface

5. Fused joints shall not display visible angular misalignment, and outside diameter mismatch shall be less than 10% of the nominal wall thickness

6. Fusion data record review that meet criteria of section 3.04.D.1 can be used as additional verification of visual indicators.

ii. Fusion Data Record Review

The fusion date record for each fused joint shall be compared to the approved fusion procedure. The reviewer shall verify the following:

1. That all data required by section 3.04.D.1 was recorded

2. Interfacial pressure was within the acceptable range

3. Heater surface temperature was within the acceptable range

4. Butt fusion pressure applied during the fusing/cool cycle was correctly calculated to include drag pressure, fell within the acceptable range for the applicable size and agrees with the recorded hydraulic fusing pressure.

5. Butt fusing pressure was reduced to a value less than or equal to drag pressure at the beginning of the heat soak cycle.

6. Fusing machine was opened at the end of the heat soak cycle, the heater was removed, and the end were brought together at the fusion pressure with the acceptable time range

7. Cooling time at butt fusing pressure met the minimum time specified

iii. If the recorded data in section 3.04.D.1 is outside the limits of the acceptable range, the joint is unacceptable, and must be removed and replaced.

iv. Frequency. Records for test fusion joints should be reviewed immediately after the joint is completed. Fusion joints for jobsite fusions should be reviewed daily or before being covered with backfill.

2. Mechanical Tests

i. Contractor shall mechanically test the first fusion of each operator and each machine used on the project. Installation shall not continue until a fusion test has passed the test. Additional mechanical test are not required as long as long as the fusion are reviewed with the frequency specified in section 3.04.E.1.iv. Testing of fusion joints with no fusion data record review shall be at a frequency specified by the Owner or Engineer.

ii. The fusion shall be allowed to cool completely, then fusion test straps shall be cut out.

iii. All samples shall be labeled with operator information. Testing must be done at 73 degrees F plus or minus 5 degrees. The test temperature and sample size are critical to testing. Testing performed at cold or elevated temperatures may not give similar results to tests performed at ambient temperatures.

iv. Each pipe sample weld shall be subjected to testing at two locations 180 degrees apart from each other in the joint weld. All specimens shall be tested by one of the following methods:

1. Reverse Bend Test are allowed for pipe sizes 4" IPS or smaller. The specimens shall be prepared and tested in accordance with ASTM F2620, Appendix X4.

2. Guided Side Bend Test are allowed for all wall thicknesses of 1" or greater. The specimens shall be removed and tested in accordance with ASTM F3183.

3. Hydrostatic Burst Test is allowed for pipe sizes 2"-24". The specimen length should measure 6 times pipe diameter with the butt fusion joint in the center of the specimen. The specimen should be tested in a tank filled with water, and testing conditions monitored and recorded with computerized equipment. The specimen will be tested at 4 times pipe rated pressure for 5 minutes with no failure of joint allowed.

v. Results of any mechanical test should be documented. Information on the weld and operator should be transferred from the sample to the testing record.

3.05 INSTALLATION

A. DIRECT BURIAL

1. Buried HDPE pipe and fittings shall be installed per engineering drawings and ASTM D2774, ASTM D2321 and AWWA Manual of Water Supply Practices M55 Chapter 8. The Design Window identified in AWWA M55 Chapter 5 (page 65 of 2006 version) shall be considered acceptable design and installation conditions.

2. When moveable trench bracing such as trench boxes, moveable sheeting, shoring or plates are used to support the sides of the trench, care shall be taken in placing and moving the boxes or supporting bracing to prevent movement of the pipe, or disturbance of the pipe bedding and the backfill. Trench boxes, moveable sheeting, shoring or plates shall not be allowed to extend below top of the pipe. As trench boxes, moveable sheeting, shoring or plates are moved, pipe bedding shall be placed to fill any voids created and the backfill shall be re-compacted to provide uniform side support for the pipe.

3. Pipe embedment - Embedment material should be Class I, Class II, or Class III materials as defined by ASTM D-2321 Section 6. The use of Class IV or Class V materials is not recommended, however, they may be used only with the evaluation and approval of the engineer at a demonstrated achievable compaction

4. Bedding: Pipe bedding shall be in conformance with ASTM D2321 Section 8. Compaction rates should be as specified in ASTM D2321. Deviations shall be approved by the engineer.

5. Haunching and backfill shall be as specified in ASTM D2321 Section 9 with Class I, II, or III materials. Compaction shall be in excess of 85% Proctor, providing a minimum modulus of 1000 psi or greater.

B. PULL-IN INSTALLATION

1. Per ASTM F1804 and/or www.HDPEapp.com, the contractor shall determine and document the maximum proposed pull-in length and pull-in force for the pressure class and pipe diameter to be pulled into an open trench. Pull-in lengths will not exceed the maximum lengths for the class and diameter pipe. A commercially available load limiter (weak link) approved by the Engineer shall be used between the puller and the pipe.

2. Prior to pulling the pipeline, contractor shall place rollers or other approved devices beneath the pipe to avoid unnecessary damage and to reduce pipe drag.

3. Trenchless installations:

i. For Horizontal Directional Drilling (HDD), refer to ASTM F1962, PPI TR-46, PPI PE Handbook (Chapter 12) and www.PPIBoreAid.com

ii. For sliplining, refer to ASTM F585, PPI PE Handbook (Chapter 11) and www.HDPEapp.com

iii. For pipe bursting, refer to PPI PE Handbook (Chapter 16)

C. APPURTENANCES

1. All appurtenances (tees, elbows, services, valves, air relief valves, fire hydrants, etc.), must be independently supported and shall not rely on the pipeline and its connections for this support. Excessive stresses may be encountered when appurtenances are inadequately supported.

2. Hydrant Assemblies shall be installed and field tested according to the requirements of AWWA M17.

3. Installation of Tracer Wire. When tracer wire is required, the Contractor shall install along the entire section of pipeline and along all service connections as listed below. The tracer wire shall be installed simultaneously with the polyethylene piping system. Tracer wire shall be installed by the Contractor once backfill has been placed and compacted to at least 12 inches above the top of the pipe and not more than 18 inches above the top of the pipe. Tracer wire shall be properly spliced at each end connection and each service connection. Care should be taken to adequately wrap and protect wire at all splice locations. No bare tracer wire shall be accepted. Provide Magnesium alloy anode for cathodic protection that conforms to the requirements of ASTM B843. Install tracer wire per local and manufacturer's requirements.

3.06 PIGGING, FLUSHING, CLEANING, AND DISINFECTING

A. All mains shall be pigged, cleaned and flushed to remove all dirt, sand, debris and other foreign matter. The Contractor shall be responsible for developing a pigging and flushing plan to be submitted to the Engineer for approval prior to pigging and flushing.

3.07 TESTING AND LEAKAGE

A. The contractor shall ensure testing can be accomplished in a safe manner, including protection of personnel, equipment, and public in the event of a failure during testing. The contractor shall restrain pipe, components, and test equipment as required. All pumps, valves, temporary connections, meters, gauges and other measuring devices shall be furnished, installed and operated by the Contractor and all such equipment and devices and their installation shall be approved by the Owner's Engineer.

B. The pressure gauges or data recorders should be calibrated and sufficiently sized to provide mid-range data that result in easy reading, interpretation. Gauges shall be accurate to within 2% of full scale

C. The test pressure may be up to 1.5 times the system design pressure, based on the lowest point in elevation in the test section. The contractor shall ensure that the designated

test pressure does not exceed the maximum allowable test pressure specified by the manufacturer for any component in the test section.

D. Test pressures require consideration of thermal conditions. Polyethylene piping materials are typically pressure rated at 73°F (23°C) and PE piping at temperatures greater than 80°F (26°C) require reduced test pressures. (Note that higher pipe temperatures should consider both ambient temperatures and radiant solar heating of exposed black HDPE pipe) Guidance for elevated temperatures can be found in the appendix of Chapter 3 (Material Properties) of the PPI Handbook of PE Pipe.

E. Gravity Pipelines-The Contractor shall perform a low-pressure air test for gravity flow pipelines to the requirements and specifications of ASTM F1417. Warning: All pneumatic test, regardless of pressure, can be dangerous and safety procedures shall be identified, documented, approved by the owner and engineer, and followed.

F. Pressure Pipelines-Pressure testing shall be conducted in accordance with requirements and recommendations of ASTM F2164 (Field Leak Testing of Polyethylene Pressure Piping Systems Using Hydrostatic Pressure), AWWA M55 Chapter 9, and PPI Handbook of Polyethylene Pipe Chapter 2 (2nd Edition).

Pneumatic (compressed air) leakage testing of HDPE pressure piping is prohibited for safety reasons.

1. The section of pipe to be tested shall be filled with potable or generally clean water (uncontaminated river/lake water) approved by the Owner/Engineer. While the system is being filled with water, air shall be carefully and completely exhausted.

2. The test procedure for HDPE pipe consists of two steps: 1) the initial phase or expansion phase and 2) the test phase. During the initial/expansion phase, sufficient make-up water shall be added hourly for 3 hours to return to the test pressure. During the test phase, the expansion phase pressure is reduced by 10 psi to test phase pressure and monitored for at least one hour (3 hours maximum).

3. Under no circumstances shall the total time under test exceed eight (8) hours. If the test is not completed due to leakage, equipment failure or any other reason, depressurize the test section and permit the system to “relax” for eight (8) hours prior to the next testing sequence.

4. In accordance with section 9.8 of ASTM F2164, the pipe shall pass if the final pressure is within 5% of the test phase pressure for the testing period (3 hours maximum). If the test section fails this test, the Contractor shall repair or replace all defective materials and/or workmanship at no additional cost to the Owner.

G. All pressure and leakage testing shall be done in the presence of a representative of the Owner and Engineer.

END OF SECTION

SECTION 15520

DUAL CONTAINED HIGH DENSITY POLYETHYLENE (HDPE) PIPE

PART 1 – GENERAL

1.01 SCOPE OF WORK

A. This specification covers the material (pipe and fittings), joining methods and general installation practice for Dual Contained High Density Polyethylene (HDPE) piping systems, including containment access ports/structures and low point inspection points.

1.02 SUBMITTALS

A. Submit product data to the Engineer for review in accordance with the Section 01300 for all pipe, fittings, and appurtenances.

B. Contractor shall also submit the following to the Engineer for approval:

1. Certified dimensional as-built drawings/profile of all installed pipe, fittings, and structures.

2. The Supplier of the material shall submit, through the Contractor, a Certificate of Compliance that the pipe, fittings and other products or materials furnished for this project have been inspected at the plant and meets or exceeds the standards set forth in this specification. The Contractor shall submit these certificates to the Engineer for approval prior to installation of the pipe materials.

3. Provide a statement that personnel responsible for fusing the pipe have been trained and qualified.

C. For items that do not meet all of the requirements of this specification, the bid/submittal shall include a written description of the deviations, along with data that show the magnitude and the justification for the deviation from the specification. The decision to accept material deviating from this specification shall be the responsibility of the specifying engineer and must be approved in writing.

1.03 REFERENCE DOCUMENTS AND STANDARDS

Unless otherwise specified, references to documents shall mean the latest published edition of the referenced document in effect at the project bid date.

ANSI/AWWA

- ANSI/AWWA C901 Polyethylene (PE) Pressure Pipe and Tubing, 1/2 in. (13 mm) Through 3 in. (76 mm) for Water Service
- ANSI/AWWA C906 Polyethylene (PE) Pressure Pipe and Fittings, 4 in. (100 mm) Through 63 in. (1,600 mm), for Water Distribution and Transmission
- AWWA M55 Manual of Water Supply Practices, PE Pipe–Design and Installation

PLASTICS PIPE INSTITUTE, PPI

- PPI Handbook of Polyethylene Pipe – 2009 (2ndEdition)
- PPI Material Handling Guide for HDPE Pipe and Fittings
- PPI TR-38 Bolt Torque for Polyethylene Flanged Joints
- PPI TN-42 Recommended Minimum Training Guidelines for PE Pipe Butt Fusion Joining Operators for Municipal and Industrial Projects
- PPI TR-46 Guidelines for Use of Mini-Horizontal Directional Drilling for Placement of High Density Polyethylene Pipe

ASTM

- ASTM D2321 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
- ASTM D2774 Standard Practice for Underground Installation of Thermoplastic Pressure Piping
- ASTM F2880 Standard Specification for Lap-Joint Type Flange Adapters for Polyethylene Pressure Pipe in Nominal Pipe Sizes 3⁄4 in. to 65 in.
- ASTM D3035 Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter
- ASTM D3261 Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing
- ASTM D3350 Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

• ASTM F585 Standard Guide for Insertion of Flexible Polyethylene Pipe Into Existing Sewers

• ASTM F714 Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter

• ASTM F1417 Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air

• ASTM F1962 Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit under Obstacles, Including River Crossings

• ASTM F2164 Standard Practice for Field Leak Testing of Polyethylene (PE) Pressure Piping Systems Using Hydrostatic Pressure

• ASTM F2206 Standard Specification for Fabricated Fittings of Butt-Fused Polyethylene (PE) Plastic Pipe, Fittings, Sheet Stock, Plate Stock, or Block Stock

• ASTM F2620 Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings

• ASTM F3124 Standard Practice for Data Recording the Procedure Used to Produce Heat Butt Fusion Joints

• ASTM F3183 Standard Practice for Guided Side Bend Evaluation of Polyethylene Pipe Butt Fusion Joint

• ASTM F3190 Standard Practice for Heat Fusion Equipment (HFE) Operator Qualification on Polyethylene (PE) and Polyamide (PA) Pipe and Fittings

PART 2 – PRODUCTS

2.01 HIGH DENSITY POLYETHYLENE MATERIALS

A. RESIN AND MATERIAL REQUIREMENTS

1. All pipe and fitting material shall be manufactured from a PE 4710 resin listed with the Plastic Pipe Institute (PPI) as TR-4. The resin material shall meet the specifications of ASTM D3350 with a minimum cell classification of 445474C. The polyethylene compound shall be suitably protected against degradation by ultraviolet light by means of carbon black of not less than 2 percent.

B. DUAL CONTAINED HDPE PIPE

1. Pipe used to fabricate the dual contained system shall be made of HDPE material with a minimum material designation code of PE4710 and with a minimum Cell Classification as noted in 2.01.A.

2. Both the carrier and containment pipe shall have an IPS (Iron Pipe Size) OD and, when required, pipe shall meet AWWA C901 (1/2" to 3") or AWWA C906 (4" to 63"), and shall be listed as meeting NSF-61. Pipe sizes 3" and large shall have a manufacturing standard of ASTM F714, while pipe smaller than 3" shall be manufactured to the dimensional requirements listed in ASTM D3035.

3. the size and DR of the dual containment pipe combinations shall be as specified on plans.

4. Dual Contained pipe shall be prefabricated prior to shipment to the jobsite. No on-site fabrication to the pipe, fittings or system shall be allowed without express written consent of the engineer and the piping supplier. Each end of pipe will have a centralizer that is thermally bonded to both the OD of the primary carrier and the ID of the secondary containment piping and designed such that movement will be restrained between the two piping systems during the simultaneous butt fusion process.

5. Centralizer shall be thermally bonded to the primary carrier pipe, and maintain position and alignment of the primary carrier in relation to the secondary containment piping.

6. Dual Contained Pipe shall be manufactured by an ISO 9001 certified manufacturer. The pipe manufacturer shall have a minimum 10 years of experience in manufacturing and production of dual contained piping and related fittings. The dual containment piping system shall be ISCO Dual Contained pipe and fittings as manufactured by ISCO Industries, Inc., or approved equal.

C. DUAL CONTAINED HDPE FITTINGS

1. General - Fittings shall be made of HDPE material with a minimum material designation code of PE4710 and with a minimum Cell Classification as noted in 2.01.A. The pressure rating of carrier fittings shall have a minimum pressure rating equal to or greater than the pipe to which they are joined unless otherwise specified

on the plans or accepted by owner/engineer. Where required, all fittings shall meet the requirements of AWWA C901 or C906.

2. End Terminations – End termination fittings shall be used to seal the system at both ends. The fitting shall be simultaneously butt fused to the carrier and containment pipe to seal the annular space. Terminations that are not butt fused in the system will not be allowed. This fitting will also provide the transition to single wall piping using the following components and guidelines:

a. Flange Adapters shall meet the dimensional and material requirements of ASTM F2880.

b. Ductile Iron, Stainless Steel, or Steel back-up rings (Van-Stone style lap joint flanges) shall have a radius on the inside diameter of the bore so as to be compatible with HDPE Flanges. Back up rings shall have bolt pattern that will mate with AWWA C207 Class D (or B or E), ASME/ANSI B 16.5 Class 150, ASME/ANSI B 16.1 Class 125, or ASME/ANSI B16.47 Series A.

c. Flange assemblies shall be assembled and torqued according to PPI TN-38, “Bolt Torque for Polyethylene Flanged Joints.”

d. Threaded transition fittings may be used in lieu of flanges, but unions must be employed to allow connections where pipe will not have any freedom of movement.

3. Centralizers - Centralizers used for pipe ends will be either molded from HDPE Pipe Grade resins or machined from HDPE Pipe Grade sheet. Manual or hand cut centralizers are not permitted since they have a low degree of dimensional accuracy. Centralizers should have at least two openings that will permit the flow of liquid between the carrier pipe and the containment pipe. The OD of the centralizer shall match the ID of the containment piping as closely as possible. Centralizer spacing for prefabricated pipe will have a standard spacing based on ISCO Industries, Inc catalog listing.

D. DUAL CONTAINED HDPE MANHOLES AND STRUCTURES

1. General- Structures and manholes shall be supplied by the same supplier as dual containment pipe and fittings.

E. FUSION UNIT REQUIREMENTS

1. All Fusion Equipment, whether new or used, rented or owned, shall be approved by the Dual Contained piping system supplier. The butt fusion equipment used to join the pipe shall be capable of meeting all normal butt fusion requirements: alignment, heating, trimming and fusion pressure.

2. If the contractor owns butt fusion equipment, the equipment must be serviced within 3 months prior to use for this project. The machine must be environmentally friendly and in satisfactory working order. The hydraulic system must be leak free. The pressure gage and thermometer must be checked for accuracy. For projects with pipe quantities of 5000' or longer, the fusion equipment should be serviced by a McElroy Authorized Service and Repair Center with at least one McElroy Certified Master Mechanic on staff within 3 months from the first fusion on the project.

3. Rental Fusion Equipment must be supplied by ISCO Industries, Inc. or approved alternate McElroy Authorized Service and Repair Center with at least one McElroy Certified Master Mechanic on staff. When requested by owner or his authority, an inspection report detailing the components inspected within 3 months prior to arrival at jobsite will be provided.

F. APPROVED SUPPLIERS

1. All Pipe, Fittings, and Fusion Equipment shall be provided by one supplier. Approved suppliers are ISCO Industries, Inc. or approved equal.

2.02 PIPELINE LOCATING MATERIALS

A. Detectable Marker Tape- Plastic marker tape shall be 5 mil minimum thickness with a solid aluminum core of .35mil minimum thickness and a minimum width of 2". The background of the tape shall be colored based on pipe service with black lettering continuously printed. Marker tape shall have a minimum 35 lbs./inch tensile strength. The installation of the tape shall be at 18 inches below finish grade.

B. Tracer Wire- All HDPE pipe 4" and greater shall be installed with an extra high-strength, copper clad steel tracer wire including 45 mil HDPE jacket that has a minimum average break load of at least 1150 lbs. The jacket shall be colored based on pipe service, with blue for potable water or green for sewer. Tracer wire gauge shall be 12 AWG, 10 AWG, or 8 AWG depending upon application and installation procedure. This wire shall to be continuous and brought up in the valve boxes at the

ends of each line segment with splices made only by methods per the equipment manufacturer's recommendation. All miscellaneous splicing components shall be furnished and installed by the Contractor.

PART 3 – EXECUTION

3.01 GENERAL

A. All Dual Contained HDPE pipe and fittings shall be joined and installed in accordance with the manufacturer's recommendations. Joining, laying, and pulling of polyethylene pipe shall be accomplished by personnel trained in working with dual containment polyethylene pipe systems.

3.02 TRANSPORTATION, UNLOADING, HANDLING AND STORAGE

A. The manufacturer shall package product in a manner designed to deliver the pipe and fittings to the project neatly, intact and without physical damage. Pipe ends shall be covered prior to shipment to prevent debris and / or liquid from entering pipe ends. During transportation each pipe shall rest on suitable pads, strips skids, or blocks securely wedged or tied in place.

B. During loading, transportation, and unloading, every precaution should be taken to prevent damage to the pipe. The handling of the pipeline shall be in such a manner that the pipe is not damaged by dragging it over sharp and cutting objects. Cuts or gouges that reduce the wall thickness by more than 10% are not acceptable and must be cut out and discarded.

C. Handle all piping material in accordance with the PPI Handbook of Polyethylene Pipe (2nd Edition), Chapter 2. All pipe and accessories shall be loaded and unloaded by lifting with hoists or by skidding in order to avoid shock or damage. Under no circumstances shall materials be dropped. Pipe handled on skidways shall not be rolled or skidded against pipe on the ground. Slings, hooks or pipe tongs shall be padded and used in such a manner as to prevent damage to the exterior surface or interior of the pipe. All pipe and fittings shall be subjected to visual inspection at time of delivery and before they are lowered into the trench to be laid.

D. Materials, if stored, shall be kept safe from damage and shall not be stacked higher than the limits recommended by the manufacturer. The bottom tiers shall be kept off the ground on timbers, rails, or concrete. Pipe shall not be stored close to heat sources. The contractor shall be responsible for all security, damage and loss of pipe, excluding Acts of God.

E. Sealing surfaces of mating components (i.e. flange faces) shall be kept free from dirt or foreign matter at all times. Flange face protection shall be used to keep the surface free from scratches and gouges.

3.03 RECEIPT INSPECTION

A. All pipe and fittings shall be subjected to visual inspection at time of delivery and before they are installed or lowered into the trench to be laid. Defective, damaged, or unsound pipe will be rejected. Cuts, punctures, or gouges that penetrate or reduce the wall thickness by 10% or more are not acceptable and must be removed and discarded. Joints or fittings that do not conform to these specifications will be rejected and must be removed immediately by the Contractor.

3.04 PIPE JOINING AND INSTALLATION

A. GENERAL

1. Keeping the annular space of dual contained pipe and fittings clean and dry should be the goal of all installations. Contamination of the annular space could lead to either poor fusions or problematic false indications of leaks or loss of integrity of the carrier/containment pipe system.

B. DIRECT BURIAL

1. Buried HDPE pipe and fittings shall be installed in accordance with ASTM D2321 or ASTM D2774 for pressure systems and AWWA Manual of Practice M55 Chapter 8. The Design Window identified in AWWA M55 Chapter 5 (page 65 of 2006 version) shall be considered acceptable design and installation conditions based on the containment pipe DR.

2. Pipe embedment - Embedment material should be Class I, Class II, or Class III materials as defined by ASTM D2321 Section 6. Class IV or Class V materials shall not be used.

3. Bedding: Pipe bedding shall be in conformance with ASTM D2321 Section 8. Compaction rates should be as specified in ASTM D2321. Deviations shall be approved by the engineer.

4. Haunching and backfill shall be as specified in ASTM D2321 Section 9 with Class I, II, or III materials. Compaction shall be in excess of 85% Proctor, providing a minimum modulus of 1000 psi or greater.

C. FUSION JOINING REQUIREMENTS:

1. All Dual Contained HDPE pipe shall be joined using the simultaneous butt fusion welding process which produces homogeneous, seal, leak tight joints for both the carrier and containment pipe.

2. The Dual Containment supplier shall provide written simultaneous butt fusion welding procedure as part of the submittal package. The procedure should identify quality checks and incorporate principles outlined in ASTM F2620 or PPI TR-33. The procedure shall identify how the simultaneous butt fusion pressure is determined.

3. Fusion joints shall be made by personnel trained by the dual containment system supplier.

A record or certificate of training for the fusion operator must be provided that documents training date.

4. Considerations should be given to adverse weather conditions, such as temperatures below freezing, precipitation, or wind. Provisions shall be accepted by the owner/engineer.

5. The open ends of all pipe sections of joined and/or installed pipe (not in service) shall be capped or plugged to prevent insects, animals, or foreign material from entering the pipe line or pipe section. Use waterproof caps to prevent the entrance of any type of contamination into the carrier or containment pipe and secure to the pipe in such a manner that the wind cannot blow loose. Where possible, the pipe shall be raised and supported at a suitable distance from the open end such that the open end will be below the level of the pipe at the point of support.

D. FUSION OPERATORS:

1. The employer of the fusion machine operator is responsible for the fusion joint quality of the fusion weld made by that individual. The employer is responsible for documenting all training and qualification records for that individual, including compliance to any code requirements for fusion/bonder operators.

2. All HDPE fusion equipment operators shall be trained by the dual containment system manufacturer to perform the simultaneous fusion procedure. Fusion equipment operators shall have current, formal training on all fusion equipment employed on the project. Training received more than two years prior to operation with no evidence of activity within the past 6 months shall not be considered current.

3. When the fusion machine operator is employed by the fusion machine and dual contained system supplier, the supplier shall maintain an ISO 9001 Certified Quality Management System.

E. BUTT FUSION EQUIPMENT:

1. For 6" and larger pipe sizes, the pipe butt fusion machine shall be a self-contained hydraulic fusion machine capable of butt fusing HDPE pipe. The carriage must be removable from the chassis for in-ditch use. The machine must be compatible with an electronic data recording device. Accessories will include all butt fusion inserts for the specified range of pipe sizes, a pyrometer kit for checking the surface temperature of the heater, extension cord of appropriate gauge (25' minimum), and hydraulic extension hoses (minimum of four at 25' each). The butt fusion machine will be McElroy, or approved equivalent.

F. BUTT FUSION EXAMINATION AND DATA REVIEW:

1. Examinations

a. Visual examination of Containment fusion: For pipe sections, examine the full exterior circumference of the containment for bead uniformity. All beads should have visually acceptable bead formation as shown in Fig 4 and Appendix X2 of ASTM F2620. In addition, the following characteristics are expected:

ii. There shall be no evidence of cracks or incomplete fusing

iii. There shall be no evidence of captured objects (e.g., pipe shavings, facer ribbons) between bonded surfaces.

iv. Variations in upset bead heights on opposite sides of the cleavage and around the circumference of fused pipe joints are acceptable.

v. The apex of the cleavage between the upset beads of the fused joint shall remain above the base material surface

vi. Fused joints shall not display visible angular misalignment, and outside diameter mismatch shall be less than 10% of the nominal wall thickness

vii. Fusion data records, when required, shall be reviewed to meet acceptable fusion criteria can be used as additional verification of visual indicators.

b. Visual examination of Carrier fusion (as required):

viii. Visual examination of carrier fusion is not possible without destructive examination

ix. Create test fusion

x. Cut and disassemble so that carrier bead can be exposed and inspected

xi. Inspect carrier bead as described in Section F. 1. a.

c. Fusion Data Record Review

xii. The fusion date record for each fused joint shall be compared to the approved fusion procedure. The reviewer shall verify the following:

1. That all data required by section 3.04.E.2.a was recorded

2. Pressure was within the acceptable range

3. Heater surface temperature was within the acceptable range

4. Butt fusion pressure applied during the fusing/cool cycle was correctly calculated to include drag pressure, fell within the acceptable range for the applicable size and agrees with the recorded hydraulic fusing pressure.

5. Butt fusing pressure was reduced to a value less than or equal to drag pressure at the beginning of the heat soak cycle.

6. Fusing machine was opened at the end of the heat soak cycle, the heater was removed, and the end were brought together at the fusion pressure with the acceptable time range

7. Cooling time at butt fusing pressure met the minimum time specified

ii. If the recorded data is outside the limits of the acceptable range, the joint is unacceptable and must be removed and replaced.

iii. Frequency. Records for test fusion joints should be reviewed immediately after the joint is completed. Fusion joints for jobsite fusions should be reviewed daily or before being covered with backfill.

3.05 TESTING AND LEAKAGE

A. The contractor shall insure testing can be accomplished in a safe manner, including protection of personnel, equipment, and public in the event of a failure during testing. The contractor shall restrain pipe, components, and test equipment as required. All pumps, valves, temporary connections, meters, gauges and other measuring devices shall be furnished, installed and operated by the Contractor and all such equipment and devices and their installation shall be approved by the Owner's Engineer.

B. The pressure gauges or data recorders should be calibrated and sufficiently sized to provide mid-range data (pressure tested will not be below 10% or greater than 90% of gauge capacity) that result in easy reading, interpretation. Gauges shall be accurate to within 2% of full scale with increments no greater than X psi.

C. Test pressure shall not exceed the lowest rated component of the system, which may be a fitting or valve.

D. Containment Pipe Testing

1. Access to the annular space via low point drains or access ports will used to conduct containment pipe testing.

2. The annular space between the carrier and containment pipe shall be tested to a maximum of 10 psi air pressure. Air pressure should be allowed to equalize for 10 minutes, then monitor the pipe for the test period of 10 minutes, during which no drop in pressure shall be allowed.

3. Intermediate testing of containment annular space may be used for evaluation of fusion and pipe integrity prior to final testing. No hydrostatic test of the carrier is required for intermediate testing. Welding and subsequent removal of end terminations will likely be necessary to provide temporary closure of the annular space.

4. The carrier pipe shall be brought up to and held at the system test pressure while the containment piping is being tested.

5. Final low pressure air testing of containment shall be conducted upon completion of the hydrostatic testing of the carrier pipe outlined in section 3.05.E.

6. Warning: All pneumatic test, regardless of pressure, can be dangerous and safety procedures shall be identified, documented, approved by the owner and engineer, and followed. ASTM F1417 may provide useful guidance and information for reference.

E. Carrier Pipe Testing

1. Carrier Pressure testing shall be conducted in accordance with requirements and recommendations of ASTM F2164 (Field Leak Testing of Polyethylene Pressure Piping Systems Using Hydrostatic Pressure), AWWA Manual of Practice M55 Chapter 9, and PPI Handbook of Polyethylene Pipe Chapter 2 (2nd Edition). High pressure or pneumatic (compressed air) leakage testing of HDPE pressure piping is prohibited for safety reasons.

a. The section of pipe to be tested shall be filled with potable or generally clean water (uncontaminated river/lake water) approved by the Owner/Engineer. While the system is being filled with water, air shall be carefully and completely exhausted. Due to the complexity of adding fittings in installed dual contained piping, systems requiring venting shall use air vent valves within containment structures located at high points during the design phase.

a. The test procedure for HDPE pipe consists of two steps: 1) the initial phase or expansion phase and 2) the test phase. During the initial/expansion phase, sufficient make-up water shall be added hourly for 3 hours to return to the test pressure. During the test phase, the expansion phase pressure is reduced by 10 psi to test phase pressure and monitored for at least one hour (3 hours maximum).

a. Under no circumstances shall the total time under hydrostatic test exceed eight (8) hours. If the test is not completed due to leakage, equipment failure or any other reason, depressurize the test section and permit the system to “relax” for eight (8) hours prior to the next testing sequence.

a. The test pressure shall be 1.5 times the operating pressure at the lowest point in elevation along the test section’s vertical pipeline profile. In accordance with section 9.8 of ASTM F2164, the pipe shall pass if the final pressure is within 5% of the test phase pressure for the testing period (3 hours maximum). If the test section fails this test, the Contractor shall repair or replace all defective materials and/or workmanship at no additional cost to the Owner.

F. Test pressures require consideration of thermal conditions. Polyethylene piping materials are typically pressure rated at 73°F (23°C) and PE piping at temperatures greater than 80°F (26°C) require reduced test pressures. (Note that higher pipe temperatures should consider both ambient temperatures and radiant solar heating of exposed black HDPE pipe) Guidance for elevated temperatures can be found in the appendix of Chapter 3 (Material Properties) of the PPI Handbook of PE Pipe.

G. All pressure and leakage testing shall be done in the presence of a representative of the Owner and Engineer.

END OF SECTION

SECTION 15540
HDPE PIPE FUSION

PART 1 – GENERAL

1.01 SCOPE OF WORK

A. This specification is intended to insure quality HDPE fusion welds are achieved. By meeting each item of the specification, a properly trained fusion operator will use properly maintained equipment. Verification of sample joints can be destructively tested and records of all fusion joints can be reviewed against accepted fusion variables.

1.02 RESPONSIBILITY

A. The employer of the fusion machine operator is responsible for the fusion joint quality of the fusion welds made by that individual. The employer is responsible for documenting all qualification and training records of that individual.

B. The owner of fusion equipment is responsible for all maintenance records of fusion equipment.

C. Employer of the fusion machine operator to have in-house safety program, established for at least 2 years with verifiable information in regard to schedules and history of safety meetings.

PART 2 – FUSION PROCEDURE

A. A fusion procedure that follows the guidelines of ASTM F 2620 Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings must be documented on company letterhead.

B. Considerations should be given to and provisions made for adverse weather conditions, such as temperatures below freezing, precipitation, or wind, which is accepted by the owner/engineer.

C. A record or certificate of training for the fusion operator must be provided that documents training to the fundamentals of ASTM F 2620.

PART 3 – FUSION OPERATOR

A. All HDPE fusion equipment operators shall be qualified to perform pipe joining.

Fusion equipment operators shall have current, formal training on all fusion equipment employed on the project. Training received more than two years prior to operation with no evidence of activity within the past 6 months shall not be considered current.

B. For projects with at least 5000’ or with pipe 26” or larger, operators or their supervisor must have a current McElroy Fusion Training Certificate for the equipment to be used on the project.

C. When the fusion machine operator is employed by the HDPE pipe and fusion machine supplier, the supplier shall maintain an ISO 9001 Certified Quality Management System.

PART 4 – FUSION PERFORMANCE QUALIFICATION

4.01 TESTING REQUIREMENTS

A. Written Examination: All operators should be able to pass a minimum 20 question written examination
with a passing grade of 80% to verify understanding of the procedures, essential variables, and requirements outlined in ASTM F 2620.
B. Physical Examination: All operators must perform a minimum of two welds, each weld must pass a visual
examination per section 4.02 and mechanical tests per section 4.03.

4.02 VISUAL EXAMINATION

A. For pipe sections, examine the full exterior circumference for bead uniformity before cutting. After cutting the pipe section, review the interior bead. All beads should have visually acceptable bead formation as shown in Fig 4 and Appendix X2 of ASTM F2620. In addition, the following characteristics are
expected:
1. There shall be no evidence of cracks or incomplete fusing
2. There shall be no evidence of captured objects (e.g., pipe shavings, facer ribbons) between bonded surfaces.
3. Variations in upset bead heights on opposite sides of the cleavage and around the circumference of fused pipe joints are acceptable.
4. The apex of the cleavage between the upset beads of the fused joint shall remain above the base material surface
5. Fused joints shall not display visible angular misalignment, and outside diameter mismatch shall be less than 10% of the nominal wall thickness
6. Fusion data record review that meet criteria of section 6-2.1 can be used as additional verification of visual indicators.

4.03 MECHANICAL TESTS

A. Each pipe sample weld shall be subjected to testing at two locations 180 degrees apart from each other in the joint weld. All specimens shall be tested by one of the following methods:

1. Reverse Bend Test are allowed for pipe sizes 6” IPS or smaller. The specimens shall be removed and tested in accordance with ASTM F 2620, Appendix X4.
2. Guided Side Bend Test are allowed for all pipe sizes 4” IPS and larger. The specimens shall be removed and tested in accordance to recommendations and procedures provided by McElroy Manufacturing.
3. In Field Tensile Testing is allowed for all pipe size 4” IPS and larger. The specimens shall be removed and tested in accordance to recommendations and procedures provided by McElroy Manufacturing.
4. High Speed Tensile Impact Test is allowed for pipe sizes 3”-63” for all wall thicknesses less than 2.5”. The specimens shall be removed and tested in accordance to ASTM F 2634.
5. Hydrostatic Burst Test is allowed for pipe sizes 2”-24”. The specimen length should measure 6 times pipe diameter with the butt fusion joint in the center of the specimen. The specimen should be tested in a tank filled with water, and testing conditions monitored and recorded with computerized equipment. The specimen will be tested at 4 times pipe rated pressure for 5 minutes with no failure of joint allowed.

B. All samples shall be labeled with operator information. Testing must be done at 73 degrees F plus or minus 5 degrees. The test temperature and sample size are critical to testing. Testing performed at cold or elevated temperatures may not give similar results to tests performed at ambient temperatures.
C. Results of any mechanical test should be documented. Information on the weld and operator should be transferred from the sample to the testing record.

4.04 FIELD HYDROSTATIC TESTING

A. When practical, intermittent and/or post construction testing of all HDPE lines will be performed

in accordance with ASTM F 2164 Standard Practice for Field Leak Testing of Polyethylene (PE) Pressure Piping Systems Using Hydrostatic Pressure. Pass/Fail Criteria as per section 9.8 of that standard should be observed.

4.05 QUALIFICATION EXPIRATION

A. An operator's qualification will be considered expired when one of the following conditions has been met:

1. When the fusion machine operator has not completed a fusion joint using a qualified procedure for a time period of 6 months or more, their qualification has expired
2. When there is specific reason to question the ability of the fusion machine operator to make fused joint meeting the requirements of the specification, the qualification of the fusion machine operator shall be revoked.
3. When the fusion machine operator has passed 2 years since last qualification date, their qualification has expired.

PART 5 – FUSION UNIT REQUIREMENTS

All Fusion Equipment, whether new or used, rented or owned, shall comply with the requirements of ISO 12176-1 "Equipment for Fusion Jointing Polyethylene Systems".

5.01 OWNER OPERATED FUSION EQUIPMENT

A. If the contractor owns butt fusion equipment, the equipment must be serviced w i t hi n 3 m ont hs prior to use for this project. The machine must be environmentally friendly and in satisfactory working order. The hydraulic system must be leak free. The pressure gage must be checked for accuracy and the thermometer checked. For projects with pipe quantities of 5000' or longer, the fusion equipment should be serviced by a McElroy Authorized Service and Repair Center with at least one McElroy Certified Master Mechanic on staff within 3 months of the first fusion on the project.

5.02 RENTAL FUSION EQUIPMENT

A. Fusion Equipment must be maintained by a McElroy Certified Rental Operation. That company would have a McElroy Authorized Service and Repair Center with at least one McElroy Certified Master Mechanic on staff. When requested by owner or his authority, an inspection report detailing the components inspected within 3 months prior to arrival at jobsite will be provided.

B. No equipment older than 5 years should be on site without engineer approval and operating inspection.

C. DataLogger must be within current calibration and have accompanying records with it.

6 FUSION DATA RECORDS AND EVALUATION

6.01 FUSION DATA RECORDER

~~A. For 6" and larger pipe sizes, A McElroy DataLogger or equivalent fusion data recorder shall be used to record all fusion welds on hydraulically operated fusion equipment. The device shall be capable of meeting the requirements of ASTM F3124, "Standard Practice for Data Recording the Procedure used to Produce Heat Butt Fusion Joints in Plastic Piping Systems or Fittings". The device, or combination of devices, shall record the following variables of each fused joint:~~

~~1. Heater surface temperature immediately before inserting the heater plate. Alternatively, the~~
~~heater plate may be measured with a pyrometer and entered into the weld record.~~
~~2. Gauge pressure during the initial heat cycle~~
~~3. Gauge pressure and elapsed time during the heat-soak cycle~~
~~4. Heater removal (dwell) time~~
~~5. Gauge pressure and elapsed time during the fusing/cool cycle~~
~~6. Drag pressure~~
~~7. Pipe diameter and wall thickness~~

8. Type of HDPE material(Specification and Classification) and manufacturer
9. Fusion Machine Identification

B. The device shall record the operator, a unique operator ID number, the date and time of each weld.
C. Records showing the device is up to date on all required calibration should be available for presentation when requested.
D. All fusion welds should be traceable to the report (via operator and weld ID) with an indentation weld stamp or by permanent paint marker/pen next to fusion weld.
E. When requested prior to commencement of work, a weld location map may requested by the owner or owner's representative.

6.02 FUSION DATA RECORD REVIEW

A. The fusion date record for each fused joint shall be compared to the approved fusion procedure. The reviewer shall verify the following:

1. That all data required by section 6-1.1 was recorded
2. Interfacial pressure was within the acceptable range
3. Heater surface temperature was within the acceptable range
4. Butt fusion pressure applied during the fusing/cool cycle was correctly calculated to include drag pressure, fell within the acceptable range for the applicable size and agrees with the recorded hydraulic fusing pressure.
5. Butt fusing pressure was reduced to a value less than or equal to drag pressure at the beginning of the heat soak cycle.
    a. Fusing machine was opened at the end of the heat soak cycle, the heater was removed, and the end were brought together at the fusion pressure with the acceptable time range
    b. Cooling time at butt fusing pressure met the minimum time specified
6. If the recorded data in section 6.2-1 is outside the limits of the acceptable range, the joint is unacceptable.
7. Frequency. Records for test fusion joints should be reviewed immediately after the joint is completed. Fusion joints for jobsite fusions should be reviewed daily or before being covered with backfill.

END OF SECTION

SECTION 15600

LEACHATE FLOW METER

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Provide all labor, materials, tools, and equipment necessary for the installation of leachate flow meters for the primary and secondary collection systems.
B. Furnish one EPG Companies Inc. flow meter system to register liquid flow rate and to record total flow for the primary leachate collection system
C. Furnish one EPG Companies Inc. flow meter system to register liquid flow rate and to record total flow for the primary leachate collection system

1.02 RELATED WORK

A. Division 15 – Mechanical

1.03 SUBMITTALS

A. Product data:
Submit manufacturer's literature and test data demonstrating that materials comply with ASTM, ANSI, AWWA, or other applicable standards.

B. Shop drawings:
Submit Shop Drawings of adapters between pipes and fittings of different materials.

PART 2 - PRODUCTS

2.01 FLOW SENSOR

A. General:
1. Dual Magnets: Sensor shall utilize a dual magnet drum design to assure unimpeded operation of the paddlewheel.
2. Special Mount: The sensor shall be supplied in flow spool pieces sized for specified flow rate range to maximize system accuracy.
3. Sensor: Shall be linear with a repeatability factor of ±.5%.
4. Line sizes: Provide 1-1/4-inch spool line size

2.02 FLOW METER

A. General:
1. Flow Totalizer: Meter shall include a bi-directional, eight digit flow rate display and eight digit flow totalizer display.
2. Programmability: Meter shall be front panel programmable for ease of calibration to line size and change in units.
3. Non-Volatile Memory: Meter shall include a non-volatile memory to retain programmed settings and totalized flow when power is disconnected.
4. LCD Display: Meter shall include a two line eight digit, ¾" high display of flow rate and totalized flow.
5. Menu Driven Programming: Meter programming shall be menu driven to simplify

setup.

6. Temperature Range: Shall maintain full function in temperatures between 0° and 55° C. Low temperature range can be extended with optional meter heater.
7. Scaling: Flow meter scale shall be gallons.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:

1. Install all process piping and accessories in strict accordance with the manufacturer's recommendations as approved by the Engineer and as indicated on the Drawings.

3.02 TESTING

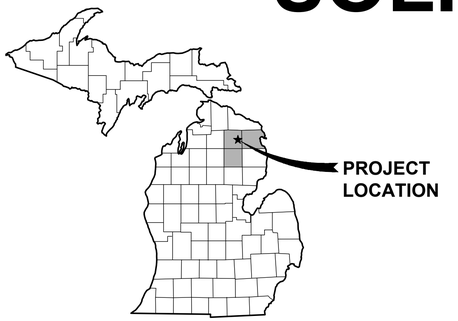
A. Flow meter and readout shall be tested after installation.

END OF SECTION

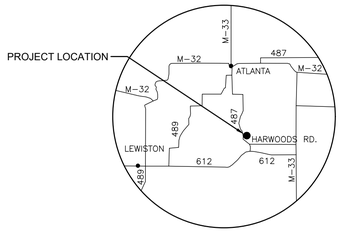
CELL C - PHASE I CONSTRUCTION PLANS
MONTMORENCY-OSCODA-ALPENA
SOLID WASTE MANAGEMENT AUTHORITY

ATLANTA, MICHIGAN
DECEMBER 2025

BIDDING DOCUMENTS



VICINITY MAP
NOT TO SCALE



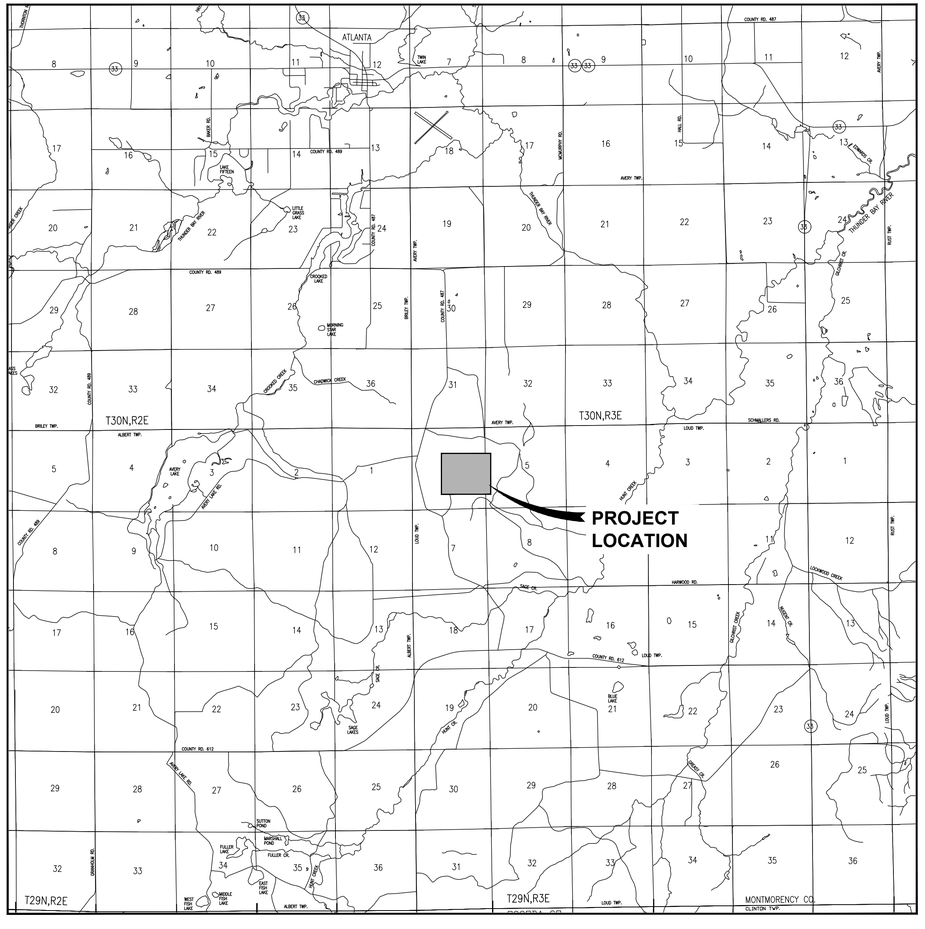
SITE MAP
NOT TO SCALE

OWNER

MONTMORENCY-OSCODA-ALPENA
SOLID WASTE MANAGEMENT AUTHORITY
6751 LANDFILL ROAD
P.O. BOX 13
ATLANTA, MICHIGAN 49709
CONTACT: CONNIE GERRIE, ADMINISTRATOR
989.875.6500

ENGINEER

GOSLING CZUBAK ENGINEERING SCIENCES, INC.
1280 BUSINESS PARK DRIVE
TRAVERSE CITY, MICHIGAN 49686
CONTACT: ADAM SEGERLIND, P.E.
231.946.9191 - 800.968.1062
www.goslingczubak.com info@goslingczubak.com



LOCATION MAP
SCALE: 1" = 5000'

SHEET LIST	
SHEET NUMBER	SHEET TITLE
0	Cover
1	Overall Site Plan
2	Existing Conditions
3	Proposed Final Grading Plan
4	Cross-Sections
5	Liner System Details
6	Interior Berm Details
7	Leachate System Details
8	Leachate Sump Details
9	Leachate Building Detail
10	Leachate Building Detail 2
11	Leachate Building Foundation Details
12	Leachate Building Pipe Detail
13	Proposed Leachate Force Main
14	Storm Water and Soil Erosion Details

GENERAL CONSTRUCTION NOTES

1. SAND DRAINAGE MATERIAL CONFORMING TO THE SPECIFICATION MAY BE OBTAINED FROM THE ON-SITE STOCKPILES. HOWEVER, SCREENING WILL BE NECESSARY. CONTRACTOR TO PROVIDE SAMPLES OF PROPOSED MATERIAL FOR TESTING TO VERIFY PERMEABILITY AND GRADATION AS SPECIFIED IN THE PROJECT MANUAL.
2. FINAL GRADING AROUND THE CELL SHALL DIRECT RUNOFF AWAY FROM THE CELL.
3. THE CONTRACTOR MAY DISPOSE OF ANY EXCESS EARTHWORK MATERIAL FOR THE PROJECT ON-SITE. THE CONTRACTOR MAY ALSO REMOVE STOCKPILED SOIL MATERIAL FREE OF CHARGE AS APPROVED BY THE OWNER.
4. THE OWNER WILL NOT SUPPLY EQUIPMENT TO THE CONTRACTOR TO DEPLOY MATERIALS.
5. ONLY THOSE ITEMS SPECIFICALLY IDENTIFIED IN THE PROJECT MANUAL AS PAY ITEMS SHALL BE USED AS THE BASIS FOR PAYMENT. ALL OTHER ITEMS OF WORK SHALL BE INCIDENTAL TO CONSTRUCTION. LIMITS OF PAYMENT FOR MATERIALS, CELL EXCAVATION AND CELL FILL VOLUMES INCLUDE THE AREA BOUNDED BY STATION 25+40, 21+60, 1+00, AND M+15. ALL MATERIALS REQUIRED OUTSIDE OF THIS AREA TO COMPLETE THE CELL AS SHOWN ARE INCIDENTAL TO CONSTRUCTION.
6. LINER INSTALLERS TO SUPPLY ALL SAND BAGS REQUIRED FOR BALLAST.

811 Know what's below. Call before you dig.

IT IS UNDERSTOOD THAT THE CONTRACTOR SHALL PERFORM ALL WORK UNDER THIS CONTRACT IN ACCORDANCE WITH ALL APPLICABLE PROVISIONS, POLICIES, RULES AND STANDARDS OF THE MICHIGAN OCCUPATIONAL SAFETY AND HEALTH ACT (MIOSHA), BEING ACT 154 OF THE PUBLIC ACTS OF 1974 AND AS AMENDED.

NOT FOR CONSTRUCTION

ORIGINAL SHEET SIZE IS 22x34 - HALF SCALE SHEET IS 11x17

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CELL C - PHASE I BIDDING

Issue Date	12/15/2025
Project No.	250008
Sheet	0

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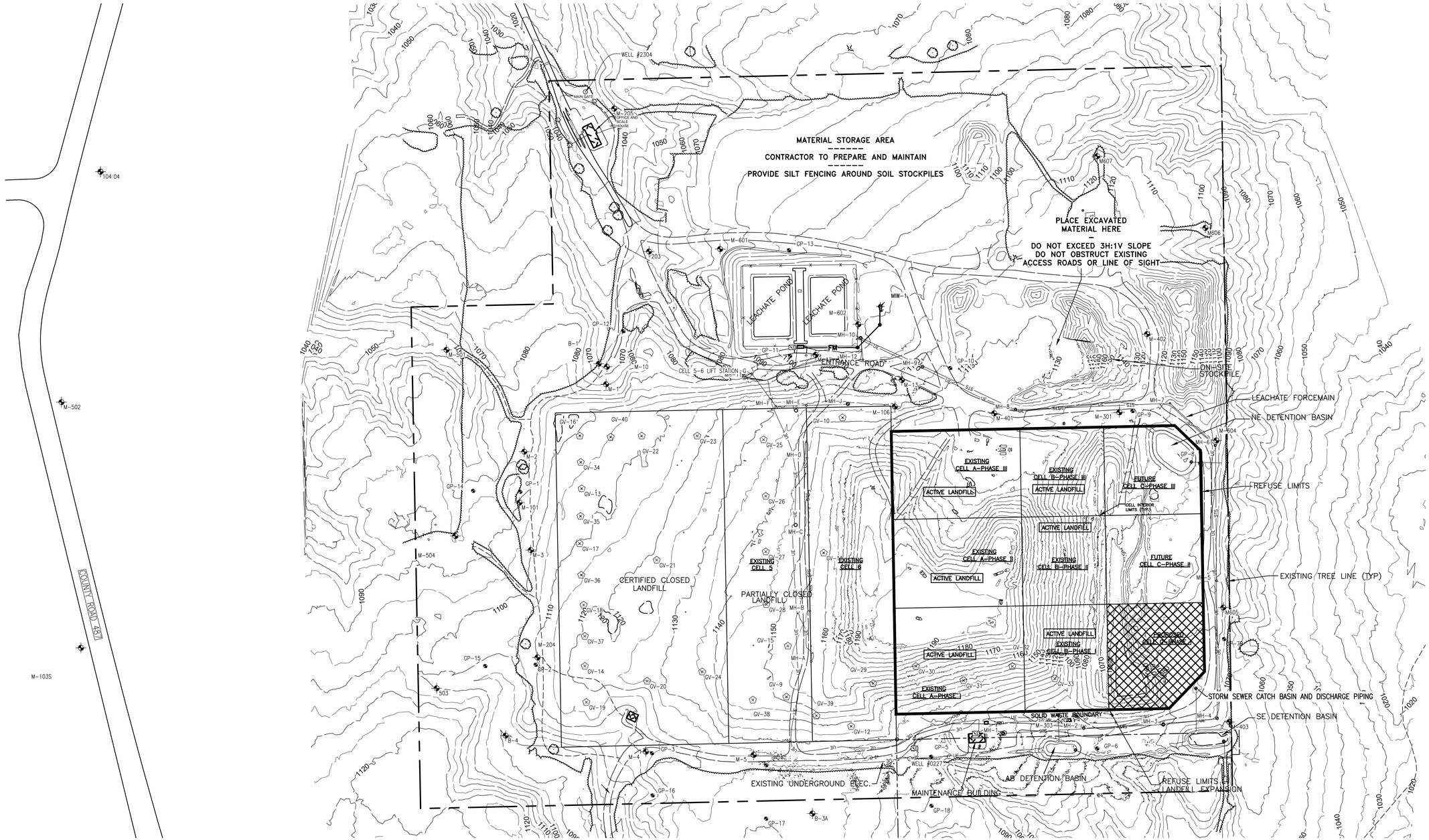

EXISTING CONDITIONS
1" = 200'

NORTH

SCALE 1" = 200'
0' 200' 400'

LEGEND
- GAS MONITORING PROBE
- PASSIVE LFG VENT
- GROUNDWATER MONITORING WELL LOCATION
- WATER WELL LOCATION

NOT FOR CONSTRUCTION

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GEOTECHNICAL
CONSTRUCTION SERVICES
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No.	Date	Revision	By

OVERALL SITE PLAN
CELL C - PHASE I BIDDING
M-O-A SOLID WASTE MANAGEMENT AUTHORITY

Date Issued:	12/15/2025
Date Surveyed:	9/30/2025
Designed By:	AES
Drawn By:	DJT
Checked By:	AES
Scale:	1"=200'

Original sheet size is 22x34

Location:
PART OF SECTION 5&6
T29N, R03E
LOUD TOWNSHIP
MONTMORENCY COUNTY
MICHIGAN

Project Number:
250008

Sheet:
1

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ACTIVE LANDFILL

EXISTING
CELL B–PHASE II

FUTURE
CELL C–PHASE II

ACTIVE LANDFILL

EXISTING
CELL B–PHASE I

PROPOSED
CELL C–PHASE I

DEWATERING REQUIRED

SOLID WASTE BOUNDARY

CELL B LEACHATE BUILDING
POWER SUPPLY FOR CELL C BUILDING

SE DETENTION BASIN

EXISTING TREE LINE (TYP)

LEACHATE FORCE MAIN & UNDERGROUND ELECTRIC

STORM SEWER CATCH BASIN AND DISCHARGE PIPING

LEACHATE FORCE MAIN MANHOLE

MH-2
MH-3
MH-4
MH-5
M-303
M605
M-403
GP-6
GP-7R
GV-32
GV-33

1190 1180 1170 1160 1150 1140 1130 1120 1110 1100 1090 1080 1070 1060 1050

27+00

EXISTING CONDITIONS

1" = 50'

NORTH

SCALE 1" = 50'

0' 50' 100'

LEGEND

- GAS MONITORING PROBE
- PASSIVE LFG VENT
- GROUNDWATER MONITORING WELL LOCATION
- WELL WATER WELL LOCATION

NOT FOR CONSTRUCTION

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No.	Date	Revision	By

EXISTING CONDITIONS
CELL C - PHASE I BIDDING
M-O-A SOLID WASTE MANAGEMENT AUTHORITY

Date Issued:	12/15/2025
Date Surveyed:	9/30/2025
Designed By:	AES
Drawn By:	DJT
Checked By:	AES
Scale:	1"=50'

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Location:
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MONTMORENCY COUNTY
MICHIGAN

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Sheet:
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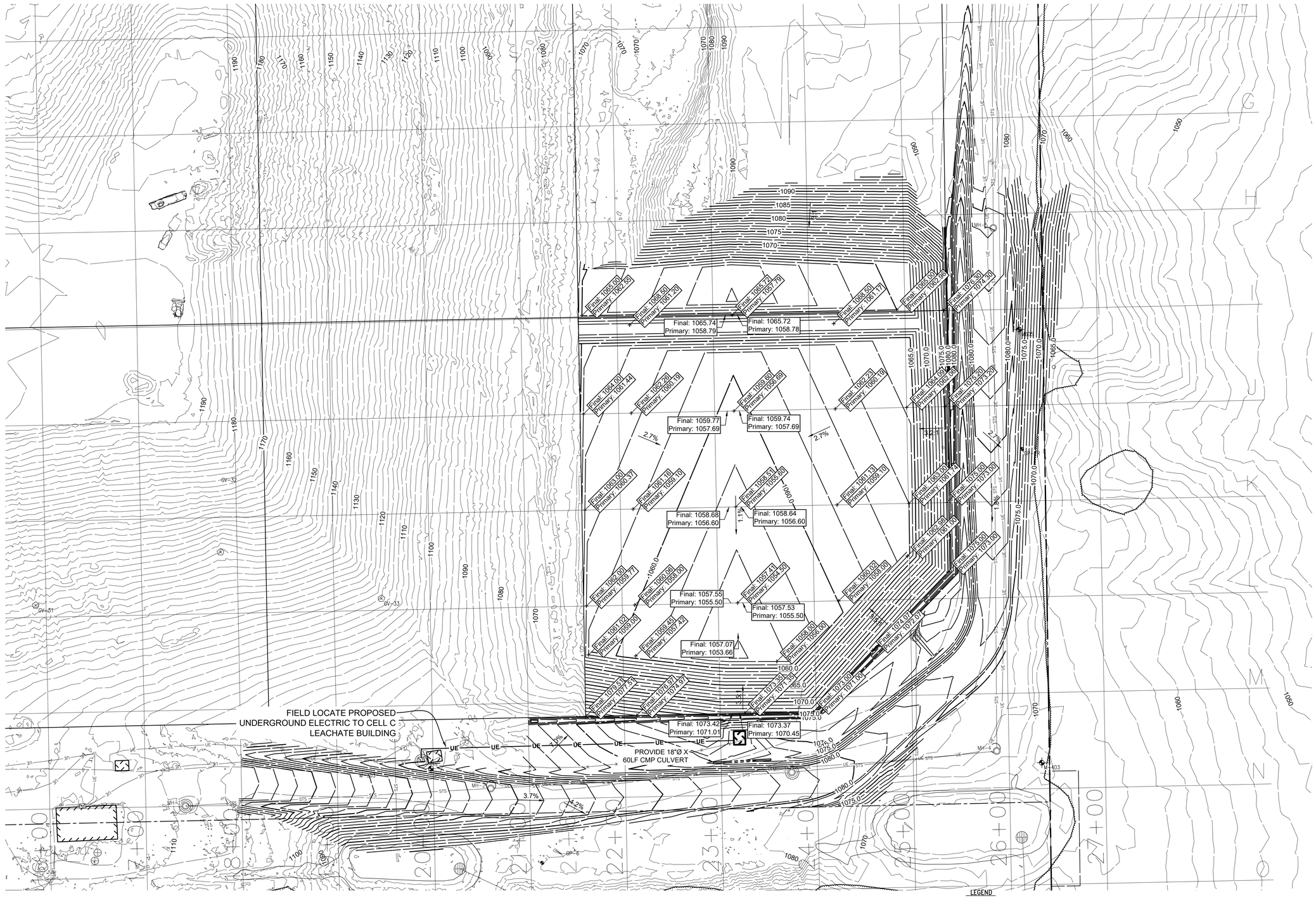

PROPOSED FINAL GRADING PLAN

1" = 50'

NORTH

SCALE 1" = 50'

0' 50' 100'

LEGEND

- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED LIMITS OF LINER CONSTRUCTION
- GAS MONITORING PROBE
- PASSIVE LFG VENT
- GROUNDWATER MONITORING WELL LOCATION
- WATER WELL LOCATION

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PROPOSED FINAL GRADING PLAN
CELL C - PHASE I BIDDING
M-O-A SOLID WASTE MANAGEMENT AUTHORITY

Date Issued:	12/15/2025
Date Surveyed:	9/30/2025
Designed By:	AES
Drawn By:	DJT
Checked By:	AES
Scale:	1"=50'

Original sheet size is 22x34

Location:
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MONTMORENCY COUNTY
MICHIGAN

Project Number:
250008

Sheet:
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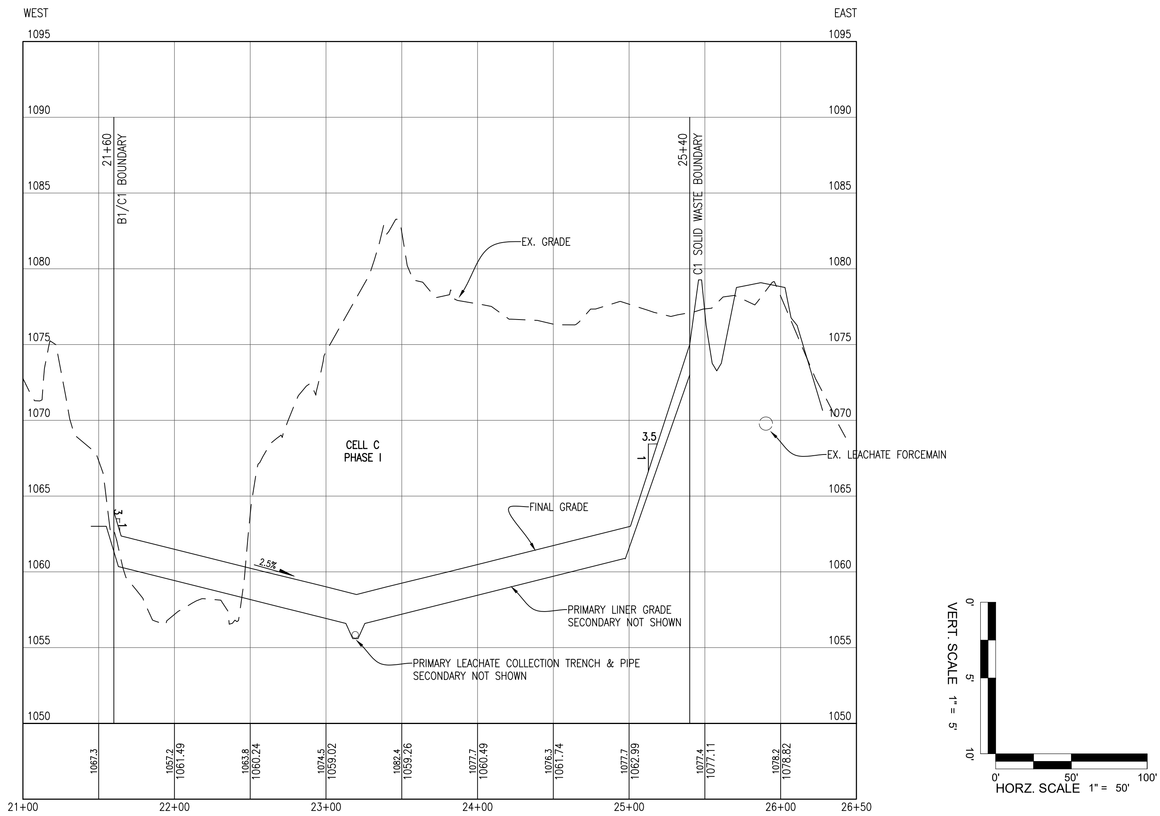
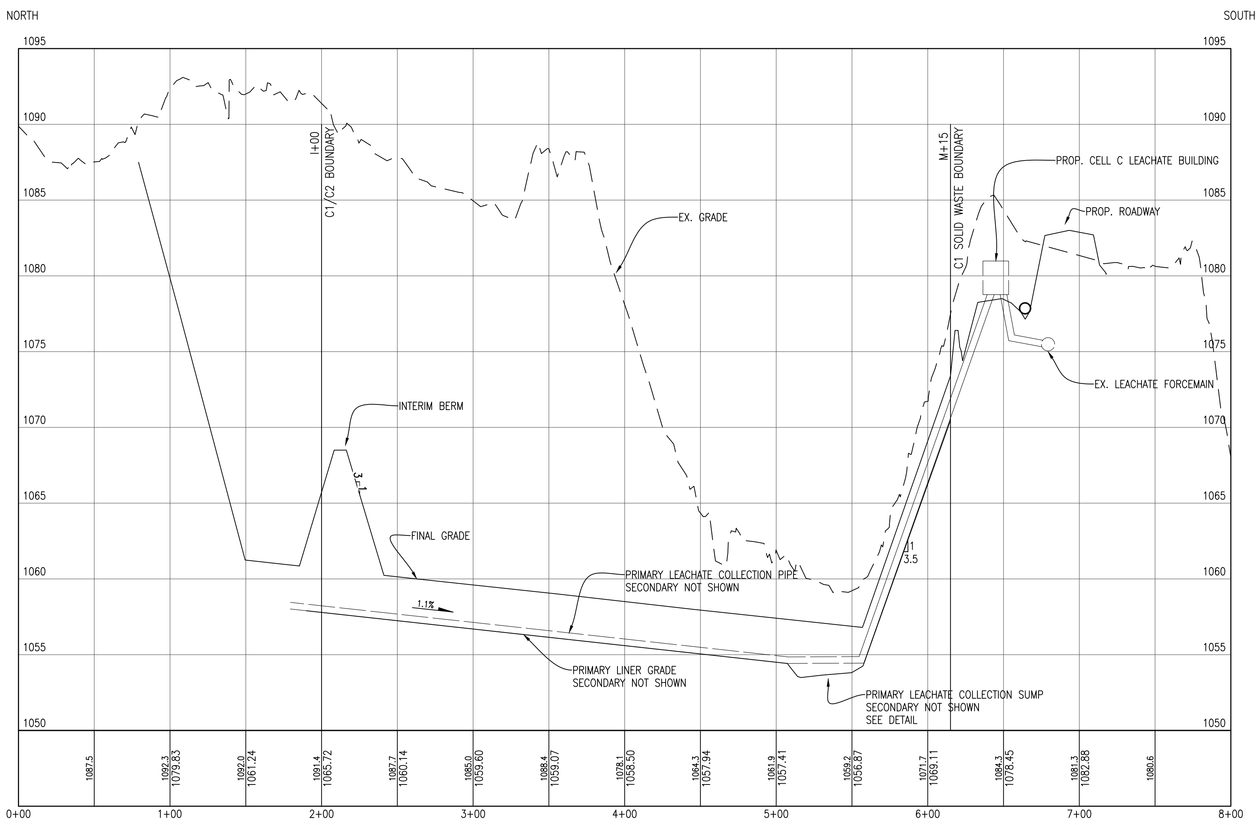


SECTION K+00

SCALE HORIZ. 1" = 50'
VERT. 1" = 5'



SECTION 23+00

SCALE HORIZ. 1" = 50'
VERT. 1" = 5'

NOT FOR CONSTRUCTION

CROSS-SECTIONS
CELL C - PHASE I BIDDING
M-O-A SOLID WASTE MANAGEMENT AUTHORITY

No.	Date	Revision	By

Date Issued: 12/15/2025
Date Surveyed: 9/30/2025
Project Mgr: AES
Drawn By: AES
Checked By: AES
Scale: AS NOTED
Original sheet size is 22x34

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Project Number: 250008
Sheet: 4

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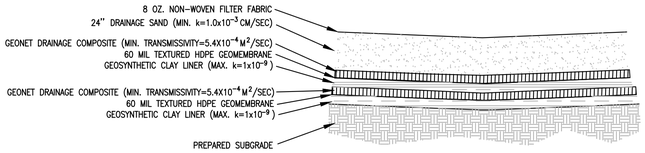
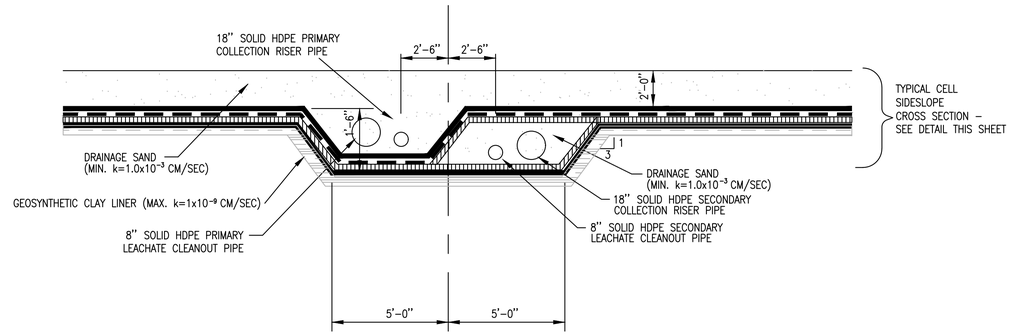
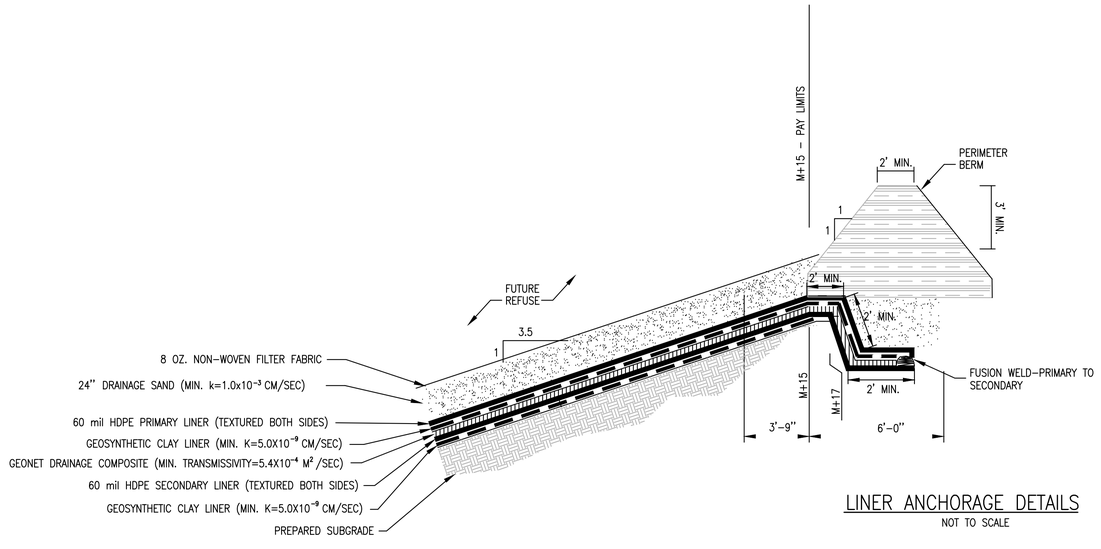


PROPOSED CELL BOTTOM CONSTRUCTION DETAIL

NOT TO SCALE



SECTION A/5



TYPICAL CELL SIDESLOPE CONSTRUCTION DETAIL

NOT TO SCALE

LINER ANCHORAGE DETAILS

NOT TO SCALE

NOT FOR CONSTRUCTION

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No.	Date	Revision	By

LINER SYSTEM DETAILS
CELL C - PHASE I BIDDING
M-O-A SOLID WASTE MANAGEMENT AUTHORITY

Date Issued:	12/15/2025
Date Surveyed:	NA
Designed By:	AES
Drawn By:	DJT
Checked By:	AES
Scale:	NTS

Original sheet size is 22x34

Location:
PART OF SECTION 5&6
T29N, R03E
LOUD TOWNSHIP
MONTMORENCY COUNTY
MICHIGAN

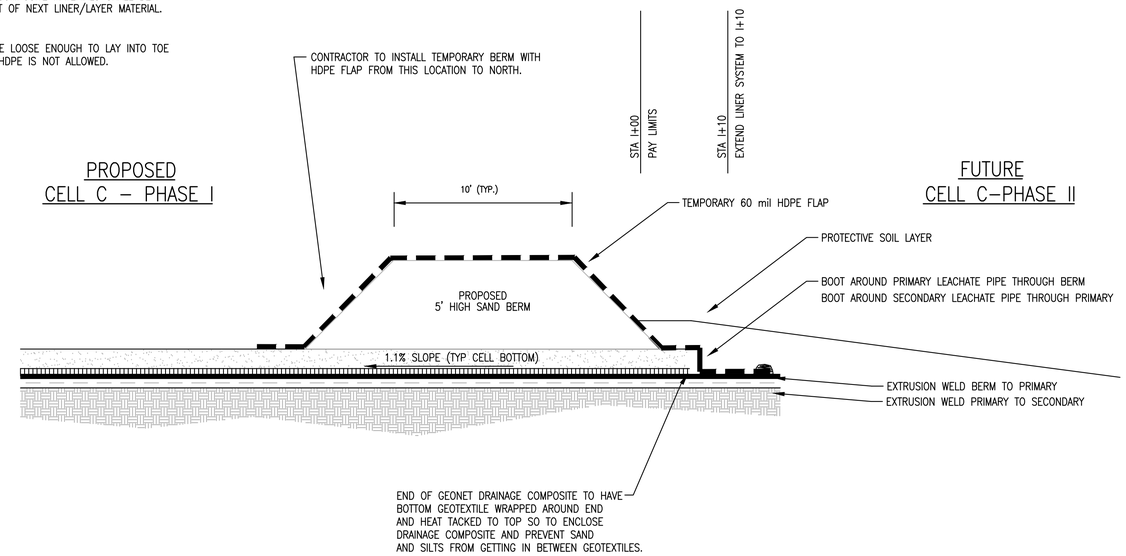
Project Number:
250008

Sheet:
5

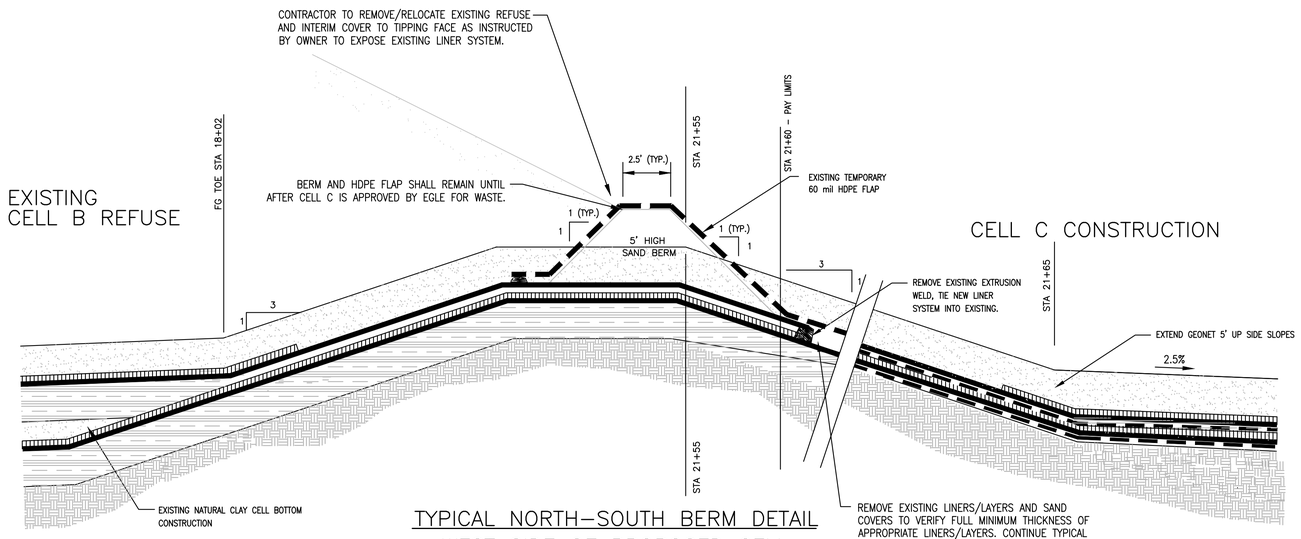
P:\250008\CADD\Data\DETAIL\Cell C\250008P2_PS_C-Phase I details.dwg, Tab: 5 Liner System Details, Saved by: aesgarfield 12/11/2025 10:09 AM, Plotted by: Adam Siegenthal 12/11/2025 10:09 AM

NOTES: ALL HDPE, GCL AND GEONET DRAINAGE COMPOSITE MATERIALS SHALL BE FLAT AND SMOOTH PRIOR TO PLACEMENT OF NEXT LINER/LAYER MATERIAL. NO FOLDS ARE ALLOWED.

AT TOE OF ALL SLOPES, HDPE SHALL BE LOOSE ENOUGH TO LAY INTO TOE AND TOUCH GCL UNDERNEATH. TAUGHT HDPE IS NOT ALLOWED.



TEMPORARY ENDING BERM DETAIL–STA 21+80 TO 25+15
NORTH SIDE OF PROPOSED CELL–STATION 1+00
NO SCALE



TYPICAL NORTH–SOUTH BERM DETAIL
WEST SIDE OF PROPOSED CELL
NOT TO SCALE

NOT FOR CONSTRUCTION

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No.	Date	Revision	By

INTERIOR BERM DETAILS
CELL C - PHASE I BIDDING
M-O-A SOLID WASTE MANAGEMENT AUTHORITY

Date Issued:	12/15/2025
Date Surveyed:	NA
Designed By:	AES
Drawn By:	DJT
Checked By:	AES
Scale:	NTS

Original sheet size is 22x34

Location:
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T29N, R03E
LOUD TOWNSHIP
MONTMORENCY COUNTY
MICHIGAN

Project Number:
250008

Sheet:
6

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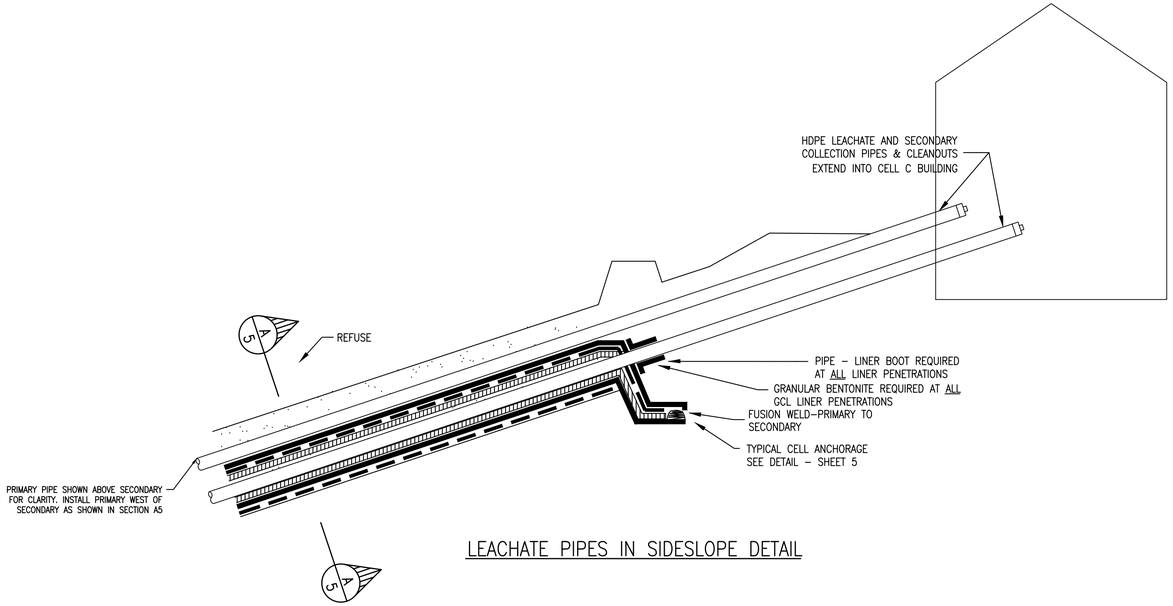
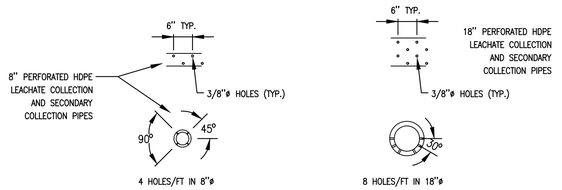


LEACHATE PIPES IN SIDESLOPE DETAIL

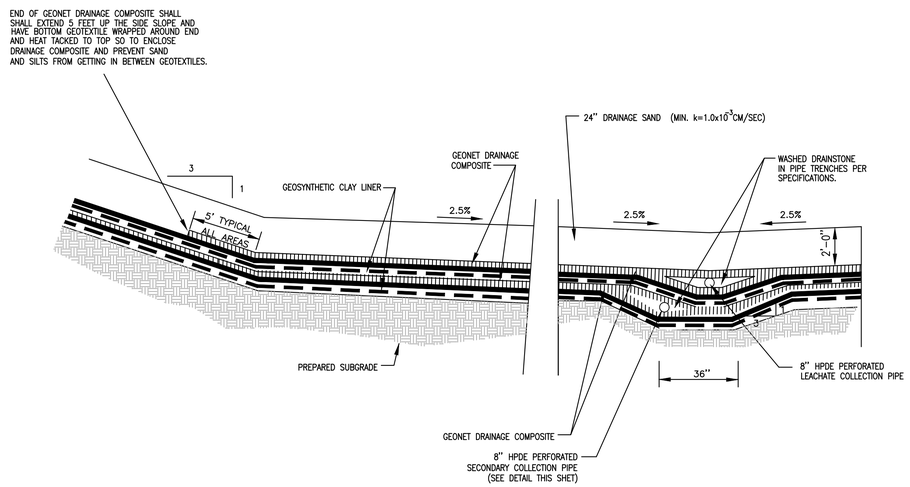


PIPE PERFORATION DETAIL

NOT TO SCALE

LEACHATE COLLECTION AND SECONDARY COLLECTION PIPING SHALL BE 8"ø HIGH DENSITY POLYETHYLENE (HDPE), WITH SDR 17.0 WALL THICKNESSES:

PERFORATIONS FOR PIPE ON FLOOR ONLY.
PIPE IN SIDESLOPE SHALL BE SOLID.



PROPOSED PIPE TRENCH SECTION STATION K+00

NOT TO SCALE

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CONSTRUCTION MATERIALS TESTING

No.	Date	Revision	By

LEACHATE SYSTEM DETAILS
CELL C - PHASE I BIDDING
M-O-A SOLID WASTE MANAGEMENT AUTHORITY

Date Issued:	12/15/2025
Date Surveyed:	NA
Designed By:	AES
Drawn By:	DJT
Checked By:	AES
Scale:	NTS

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Location:
PART OF SECTION 5&6
T29N, R03E
LOUD TOWNSHIP
MONTMORENCY COUNTY
MICHIGAN

Project Number:
250008

Sheet:
7

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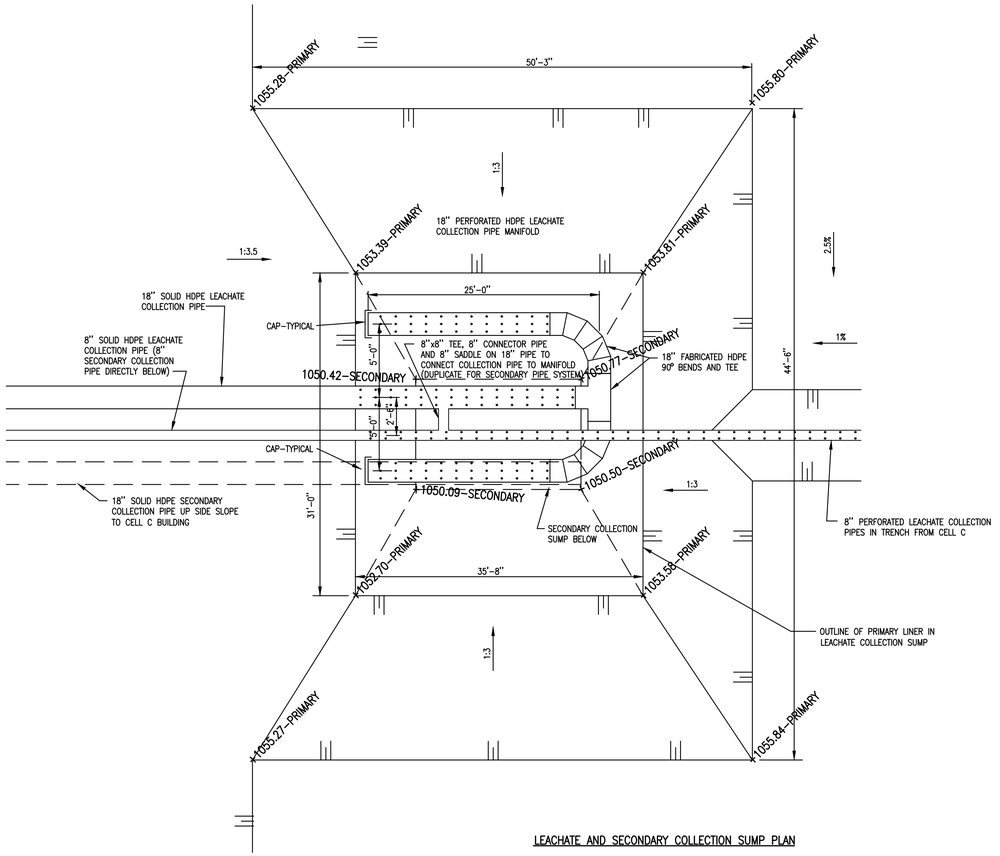
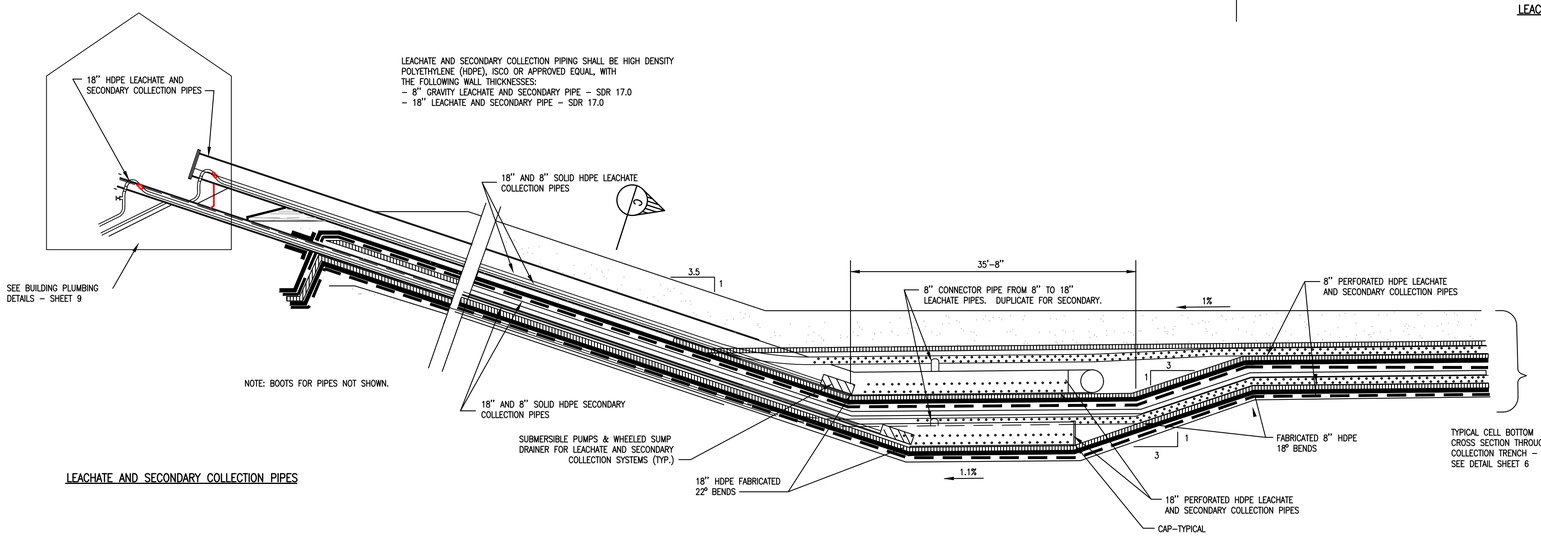


LEACHATE AND SECONDARY COLLECTION SUMP PLAN



LEACHATE AND SECONDARY COLLECTION PIPES

NOT FOR CONSTRUCTION

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CONSTRUCTION MATERIALS TESTING

No.	Date	Revision	By

LEACHATE SUMP DETAILS
CELL C - PHASE I BIDDING
M-O-A SOLID WASTE MANAGEMENT AUTHORITY

Date Issued:	12/15/2025
Date Surveyed:	9/30/2025
Designed By:	AES
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Scale:	----

Original sheet size is 22x34

Location:
PART OF SECTION 5&6
T29N, R03E
LOUD TOWNSHIP
MONTMORENCY COUNTY
MICHIGAN

Project Number:
250008

Sheet:
8

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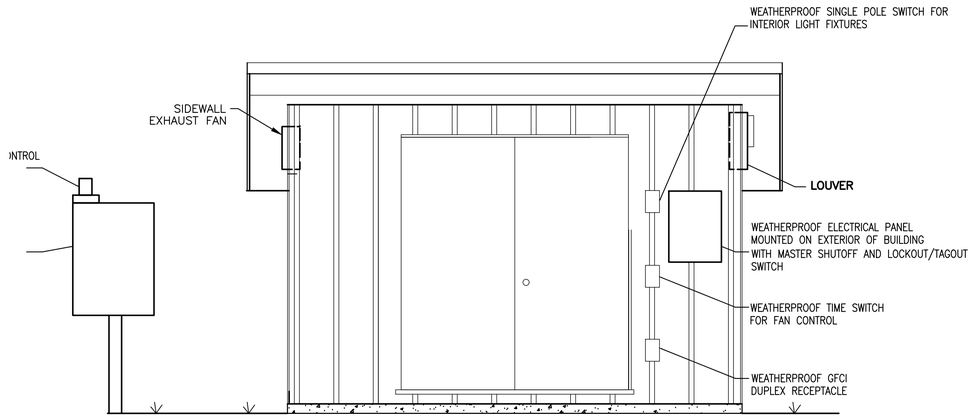
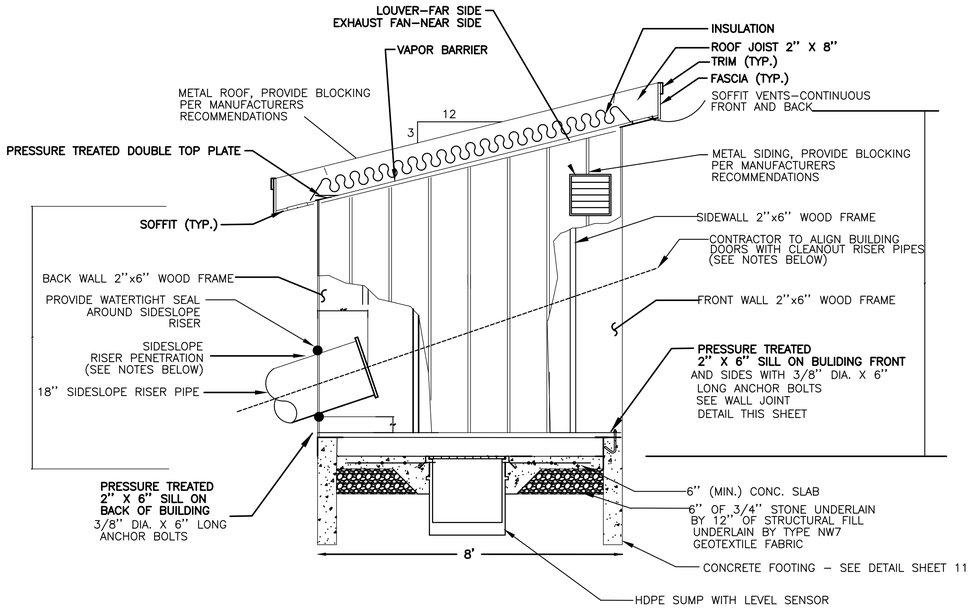


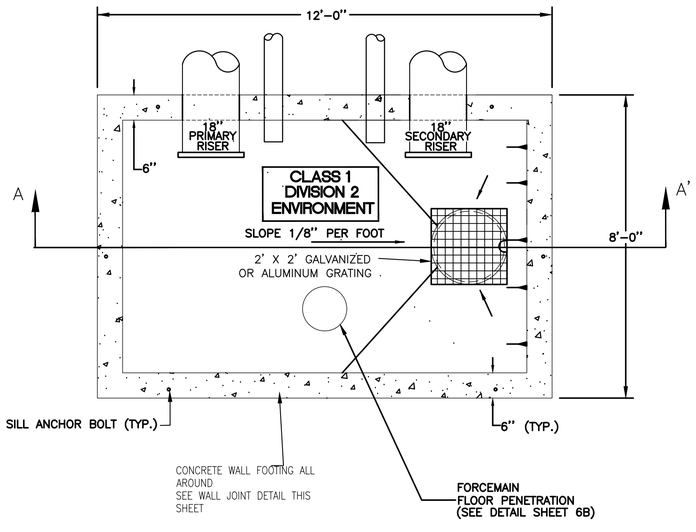
BUILDING-ELEVATION FRONT VIEW

NOT TO SCALE



BUILDING SECTION - SIDE VIEW

APPROX. SCALE: 1/2''=1'



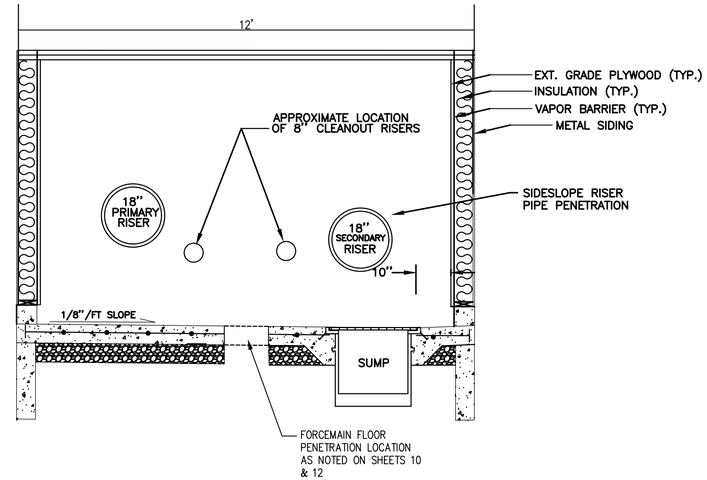
BUILDING FLOOR PLAN

APPROX. SCALE: 1/2''= 1'

NOTES:

1) THE BUILDING DOORS SHALL BE CENTERED BETWEEN THE PIPES. FIELD VERIFY THAT THERE WILL BE ENOUGH SPACE FOR 1.5'' AND 2.0'' PUMP RISER PIPES TO BE PULLED FROM THE 18'' RISERS AND TAKEN THROUGH THE DOORS (ENGINEER APPROVAL OF LOCATION REQUIRED).

2) PROVIDE ADEQUATE BLOCKING BENEATH THE 18'' PIPES AT THE BUILDING PENETRATION.



BUILDING ELEVATION A-A'

APPROX. SCALE: 1/2''=1'

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LEACHATE BUILDING DETAIL
CELL C - PHASE I BIDDING
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9

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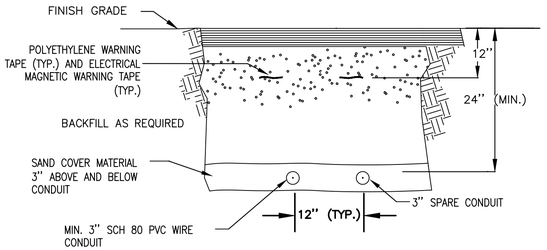


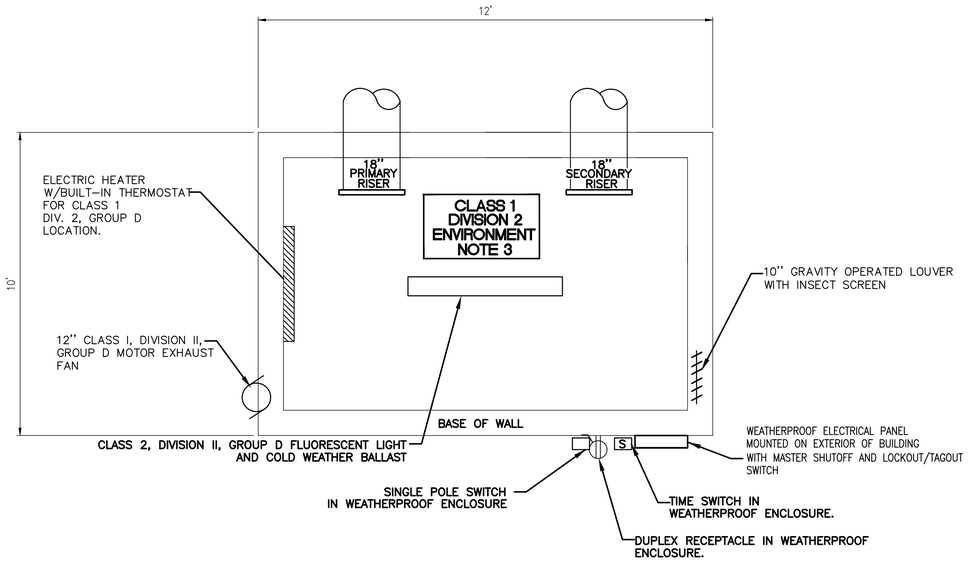
NOTES:

1) INSTALL H-20 RATED ELECTRICAL PULL BOXES WITH A MAXIMUM 400 FT SPACING ALONG ELECTRICAL CONDUIT.

2) PROVIDE MINIMUM 1 CONDUIT FOR USE AS A SPARE.

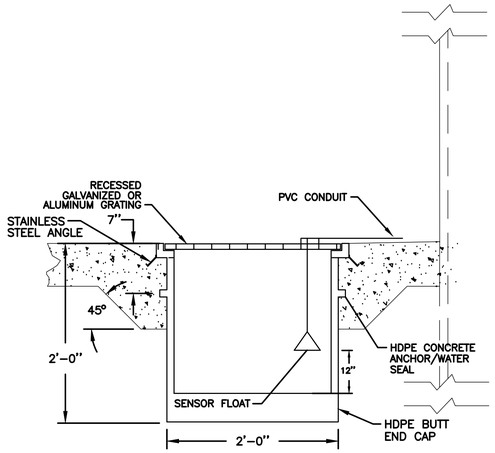
SECTION-UNDERGROUND CONDUIT

NOT TO SCALE



BUILDING ELECTRICAL PLAN VIEW

NOT TO SCALE



BUILDING SUMP LEVEL SWITCH DETAIL

NOT TO SCALE

NOTES:

1. REFER TO SECTION 11306 FOR PUMP CONTROLLER SPECIFICATIONS.
2. ALL CONDUIT SHALL HAVE A DIAMETER NO LESS THAN 3 INCH SCHEDULE 80 PVC.
3. CONTRACTOR RESPONSIBLE FOR ALL ELECTRICAL WIRING TO ACCOMMODATE PLAN.
4. ALL ELECTRICAL WORK TO BE PERFORMED IN ACCORDANCE WITH APPLICABLE ELECTRICAL CODES BY A STATE OF MICHIGAN LICENSED ELECTRICAL CONTRACTOR.
5. ALL CONDUIT LEAVING THE BUILDING (CLASS 1 DIVISION 2 AREA) SHALL BE PROVIDED WITH A CONDUIT SEAL IN ACCORDANCE WITH APPLICABLE ELECTRIC CODES. THERE SHALL BE NO UNION, COUPLING, BOX OR FITTING IN THE CONDUIT BETWEEN THE SEALING FITTING AND THE POINT AT WHICH THE CONDUIT LEAVES THE DIVISION 2 LOCATION. THE LOCATION OF THE BUILDING WALL ELECTRICAL PENETRATIONS TO BE FIELD LOCATED BY STATE OF MICHIGAN LICENSED ELECTRICAL CONTRACTOR IN ACCORDANCE WITH APPLICABLE ELECTRIC CODES.
6. SENSOR FLOATS ARE INTRINSICALLY SAFE AND SHALL BE INSTALLED BY A STATE OF MICHIGAN LICENSED ELECTRICAL CONTRACTOR IN ACCORDANCE WITH APPLICABLE ELECTRIC CODES.
7. ELECTRICAL FEATURES INCLUDING HEATER, LIGHTING, PANEL, SWITCHES, EXHAUST FAN, AND WIRING TO TO BE FIELD LOCATED BY STATE OF MICHIGAN LICENSED ELECTRICAL CONTRACTOR IN ACCORDANCE WITH APPLICABLE ELECTRIC CODES.
8. SOURCE OF ELECTRICITY TO BE FIELD VERIFIED WITH LANDFILL PERSONNEL.
9. PUMP CONTROL PANEL MAY BE RELOCATED OR MOVED/ATTACHED TO THE SIDE OF THE BUILDING TO FACILITATE CONNECTIONS. IF NOT ATTACHED TO THE BUILDING, RUN WIRE CONDUIT UNDERGROUND FROM BUILDING TO CONTROL PANEL.

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LEACHATE BUILDING DETAIL 2
CELL C - PHASE I BIDDING
M-O-A SOLID WASTE MANAGEMENT AUTHORITY

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MICHIGAN

Project Number:
250008

Sheet:
10

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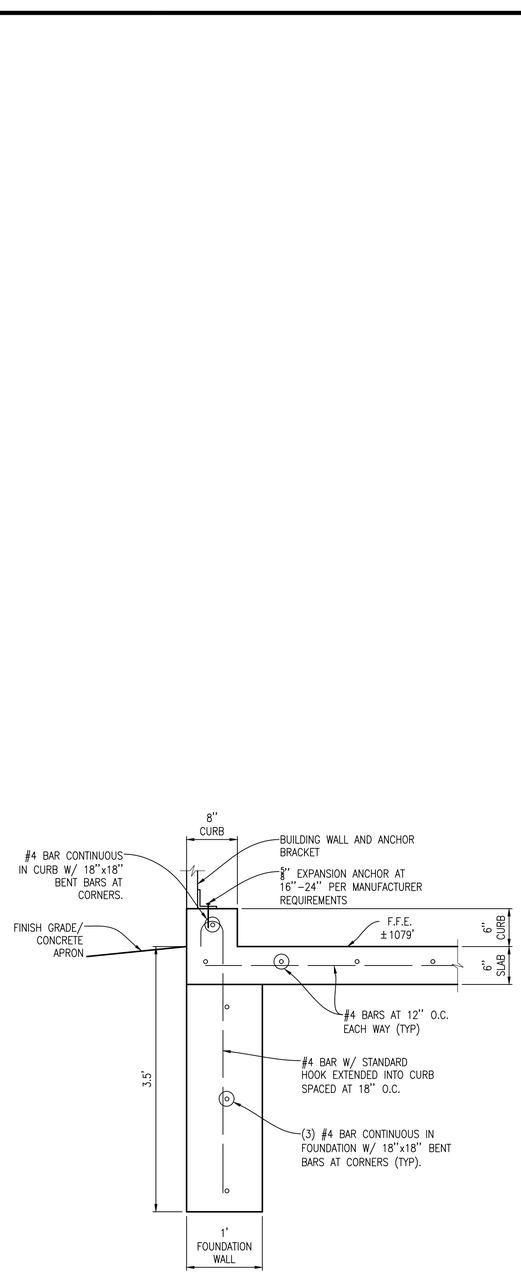
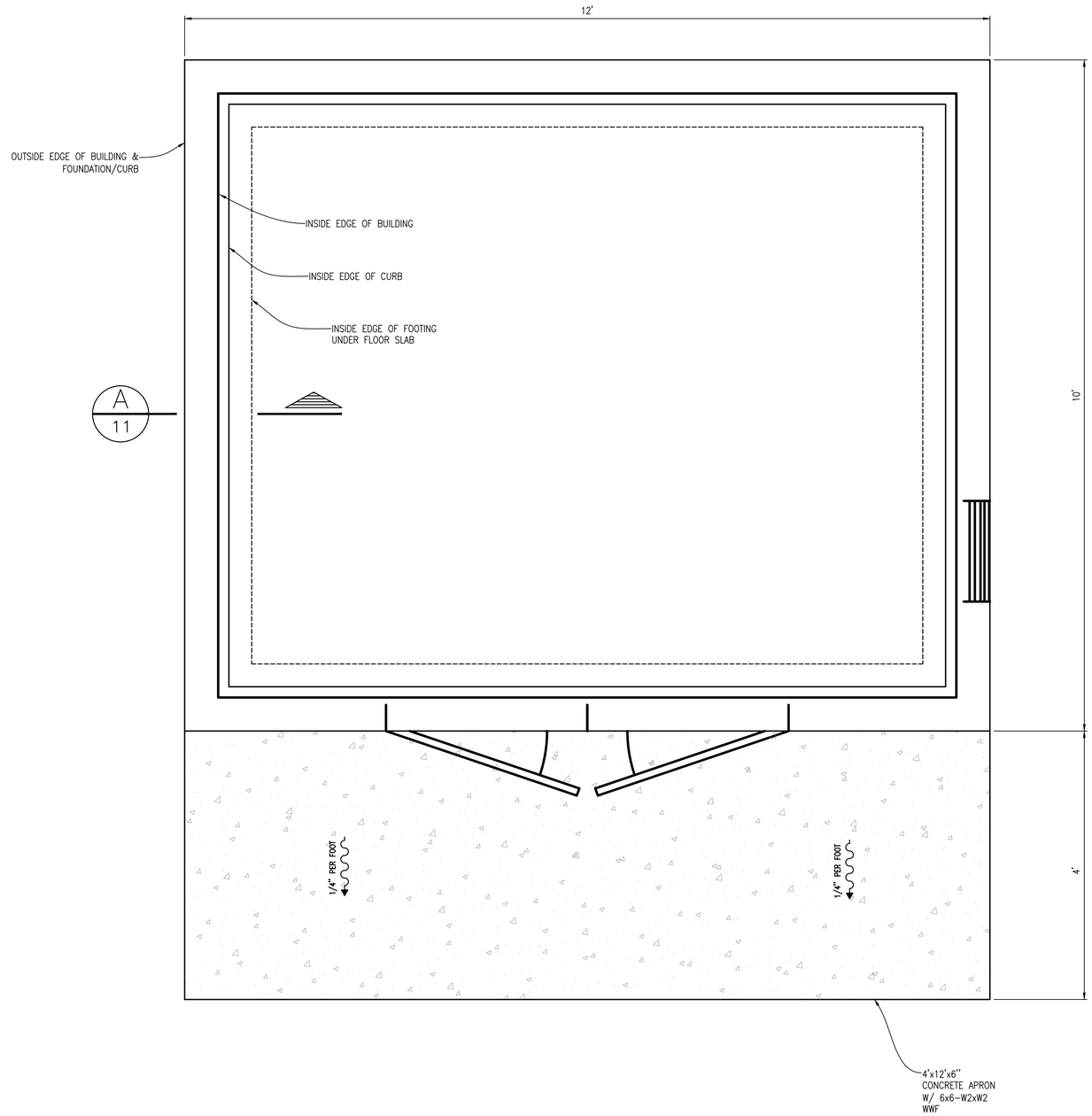


SECTION A

SCALE : 1" = 1'-0"

NOTES

1. ALL CONCRETE SHALL ATTAIN A 28 DAY COMPRESSIVE STRENGTH f'c OF 4000 psi (U.N.O.). ALL C.I.P. CONCRETE SHALL BE NORMAL WEIGHT.
2. REINFORCEMENT FOR CONCRETE SHALL CONFORM TO THE FOLLOWING: DEFORMED BARS SHALL BE ASTM GRADE 60.
3. COMPACT GRANULAR FILL MATERIAL UNDER SLAB AND FOUNDATION WALL.
4. FIELD VERIFY FLOOR ELEVATION WITH ENGINEER PRIOR TO ESTABLISHING FINAL GRADE.



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LEACHATE BUILDING FOUNDATION DETAILS
CELL C - PHASE I BIDDING
M-O-A SOLID WASTE MANAGEMENT AUTHORITY

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MICHIGAN

Project Number:
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Sheet:
11

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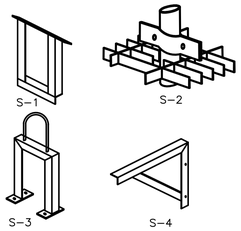
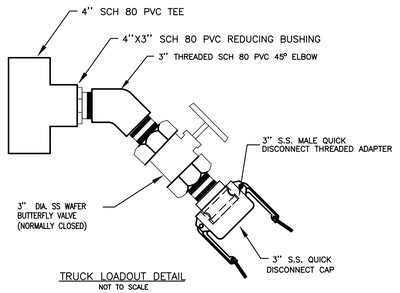
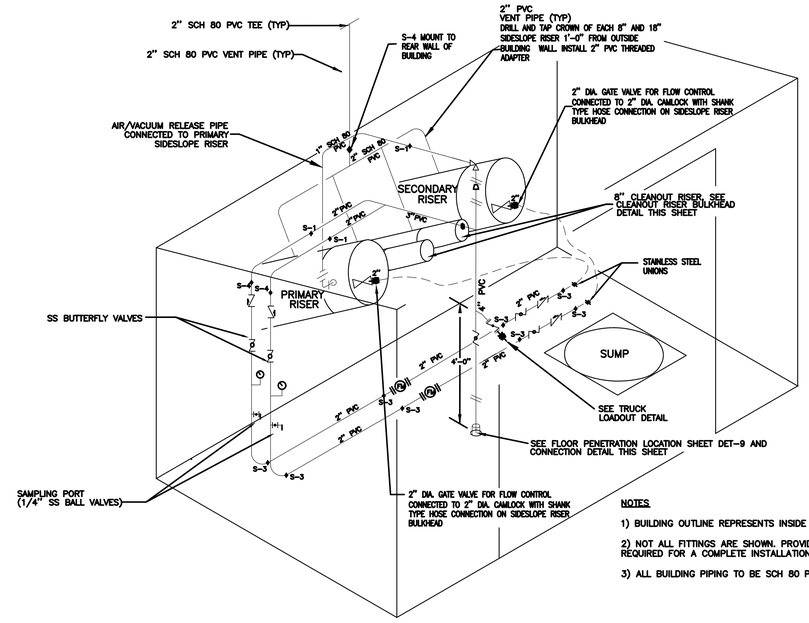


NOTE:
1) PIPE SUPPORTS SHALL BE CONSTRUCTED USING 2" X 1/8" S.S. ANGLE, AND 2" X 1/4" S.S. FLATSTOCK. SUPPORTS SHOWN ARE INTENDED TO ILLUSTRATE GENERAL DESIGN. MODIFY DESIGN AND LOCATIONS AS REQUIRED TO MEET SPECIFIC REQUIREMENTS AND CONFORM TO SPECIFICATIONS.

PIPE SUPPORT DETAILS
NOT TO SCALE



TRUCK LOADOUT DETAIL
NOT TO SCALE



NOTES

1) BUILDING OUTLINE REPRESENTS INSIDE SURFACES OF BUILDING.

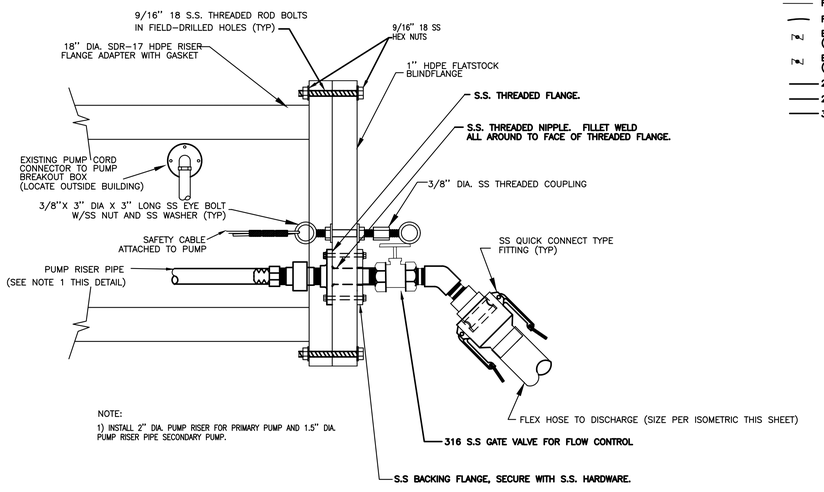
2) NOT ALL FITTINGS ARE SHOWN. PROVIDE ALL FITTINGS REQUIRED FOR A COMPLETE INSTALLATION.

3) ALL BUILDING PIPING TO BE SCH 80 PVC.

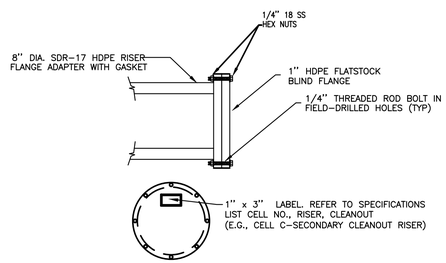
LEGEND:

- RIGID PIPE
- FLEXIBLE HOSE
- BUTTERFLY VALVE (NORMALLY OPEN)
- BUTTERFLY VALVE (NORMALLY CLOSED)
- 2" PRIMARY PIPING
- 2" SECONDARY PIPING
- 3"&4" COMBINED PIPE
- CAMLOCK (QUICK DISCONNECT FITTING)
- VACUUM /AIR RELEASE
- FLANGE
- CHECK VALVE
- FLOW METER
- WYE
- BUSHING
- S-1 PIPE SUPPORT
- BALL VALVE NORMALLY CLOSED
- GATE VALVE NORMALLY OPEN
- PRESSURE GAUGE
- SAMPLE PORT
- 1" AIR RELEASE/VACUUM PIPE
- 2" VENT PIPE

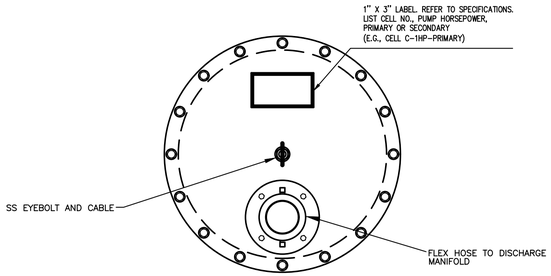
BUILDING PIPING ISOMETRIC
NOT TO SCALE



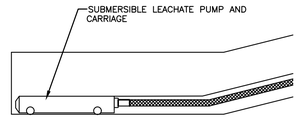
NOTE:
1) INSTALL 2" DIA. PUMP RISER FOR PRIMARY PUMP AND 1.5" DIA. PUMP RISER PIPE SECONDARY PUMP.



CLEANOUT RISER BULKHEAD DETAIL
NOT TO SCALE



SIDESLOPE RISER BULKHEAD DETAIL
NOT TO SCALE



SIDESLOPE RISER DETAIL
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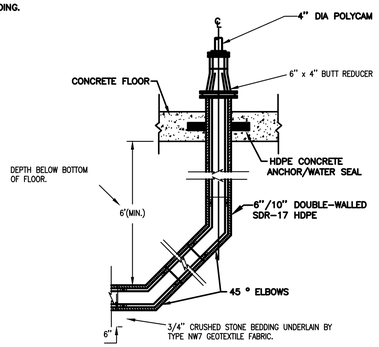

NOTE: 1) SEAL ANNULUS BETWEEN 10" DIA. OUTER HDPE PIPE AND 6" DIA. INNER HDPE PIPE USING 1" THICK FLAT STOCK WITH EXTRUSION WELDS

FLOOR PENETRATION CONNECTION DETAIL
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LEACHATE BUILDING PIPE DETAIL
CELL C - PHASE I BIDDING
M-O-A SOLID WASTE MANAGEMENT AUTHORITY

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12

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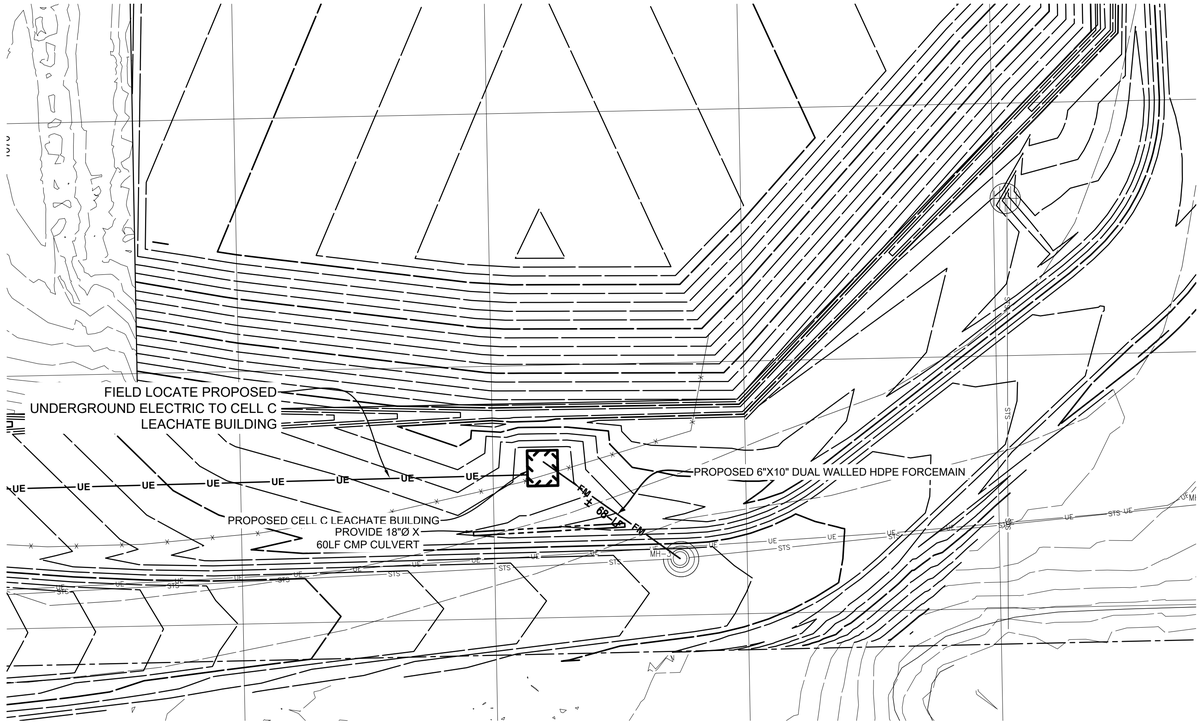


LEGEND

- EXISTING MAJOR CONTOUR (1400)
- EXISTING MINOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR CONTOUR (1400)
- PROPOSED LIMITS OF LINER CONSTRUCTION
- GAS MONITORING PROBE
- PASSIVE LFG VENT
- GROUNDWATER MONITORING WELL LOCATION
- WATER WELL LOCATION (WELL)

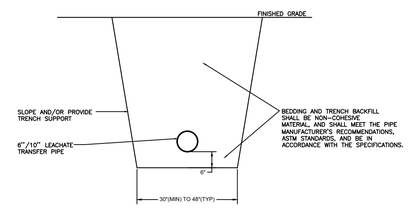
PROPOSED FINAL GRADING PLAN

1" = 30'

NORTH

SCALE 1" = 30'

0' 30' 60'

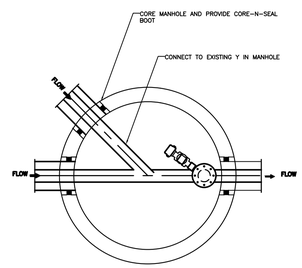


TYPICAL LEACHATE TRANSFER PIPE TRENCH DETAIL

NOT TO SCALE

NOTES:

1) MAXIMUM PARTICLE SIZE FOR BACKFILL MATERIAL USED FOR PIPE BEDDING AND AS TRENCH BACKFILL TO 12" OVER CROWN OF PIPE SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.



EXISTING MANHOLE 3 CONSTRUCTION DETAIL

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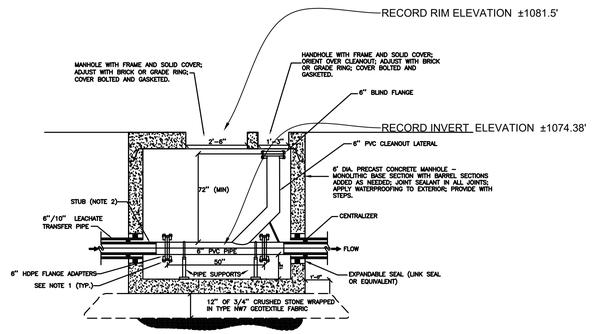

CLEANOUT MANHOLE (MH-1, MH-2, MH-3, MH-6 THRU MH-8, AND MH-10)

NOT TO SCALE

NOTES:

1) ALL FLANGE HARDWARE SHALL BE 304 STAINLESS STEEL. GASKETS SHALL BE EPDM, FULL FACED. APPLY LUBRICANT TO THREADS PRIOR TO ASSEMBLY. NUTS AND BOLTS SHALL BE MANUFACTURED STAINLESS STEEL, SIZED TO FIT AS APPROPRIATE. APPLY TORQUE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

2) VERIFY SIZES OF FITTINGS AND CHECK FIT IN MANHOLE PRIOR TO FINAL ASSEMBLY. DIMENSIONS OF CLEANOUT LATERAL ARE SPECIAL ORDER, ORDER WITH FLANGES. STUBS INTO MANHOLE WILL BE SHORT.

3) CONSTRUCT PIPE SUPPORTS USING 2"X2"X1/8" S.S. ANGLE, WELD JOINTS, SECURE PIPE USING S.S. U-BOLTS. SUPPORT SHALL RIGIDLY SECURE PIPE AND PREVENT VERTICAL OR LATERAL MOVEMENT. SECURE SUPPORTS TO CONCRETE WITH 3/8" DIA. S.S. ANCHORS, RAWL-STUD OR EQUAL.

4) ORIENT CLEANOUT LATERAL SO THAT WYE PROVIDES UPSTREAM ACCESS.

5) EXTEND CLEANOUT SO THAT BLIND FLANGE IS 6" TO 12" BELOW HANDHOLE COVER.

EXISTING MANHOLE 3 CONSTRUCTION DETAIL

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No.	Date	Revision	By

PROPOSED LEACHATE FORCE MAIN CELL C - PHASE I BIDDING

M-O-A SOLID WASTE MANAGEMENT AUTHORITY

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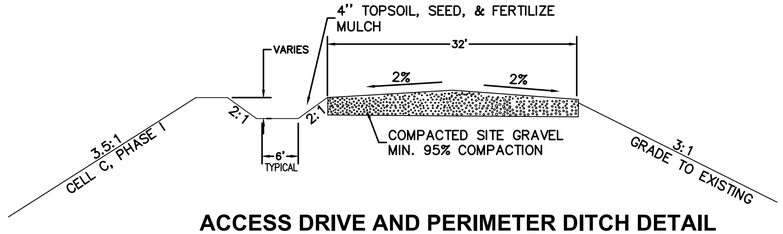
MICHIGAN UNIFIED KEYING SYSTEM

1	Stripping & Stockpiling Topsoil	TOPSOIL MAY BE STOCKPILED ABOVE BORROW AREAS TO ACT AS A DIVERSION. STOCKPILE SHOULD BE TEMPORARILY SEEDED.
3	Grubbing Omitted	TOPSOIL MAY BE STOCKPILED ABOVE BORROW AREAS TO ACT AS A DIVERSION. STOCKPILE SHOULD BE TEMPORARILY SEEDED.
5	Seeding	STABILIZATION METHOD UTILIZED ON SITES WHERE EARTH CHANGE HAS BEEN COMPLETED (FINAL GRADING ATTAINED).
6	Seeding w/ Mulch and/or Matting	FACILITATES ESTABLISHMENT OF VEGETATIVE COVER. EFFECTIVE FOR DRAINAGEWAYS WITH LOW VELOCITY. EASILY PLACED IN SMALL QUANTITIES BY INEXPERIENCED PERSONNEL. SHOULD INCLUDE PREPARED TOPSOIL BED.
14	Aggregate Cover	STABILIZE SOIL SURFACE THUS MINIMIZING EROSION. PERMITS CONSTRUCTION TRAFFIC IN ADVERSE WEATHER. MAY BE USED AS PART OF PERMANENT BASE CONSTRUCTION OF PAVED ARES.
24	Grassed Waterway	MUCH MORE STABLE FORM OF DRAINAGEWAY THAN BARE CHANNEL. GRASS TENDS TO SLOW RUNOFF AND FILTER OUT SEDIMENT. USED WHERE BARE CHANNEL WOULD BE ERODED.
49	Check Dams	REDUCES FLOW VELOCITY, CATCHES SEDIMENT. CAN BE CONSTRUCTED OF LOGS, STRAW, HAY, ROCK, LUMBER OR MASONRY, OR SAND BAGS.
54	Silt Fence	GEOTEXTILE FABRIC AND POSTS. FILTERS AND DETAINS RUNOFF.
D	DUST CONTROL	DUST CONTROL APPLICATIONS MAY INCLUDE WATERING, CHEMICAL SUPPRESSION, TEMPORARY AGGREGATE AND HAUL TRUCK COVERS.

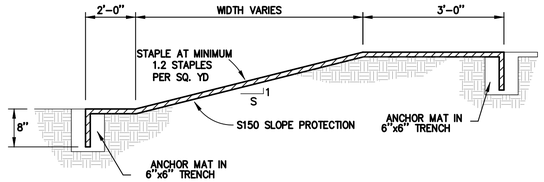
○ DENOTES TEMPORARY MEASURE. □ DENOTES PERMANENT MEASURE.



ACCESS DRIVE AND PERIMETER DITCH DETAIL

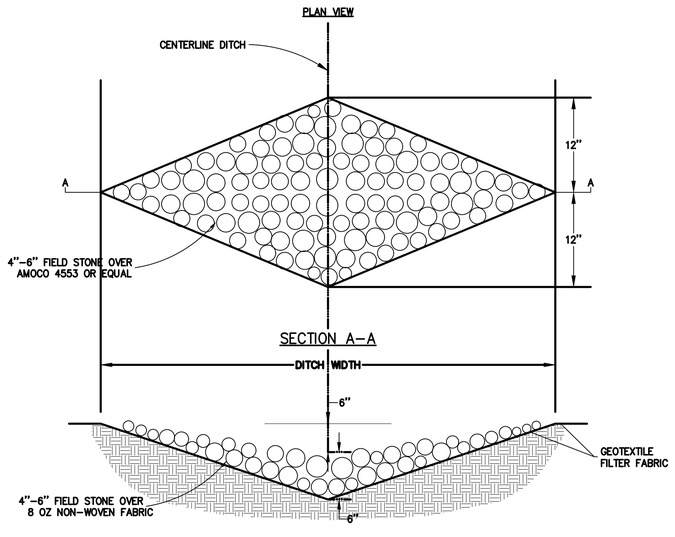
NOT TO SCALE

SLOPE PROTECTION SHALL BE APPLIED TO ALL SLOPES 2:1 OR STEEPER OR AS DETAILED ON THE DRAWINGS. SLOPE PROTECTION SHALL BE S150 AS MANUFACTURED BY NORTH AMERICAN GREEN OR AN APPROVED EQUAL.



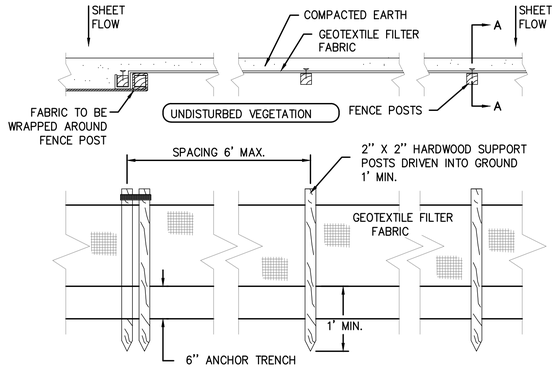
MULCH BLANKET DETAIL

NOT TO SCALE



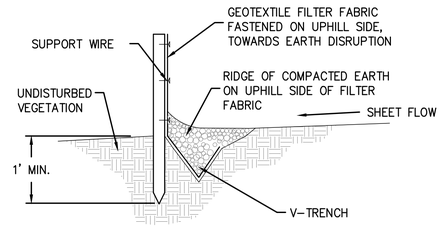
STONE CHECK DAM

NO SCALE



SILT FENCE DETAIL

NOT TO SCALE



SECTION A-A

NOT FOR CONSTRUCTION

GoslingCzubak
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info@goslingczubak.com
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ENVIRONMENTAL & DRILLING
CONSTRUCTION MATERIALS TESTING

No.	Date	Revision	By

STORM WATER AND SOIL EROSION DETAILS
CELL C - PHASE I BIDDING
M-O-A SOLID WASTE MANAGEMENT AUTHORITY

Date Issued:	12/15/2025
Date Surveyed:	----
Designed By:	----
Drawn By:	----
Checked By:	AES
Scale:	----

Original sheet size is 22x34

Location:
PART OF SECTION 5&6
T29N, R03E
LOUD TOWNSHIP
MONTMORENCY COUNTY
MICHIGAN

Project Number:
250008

Sheet:
14

P:\250008\CAD\Date\DETAILS_C-Phase I details.dwg, Tab: 14 Storm Water and Soil Erosion Details, Saved by aesgerrish 12/11/2025 10:57 AM, Plotted by Adam Gerrish 12/11/2025 10:57 AM