

Contract Documents and Technical Specifications

Contract 1, Phase 2 Water and Sewer
Improvements

Elk Rapids, MI

Owner:

Village of Elk Rapids

315 Bridge Street

Elk Rapids, MI 49629

Engineer:

Gosling Czubak Engineering Sciences, Inc.

1280 Business Park Drive

Traverse City, Michigan

(231) 946-9191

www.goslingczubak.com

April 1, 2026

GCES Project # 240424



CIVIL ENGINEERING

SURVEYING

ENVIRONMENTAL SERVICES

CONSTRUCTION SERVICES

GEOTECHNICAL

DRILLING

LANDSCAPE ARCHITECTURE

WWW.GOSLINGCZUBAK.COM

TABLE OF CONTENTS

	<u>NO. OF PAGES</u>
ADVERTISEMENT FOR BIDS	2
INSTRUCTIONS TO BIDDERS.....	11
*BID.....	4
BID SCHEDULE	4
*BID BOND	2
*NON-COLLUSIVE AFFIDAVIT	1
NOTICE OF AWARD	1
CONTRACT	7
NOTICE TO PROCEED	1
PERFORMANCE BOND	3
PAYMENT BOND	3
APPLICATION FOR PAYMENT.....	6
CERTIFICATE OF SUBSTANTIAL COMPLETION	1
GENERAL CONDITIONS.....	75
SUPPLEMENTARY CONDITIONS	19
WORK CHANGE DIRECTIVE.....	1
CHANGE ORDER.....	1
FIELD ORDER.....	1
TECHNICAL SPECIFICATIONS	

*Must be submitted with BID

ADVERTISEMENT FOR BIDS

Village of Elk Rapids
Elk Rapids, MI
Contract 1, Phase 2 Water and Sewer Improvements

General Notice

Village of Elk Rapids (Owner) is requesting Bids for the construction of the following Project:

Contract 1, Phase 2 Water and Sewer Improvements
260124

Bids for the construction of the Project will be received at the office of the Village of Elk Rapids located at 315 Bridge Street, Elk Rapids, MI 49629, until April 29, 2026 at 10 am local time. At that time the Bids received will be publicly opened and read.

The Project includes the following Work:

A. Sanitary Sewer System Improvements

1. **1,975 feet of 6" sanitary sewer forcemain in Lake and Ames Streets between Iroquois and Golf View Lane.**
2. **1,104 feet of 8" sanitary sewer in Lake Street between Brand and Bass Streets; remove and replace.**
3. **1,293 feet of 8" sanitary sewer in Loomis Street between US-31 and Pump Station 6; remove and replace and new.**
4. **708 feet of 8" sanitary sewer in Loomis Street between US-31 and Pump Station 6; abandon sewer demo structures.**
5. **692 feet of 10" sanitary sewer in Traverse Street alley between Spruce Street and Pine Street; remove and replace.**
6. **1,205 feet of 12" sanitary sewer in 1st Street between US-31 and Pine Street; clean and line.**
7. **766 feet of 10" sanitary sewer in Lake Street between Loomis Street and Pump Station 6; clean and line.**
8. **253 feet of 10" sanitary sewer truss pipe in Iron Treatment Plant Property between Lake Street and Pump Station 6; clean and line.**

B. Water System Improvements

1. **1,118 feet of 8" PVC C900 water main in Loomis Street between US-31 and Lake Street.**
2. **3,298 feet of 8" PVC C900 water main in Lake Street between Loomis Street and Ames Street.**
3. **306 feet of 8" PVC C900 water main in Henry Street between Ames Street and Buckley Street.**
4. **140 feet of 14" HDPE water main in US-31 crossing from east to west at Elk Lake Road.**

C. Select Street Improvements

1. **Resurface a total of 4,410 SYD of Village Streets in the following locations:**
 - a. **Center Road from Ames Street to Second Street.**
 - b. **Elm Street from River Street to Traverse Street.**
 - c. **North Bay Shore Drive from Dexter Street to approximately 450 feet north of Dexter.**

D. Fiber Conduit

- a. **Installation of 7,125 feet of 1.25" SDR 11 HDPE Conduit in the following locations.**
 - i. **Lake Street from Loomis to Ames**

- ii. **Loomis Street from Lake to east of US-31**
- iii. **Ames from Lake to Golf View Lane**
- iv. **Henry Street from Ames to Buckley**

Bids are requested for the following Contract: Contract 1, Phase 2 Water and Sewer Improvements

Obtaining the Bidding Documents

The Issuing Office for the Bidding Documents is:

Gosling Czubak Engineering Sciences, Inc.
1280 Business Park Drive, Traverse City, Michigan 49686
(231) 946-9191

Prospective Bidders may view the bidding documents by downloading from the issuing website.
<https://www.goslingczubak.com/project-bidding/>.

Printed copies of the Bidding Documents will not be issued from the bidding office.

Bidding Documents are free for download from the issuing office or the website for the Builders Exchange of Northwest Michigan.

Register for bid with Tim Korson by email at tnkorson@goslingczubak.com. Failure to do so may result in not receiving notification of Addendum postings.

Pre-bid Conference

A mandatory pre-bid conference for the Project will be held on April 15, 2026 at 10 am at Village of Elk Rapids Offices, 315 Bridge St, Elk Rapids, Michigan 49629. 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: Village of Elk Rapids
By: David Tait
Title: Village Manager
Date: April 1, 2026

+ + END OF ADVERTISEMENT FOR BIDS + +

INSTRUCTIONS TO BIDDERS FOR CONSTRUCTION CONTRACT

TABLE OF CONTENTS

	Page
Article 1— Defined Terms.....	1
Article 2— Bidding Documents.....	1
Article 3— Qualifications of Bidders.....	2
Article 4— Pre-Bid Conference.....	2
Article 5— Site and Other Areas; Existing Site Conditions; Examination of Site; Owner’s Safety Program; Other Work at the Site.....	3
Article 6— Bidder’s Representations and Certifications.....	4
Article 7— Interpretations and Addenda.....	4
Article 8— Bid Security.....	5
Article 9— Contract Times.....	5
Article 10— Substitute and “Or Equal” Items.....	5
Article 11— Subcontractors, Suppliers, and Others.....	6
Article 12— Preparation of Bid.....	7
Article 13— Basis of Bid.....	8
Article 14— Submittal of Bid.....	8
Article 15— Modification and Withdrawal of Bid.....	9
Article 16— Opening of Bids.....	9
Article 17— Bids to Remain Subject to Acceptance.....	9
Article 18— Evaluation of Bids and Award of Contract.....	9
Article 19— Bonds and Insurance.....	10
Article 20— Signing of Agreement.....	10
Article 21— Sales and Use Taxes.....	11
Article 22— Contracts to Be Assigned.....	11
Article 23— Wage Rate Requirements.....	11

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 Bidder's are to register with Tim Korson by email at tnkorson@goslingczubak.com 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.
- 2.04 *Electronic Documents*
- A. When the Bidding Requirements indicate that electronic (digital) copies of the Bidding Documents are available, such documents will be made available to the Bidders as Electronic Documents in the manner specified.
1. Bidding Documents will be provided in Adobe PDF (Portable Document Format) (.pdf) that is readable by Adobe Acrobat Reader Version. 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.

ARTICLE 3—QUALIFICATIONS OF BIDDERS

- 3.01 To demonstrate Bidder's qualifications to perform the Work, after submitting its Bid and within seven days of Owner's request, Bidder must submit the following information:
- A. AGC's "Construction Contractor's Qualification Statement for Engineered Construction," AGC Document No. 220 or "Contractor's Statement of Qualifications for a Specific Project," AGC Document No. 221.
 - B. Written evidence establishing its qualifications such as financial data, previous experience, and present commitments.
 - C. 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.
 - D. Bidder's state or other contractor license number, if applicable.
 - E. Subcontractor and Supplier qualification information.
 - F. 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.
- 3.04 Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.

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*

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 *Site Visit and Testing by Bidders*

- A. Bidders are encouraged 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. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.
- C. 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.
- D. 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.

5.04 *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.

5.05 *Other Work at the Site*

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

ARTICLE 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. Contact Name: Tim Korson
Email: tnkorson@goslingczubak.com
Direct Phone: (231) 933-5113

- 7.03 Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all registered plan holders. Questions received less than seven days prior to the date for opening of Bids may not be answered.
- 7.04 Only responses set forth in an Addendum will be binding. Oral and other interpretations or clarifications will be without legal effect. Responses to questions are not part of the Contract Documents unless set forth in an Addendum that expressly modifies or supplements the Contract Documents.

ARTICLE 8—BID SECURITY

- 8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of five percent of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form of a Bid bond issued by a surety meeting the requirements of Paragraph 6.01 of the General Conditions. Such Bid bond will be issued in the form included in the Bidding Documents.
- 8.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract, furnished the required Contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract and furnish the required Contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited, in whole in the case of a penal sum bid bond, and to the extent of Owner's damages in the case of a damages-form bond. Such forfeiture will be Owner's exclusive remedy if Bidder defaults.
- 8.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective Date of the Contract or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.
- 8.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within 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.
- 9.02 Provisions for liquidated damages, if any, for failure to timely attain a Milestone, Substantial Completion, or completion of the Work in readiness for final payment, are set forth in the Agreement.

ARTICLE 10—SUBSTITUTE AND "OR EQUAL" ITEMS

- 10.01 The Contract for the Work, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, and those "or-equal" or substitute or materials and equipment subsequently approved by Engineer prior to the submittal of Bids and identified by Addendum. No item of material or equipment will be considered by Engineer as an "or-equal" or substitute unless written request for approval has been submitted by Bidder and has been

received by Engineer at least 15 days prior to the date for receipt of Bids in the case of a proposed substitute and 5 days in the case of a proposed "or-equal." Each such request must comply with the requirements of Paragraphs 7.05 and 7.06 of the General Conditions, and the review of the request will be governed by the principles in those paragraphs. The burden of proof of the merit of the proposed item is upon Bidder. Engineer's decision of approval or disapproval of a proposed item will be final. If Engineer approves any such proposed item, such approval will be set forth in an Addendum issued to all registered Bidders. Bidders cannot rely upon approvals made in any other manner. Substitutes and "or-equal" materials and equipment may be proposed by Contractor in accordance with Paragraphs 7.04 and 7.05 of the General Conditions 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.
- 10.03 If an award is made, Contractor shall be allowed to submit proposed substitutes and "or-equals" in accordance with the General Conditions.

ARTICLE 11—SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- 11.01 If required by the bidding documents, The apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening, submit to Owner a list of the Subcontractors or Suppliers proposed for the following portions of the Work:

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

- 11.02 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.

- 11.03 Contractor shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom Contractor has reasonable objection.
- 11.04 The Contractor shall not award work to Subcontractor(s) in excess of the limits stated in SC 7.06.

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 seal shall be affixed and attested by the corporate secretary or an assistant corporate secretary. 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.
- 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 *Unit Price*

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

13.02 *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 the location designated in the Advertisement.

- 14.03 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

ARTICLE 15—MODIFICATION AND WITHDRAWAL OF BID

- 15.01 An unopened Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.
- 15.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 15.01 and submit a new Bid prior to the date and time for the opening of Bids.
- 15.03 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, the Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, the Bidder will be disqualified from further bidding on the Work.

ARTICLE 16—OPENING OF BIDS

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

ARTICLE 17—BIDS TO REMAIN SUBJECT TO ACCEPTANCE

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

ARTICLE 18—EVALUATION OF BIDS AND AWARD OF CONTRACT

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

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

- 18.04 If Owner awards the contract for the Work, such award will be to the responsible Bidder submitting the lowest responsive Bid.
- 18.05 *Evaluation of Bids*
- A. In evaluating Bids, Owner will consider whether the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.
 - B. For the determination of the apparent low Bidder when unit price bids are submitted, Bids will be compared on the basis of the total of the products of the estimated quantity of each item and unit price Bid for that item, together with any lump sum items.
- 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.

ARTICLE 22—CONTRACTS TO BE ASSIGNED

ARTICLE 23—WAGE RATE REQUIREMENTS

23.01 If the contract price is in excess of \$100,000, provisions of the Contract Work Hours and Safety Standards Act at 29 CFR 5.5(b) apply.

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:

*Village of Elk Rapids
315 Bridge Street
Elk Rapids, MI 49629*

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. Affidavit for Non-Collusion; and
- G. Bid Schedule and Material and Equipment Selection Lists.

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

3.01 *Unit Price Bids*

- A. Bidder will perform the following Work at the unit prices indicated in the bid schedule following this section.
- B. Bidder acknowledges that:
 1. each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor's overhead and profit for each separately identified item, and
 2. estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Work will be based on actual quantities, determined as provided in the Contract Documents.

3.02 *Total Bid Price (Lump Sum and Unit Prices)*

Total Bid Price (Total of all Lump Sum and Unit Price Bids)	\$
---	----

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 agrees that the Work will be substantially complete on or before October 29, 2027, and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before November 12, 2027.
- 4.03 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 90 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.
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.
- c. Collusive practice means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels.
- d. Coercive practice means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

BIDDER hereby submits this Bid as set forth above:

Bidder:

(typed or printed name of organization)

By:

(individual's signature)

Name:

(typed or printed)

Title:

(typed or printed)

Date:

(typed or printed)

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

Attest:

(individual's signature)

Name:

(typed or printed)

Title:

(typed or printed)

Date:

(typed or printed)

Address for giving notices:

Bidder's Contact:

Name:

(typed or printed)

Title:

(typed or printed)

Phone:

Email:

Address:

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

I. BASE BID - ELK RAPIDS CONTRACT 1 PHASE 2 WATER AND SEWER IMPROVEMENTS

Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Estimate	Amount
1	Mobilization	1	LS	\$	-	\$ -
2	Audio Visual Route Survey	1	LS	\$	-	\$ -
3	Traffic Control	1	LS	\$	-	\$ -
4	Soil Erosion and Sediment Control	1	LS	\$	-	\$ -
5	Dewatering	1	LS	\$	-	\$ -
6	Asphalt Removal	16,759	SYD	\$	-	\$ -
7	Concrete, Removal	2,522	SFT	\$	-	\$ -
8	Curb & Gutter Removal	1,476	LF	\$	-	\$ -
9	Tree Removal	3	EA	\$	-	\$ -
10	Exploratory Digging Lake Street	1	LS	\$	-	\$ -
11	Temporary Water Service	1	LS	\$	-	\$ -
12	Watermain, Removal, AC, 8 inch	2,000	LF	\$	-	\$ -
13	Water Main, PVC, 6 inch	195	LF	\$	-	\$ -
14	Water Main, PVC, 8 inch	4,728	LF	\$	-	\$ -
15	Water Main, HDPE, 12 inch, HDD	140	LF	\$	-	\$ -
16	Gate Valve, 6 inch	2	EA	\$	-	\$ -
17	Gate Valve, 8 inch	9	EA	\$	-	\$ -
18	Tapping Sleeve and Valve, 8 inch	2	EA	\$	-	\$ -
19	Tapping Sleeve and Valve, 12 inch	1	EA	\$	-	\$ -
20	Copper Service, 1 inch	1,604	LF	\$	-	\$ -
21	Copper Service, 1.5 inch	56	LF	\$	-	\$ -
22	Corp Stop, 1 inch	50	EA	\$	-	\$ -
23	Corp Stop, 1.5 inch	1	EA	\$	-	\$ -
24	Curb Stop, 1 inch	50	EA	\$	-	\$ -
25	Curb Stop, 1.5 inch	1	EA	\$	-	\$ -
26	Hydrant Assembly, 6 inch	10	EA	\$	-	\$ -
27	Hydrant Assembly, Salvage	10	EA	\$	-	\$ -
28	Salvage Gate Valve	6	EA	\$	-	\$ -
29	Water Main connect, cut and cap, and abandon	12	EA	\$	-	\$ -
30	Sanitary Structure, 48 inch dia	19	EA	\$	-	\$ -
31	Sanitary, PVC, 8 inch	1,889	LF	\$	-	\$ -
32	Sanitary, PVC, 10 inch	1,134	LF	\$	-	\$ -
33	Sanitary, TRUSS, 10 inch	252	LF	\$	-	\$ -
34	Sewer Service, PVC, 6 inch	24	EA	\$	-	\$ -
35	Sanitary Sewer Removal	2,065	LF	\$	-	\$ -
36	Sanitary Sewer Structure Removal	11	EA	\$	-	\$ -

I. BASE BID - ELK RAPIDS CONTRACT 1 PHASE 2 WATER AND SEWER IMPROVEMENTS

Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Estimate	Amount
37	Sanitary Sewer Structure Abandonment	8	EA	\$ -	\$ -	-
38	Sanitary Sewer Abandonment, Flowable Fill	708	LF	\$ -	\$ -	-
39	Sanitary Sewer Connect to Existing System	4	EA	\$ -	\$ -	-
40	Sanitary Sewer Bypass Pumping	1	LS	\$ -	\$ -	-
41	Rehab Structure, 48 inch dia	12	EA	\$ -	\$ -	-
42	Sanitary Sewer, CIP, 6 INCH	10	LF	\$ -	\$ -	-
43	Sanitary Sewer, CIP, 8 INCH	80	LF	\$ -	\$ -	-
44	Sanitary Sewer, CIP, 10 INCH	650	LF	\$ -	\$ -	-
45	Sanitary Sewer, CIP, 12 INCH	869	LF	\$ -	\$ -	-
46	Sanitary Sewer, CIP, 18 INCH	364	LF	\$ -	\$ -	-
47	Sanitary Sewer Force Main, HDPE, 6 INCH	1,975	LF	\$ -	\$ -	-
48	Sanitary Sewer Force Main, Air Release	2	EA	\$ -	\$ -	-
49	Sanitary Sewer Forcemain, Connect to Ex. Manhole	5	EA	\$ -	\$ -	-
50	Abandon Existing Force Main Cut and Cap/Plug	2	EA	\$ -	\$ -	-
51	Storm Structure, 24 inch dia, Removal	8	EA	\$ -	\$ -	-
52	Storm Structure, 48 inch dia, Removal	-	EA	\$ -	\$ -	-
53	Storm, HDPE, 12 inch, Removal	272	LF	\$ -	\$ -	-
54	Storm, PVC, 6 inch, Removal	27	LF	\$ -	\$ -	-
55	Storm, RCP, 8 inch, Removal	113	LF	\$ -	\$ -	-
56	Storm, RCP, 12 inch, Removal	350	LF	\$ -	\$ -	-
57	Storm, RCP, 15 inch, Removal	66	LF	\$ -	\$ -	-
58	Storm Structure, 24 inch dia	10	EA	\$ -	\$ -	-
59	Storm Structure, 48 inch dia	3	EA	\$ -	\$ -	-
60	Storm, HDPE, 12 inch	512	LF	\$ -	\$ -	-
61	Storm, PVC, 6 inch	27	LF	\$ -	\$ -	-
62	Storm, RCP, 8 inch	113	LF	\$ -	\$ -	-
63	Storm, RCP, 12 inch	752	LF	\$ -	\$ -	-
64	Storm, RCP, 15 inch	66	LF	\$ -	\$ -	-
65	Storm Connect to Existing	3	EA	\$ -	\$ -	-
66	Grading	1	LS	\$ -	\$ -	-

I. BASE BID - ELK RAPIDS CONTRACT 1 PHASE 2 WATER AND SEWER IMPROVEMENTS						
Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Estimate	Amount
67	Aggregate Base, 22A	2,465	TON	\$	-	\$ -
68	HMA, 4EL	2,765	TON	\$	-	\$ -
69	Driveway, CI II, 3 inch	115	TON	\$	-	\$ -
70	Shoulder, CL II, 3 inch	167	TON	\$	-	\$ -
71	Sidewalk, Conc, 4 inch	80	SFT	\$	-	\$ -
72	Driveway, Conc, 6 inch	2,442	SFT	\$	-	\$ -
73	Curb and/or Gutter Installation	2,068	LF	\$	-	\$ -
74	Pavement Marking	1	LS	\$	-	\$ -
75	Restoration	1	LS	\$	-	\$ -
					Total Cost	\$ -

II. ALTERNATE A - RESURFACE SELECT LOCATIONS						
1. Center Road from Ames Street to Second Street						
2. Elm Street from River Street to Traverse Street						
3. North Bay Shore Drive from Dexter Street to approximately 450 feet north of Dexter						
Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Estimate	Amount
1	Milling & Bond Coat	4,410	SYD	\$	-	\$ -
2	HMA	364	Ton	\$	-	\$ -
					Total Cost	\$ -

III. ALTERNATE B - FIBER CONDUIT AND STRUCTURES						
Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Estimate	Amount
A	1.25" SDR 11 HDPE Conduit	7,125	LF	\$	-	\$ -
B	24" X 36" X 24" Handhole	13	EA	\$	-	\$ -
C	17" X 30" X 24" Handhole	25	EA	\$	-	\$ -
D	10" X 10" Flower Pot	24	EA	\$	-	\$ -
E	8' Ground Rod	38	EA	\$	-	\$ -
					Total Cost	\$ -

BID BOND (PENAL SUM FORM)

Bidder Name: [Full formal name of Bidder] Address (<i>principal place of business</i>): [Address of Bidder's principal place of business]	Surety Name: [Full formal name of Surety] Address (<i>principal place of business</i>): [Address of Surety's principal place of business]
Owner Name: Village of Elk Rapids Address (<i>principal place of business</i>): Village of Elk Rapids Offices 315 Bridge Street Elk Rapids, MI 49629	Bid Project (<i>name and location</i>): Bid Due Date:
Bond Penal Sum: [Amount] Date of Bond: [Date]	
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 _____ (<i>Full formal name of Bidder</i>)	Surety _____ (<i>Full formal name of Surety</i>) (<i>corporate seal</i>)
By: _____ (<i>Signature</i>)	By: _____ (<i>Signature</i>) (<i>Attach Power of Attorney</i>)
Name: _____ (<i>Printed or typed</i>)	Name: _____ (<i>Printed or typed</i>)
Title: _____	Title: _____
Attest: _____ (<i>Signature</i>)	Attest: _____ (<i>Signature</i>)
Name: _____ (<i>Printed or typed</i>)	Name: _____ (<i>Printed or typed</i>)
Title: _____	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.	

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.

NON-COLLUSIVE AFFIDAVIT

The Undersigned, _____
being _____ and duly authorized so to act,
being duly sworn, deposes and says that _____
is the contractor submitting this bid, and that its agents, officers, or employees have not
directly or indirectly entered into any agreements, participated in any collusion, or
otherwise taken any action in restraint of free competitive bidding in connection with this
proposal for the above project.

Name

Title

Taken, subscribed and sworn before me this _____ day of _____

(Notary's Signature)

Notary Public in and for

County

My Commission Expires:

NOTICE OF AWARD

Date of Issuance:

Owner: Village of Elk Rapids

Owner's Project No.:

Engineer: Gosling Czubak Engineering Sciences, Inc.

Engineer's Project No.:

Project:

Contract Name:

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:

Text.

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.

Three 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 an electronic copy of 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): Bonds are not to be dated until after the contract is signed and dated by the Owner.

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: Village of Elk Rapids

By (signature): _____

Name (printed): David Tait

Title: Village Manager

Copy: Engineer

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

This Agreement is by and between Village of Elk Rapids ("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:

A. Sanitary Sewer System Improvements

1. **1,975 feet of 6" sanitary sewer forcemain in Lake and Ames Streets between Iroquois and Golf View Lane.**
2. **1,104 feet of 8" sanitary sewer in Lake Street between Brand and Bass Streets; remove and replace.**
3. **1,293 feet of 8" sanitary sewer in Loomis Street between US-31 and Pump Station 6; remove and replace and new.**
4. **708 feet of 8" sanitary sewer in Loomis Street between US-31 and Pump Station 6; abandon sewer demo structures.**
5. **692 feet of 10" sanitary sewer in Traverse Street alley between Spruce Street and Pine Street; remove and replace.**
6. **1,205 feet of 12" sanitary sewer in 1st Street between US-31 and Pine Street; clean and line.**
7. **766 feet of 10" sanitary sewer in Lake Street between Loomis Street and Pump Station 6; clean and line.**
8. **253 feet of 10" sanitary sewer truss pipe in Iron Treatment Plant Property between Lake Street and Pump Station 6; clean and line.**

B. Water System Improvements

1. **1,118 feet of 8" PVC C900 water main in Loomis Street between US-31 and Lake Street.**
2. **3,298 feet of 8" PVC C900 water main in Lake Street between Loomis Street and Ames Street.**
3. **306 feet of 8" PVC C900 water main in Henry Street between Ames Street and Buckley Street.**
4. **140 feet of 14" HDPE water main in US-31 crossing from east to west at Elk Lake Road.**

C. Select Street Improvements

1. **Resurface a total of 4,410 SYD of Village Streets in the following locations:**
 - a. **Center Road from Ames Street to Second Street.**
 - b. **Elm Street from River Street to Traverse Street.**
 - c. **North Bay Shore Drive from Dexter Street to approximately 450 feet north of Dexter.**

D. Fiber Conduit

- a. **Installation of 7,125 feet of 1.25" SDR 11 HDPE Conduit in the following locations.**
 - i. **Lake Street from Loomis to Ames**

- ii. **Loomis Street from Lake to east of US-31**
- iii. **Ames from Lake to Golf View Lane**
- iv. **Henry Street from Ames to Buckley**

ARTICLE 2—THE PROJECT

2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows: Contract 1, Phase 2 Water and Sewer Improvements

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 Gosling Czubak Engineering Sciences, Inc.

ARTICLE 4—CONTRACT TIMES

4.01 *Time is of the Essence*

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

4.02 *Contract Times: Dates*

A. The Work will be substantially complete on or before October 29, 2027, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before November 12, 2027.

4.04 Milestones

A. Parts of the Work must be substantially completed on or before the following Milestone(s):

1. Milestone 1 – October 30, 2026

- a. Lake Street from Loomis to Ames Water and Sewer Improvements, Conduit Installation, Paving, Shoulder
- b. Resurfacing
 - 1) Center Road from Ames Street to Second Street
 - 2) Elm Street from River Street to Traverse Street
 - 3) North Bay Shore Drive from Dexter Street to approximately 450 feet north of Dexter

4.05 *Liquidated Damages*

A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved within the Contract Times, as duly modified. The parties also

recognize the delays, expense, and difficulties involved in proving, in a legal or arbitration proceeding, the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):

1. *Substantial Completion*: Contractor shall pay Owner \$250 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 \$250 for each day that expires after such time until the Work is completed and ready for final payment.
 4. Liquidated damages for failing to timely attain Milestones, Substantial Completion, and final completion are not additive, and will not be imposed concurrently.
- B. If Owner recovers liquidated damages for a delay in completion by Contractor, then such liquidated damages are Owner's sole and exclusive remedy for such delay, and Owner is precluded from recovering any other damages, whether actual, direct, excess, or consequential, for such delay, except for special damages (if any) specified in this Agreement.

4.06 *Special Damages*

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

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.

B. 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 25th day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.

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

a. 90% percent of the value of the Work completed (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 legal rate.

ARTICLE 7—CONTRACT DOCUMENTS

7.01 *Contents*

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

EJCDC® C-520, Agreement between Owner and Contractor for Construction Contract (Stipulated Price).
Copyright © 2018 National Society of Professional Engineers, American Council of Engineering Companies,
and American Society of Civil Engineers. All rights reserved.

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 (not attached but incorporated by reference) consisting of ??? sheets with each sheet bearing the following general title: Project
 7. Drawings listed on the attached sheet index.
 8. Addenda (numbers ? to ?, inclusive).
 9. Exhibits to this Agreement (enumerated as follows):
 - a. Contractor's Bid (pages 1 to 1, inclusive).
 10. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
 - a. Notice to Proceed.
 - b. Work Change Directives.
 - c. Change Orders.
 - d. Field Orders.
- B. The Contract Documents listed in Paragraph 7.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 7.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in the Contract.

ARTICLE 8—REPRESENTATIONS, CERTIFICATIONS, AND STIPULATIONS

8.01 *Contractor's Representations*

- A. In order to induce Owner to enter into this Contract, Contractor makes the following representations:
1. Contractor has examined and carefully studied the Contract Documents, including Addenda.
 2. Contractor has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 3. Contractor is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.

4. Contractor has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
5. Contractor has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.
6. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (c) Contractor's safety precautions and programs.
7. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
8. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
9. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
10. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
11. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

8.02 *Contractor's Certifications*

- A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 8.02:
 1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution;
 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner,

(b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

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

8.03 *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.

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: Village of Elk Rapids

Contractor:

(typed or printed name of organization)

(typed or printed name of organization)

By: _____
(individual's signature)

By: _____
(individual's signature)

Date: _____
(date signed)

Date: _____
(date signed)

Name: _____
(typed or printed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Title: _____
(typed or printed)

(If [Type of Entity] is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest: _____
(individual's signature)

Attest: _____
(individual's signature)

Title: _____
(typed or printed)

Title: _____
(typed or printed)

Address for giving notices:

Address for giving notices:

Designated Representative:

Designated Representative:

Name: _____
(typed or printed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

Address:

Phone: _____

Phone: _____

Email: _____

Email: _____

(If [Type of Entity] is a corporation, attach evidence of authority to sign. If [Type of Entity] 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: _____

NOTICE TO PROCEED

Owner: Village of Elk Rapids Owner's Project No.: _____

Engineer: Gosling Czubak Engineering Sciences, Inc. Engineer's Project No.: _____

Contractor: _____ Contractor's Project No.: _____

Project: _____

Contract Name: _____

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 Date, and the date by which readiness for final payment must be achieved is Date.

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

1. Submit and have approved a video survey of existing conditions
2. Submit and have approved shop drawings
3. Complete Pre-Construction Meeting

Owner: Village of Elk Rapids

By (*signature*): _____

Name (*printed*): David Tait

Title: Village Manager

Date Issued: _____

Copy: Engineer

PERFORMANCE BOND

Contractor Name: [Full formal name of Contractor] Address <i>(principal place of business)</i> : [Address of Contractor's principal place of business]	Surety Name: [Full formal name of Surety] Address <i>(principal place of business)</i> : [Address of Surety's principal place of business]
Owner Name: Village of Elk Rapids Address <i>(principal place of business)</i> : Village of Elk Rapids Offices 315 Bridge Street Elk Rapids, MI 49629	Contract Description <i>(name and location)</i> : Contract Price: [Amount from Contract] Effective Date of Contract: [Date from Contract]
Bond Bond Amount: [Amount] Date of Bond: [Date] <i>(Date of Bond cannot be earlier than Effective Date of Contract)</i> Modifications to this Bond form: <input checked="" type="checkbox"/> None <input type="checkbox"/> 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
_____ <i>(Full formal name of Contractor)</i>	_____ <i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <i>(Signature)</i>	By: _____ <i>(Signature)(Attach Power of Attorney)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
<i>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.</i>	

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.
2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond will arise after:
 - 3.1. The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice may indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 will be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement does not waive the Owner's right, if any, subsequently to declare a Contractor Default;
 - 3.2. The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
 - 3.3. The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.
4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 does not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.
5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:
 - 5.1. Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;
 - 5.2. Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;
 - 5.3. Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or
 - 5.4. Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:

- 5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or
 - 5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.
6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment, or the Surety has denied liability, in whole or in part, without further notice, the Owner shall be entitled to enforce any remedy available to the Owner.
7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner will not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety will not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:
 - 7.1. the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
 - 7.2. additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and
 - 7.3. liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.
8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.
9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price will not be reduced or set off on account of any such unrelated obligations. No right of action will accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.
10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
11. Any proceeding, legal or equitable, under this Bond must be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and must be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit will be applicable.
12. Notice to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears.
13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted therefrom and provisions conforming to such

statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.

14. Definitions

- 14.1. *Balance of the Contract Price*—The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.
 - 14.2. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.
 - 14.3. *Contractor Default*—Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.
 - 14.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
 - 14.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.
15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.
16. Modifications to this Bond are as follows: None

PAYMENT BOND

Contractor Name: [Full formal name of Contractor] Address <i>(principal place of business)</i> : [Address of Contractor's principal place of business]	Surety Name: [Full formal name of Surety] Address <i>(principal place of business)</i> : [Address of Surety's principal place of business]
Owner Name: Village of Elk Rapids Address <i>(principal place of business)</i> : Village of Elk Rapids Offices 315 Bridge Street Elk Rapids, MI 49629	Contract Description <i>(name and location)</i> : Contract Price: [Amount, from Contract] Effective Date of Contract: [Date, from Contract]
Bond Bond Amount: [Amount] Date of Bond: [Date] <i>(Date of Bond cannot be earlier than Effective Date of Contract)</i> Modifications to this Bond form: <input checked="" type="checkbox"/> None <input type="checkbox"/> 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
<i>(Full formal name of Contractor)</i>	<i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <i>(Signature)</i>	By: _____ <i>(Signature)(Attach Power of Attorney)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
<i>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.</i>	

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

8. The Surety's total obligation will not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond will be credited for any payments made in good faith by the Surety.
9. Amounts owed by the Owner to the Contractor under the Construction Contract will be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfying obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.
11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
12. No suit or action will be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit will be applicable.
13. Notice and Claims to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, will be sufficient compliance as of the date received.
14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted here from and provisions conforming to such statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.
15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.
16. Definitions
 - 16.1. *Claim*—A written statement by the Claimant including at a minimum:
 - 16.1.1. The name of the Claimant;
 - 16.1.2. The name of the person for whom the labor was done, or materials or equipment furnished;
 - 16.1.3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
 - 16.1.4. A brief description of the labor, materials, or equipment furnished;

- 16.1.5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
 - 16.1.6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
 - 16.1.7. The total amount of previous payments received by the Claimant; and
 - 16.1.8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.
- 16.2. *Claimant*—An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond is to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.
 - 16.3. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.
 - 16.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
 - 16.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.
17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.
 18. Modifications to this Bond are as follows: None

Contractor's Application for Payment

Owner: <u>Village of Elk Rapids</u>	Owner's Project No.: _____
Engineer: <u>Gosling Czubak Engineering Czubak, Inc.</u>	Engineer's Project No.: _____
Contractor: _____	Contractor's Project No.: _____
Project: _____	
Contract: _____	
Application No.: _____	Application Date: _____
Application Period: From _____	to _____

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

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: _____

<p>Recommended by Engineer</p> <p>By: _____</p> <p>Title: _____</p> <p>Date: _____</p> <p>Approved by Funding Agency</p> <p>By: _____</p> <p>Title: _____</p> <p>Date: _____</p>	<p>Approved by Owner</p> <p>By: _____</p> <p>Title: _____</p> <p>Date: _____</p> <p>By: _____</p> <p>Title: _____</p> <p>Date: _____</p>
--	---

Progress Estimate - Unit Price Work

Contractor's Application for Payment

Owner:	Village of Elk Rapids		Owner's Project No.:	
Engineer:	Gosling Czubak Engineering Czubak, Inc.		Engineer's Project No.:	
Contractor:			Contractor's Project No.:	
Project:				
Contract:				

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

A	B	C	D	E	F	G	H	I	J	K	L	
Bid Item No.	Description	Contract Information				Work Completed		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) (\$)	
		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) (\$)					
Original Contract												
1					-		-		-		-	
2					-		-		-		-	
3					-		-		-		-	
4					-		-		-		-	
5					-		-		-		-	
6					-		-		-		-	
7					-		-		-		-	
8					-		-		-		-	
9					-		-		-		-	
10					-		-		-		-	
11					-		-		-		-	
12					-		-		-		-	
13					-		-		-		-	
14					-		-		-		-	
15					-		-		-		-	
16					-		-		-		-	
17					-		-		-		-	
18					-		-		-		-	
19					-		-		-		-	
20					-		-		-		-	
Original Contract Totals					\$	-	\$	-	\$	-	\$	-

CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner: Village of Elk Rapids
Engineer: Gosling Czubak Engineering Sciences, Inc.
Contractor: _____
Project: _____
Contract Name: _____

Owner's Project No.: _____
Engineer's Project No.: _____
Contractor's Project No.: _____

This Preliminary Final Certificate of Substantial Completion applies to:

All Work The following specified portions of the Work:

[Describe the portion of the work for which Certificate of Substantial Completion is issued]

Date of Substantial Completion: Date

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:

[List amendments to Owner's Responsibilities]

Amendments to Contractor's Responsibilities: None As follows:

[List amendments to Contractor's Responsibilities]

The following documents are attached to and made a part of this Certificate:

[List attachments such as punch list; other documents]

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: _____

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

TABLE OF CONTENTS

	Page
Article 1—Definitions and Terminology.....	1
1.01 Defined Terms.....	1
1.02 Terminology.....	6
Article 2—Preliminary Matters.....	7
2.01 Delivery of Performance and Payment Bonds; Evidence of Insurance.....	7
2.02 Copies of Documents.....	7
2.03 Before Starting Construction.....	7
2.04 Preconstruction Conference; Designation of Authorized Representatives.....	8
2.05 Acceptance of Schedules.....	8
2.06 Electronic Transmittals.....	8
Article 3—Contract Documents: Intent, Requirements, Reuse.....	9
3.01 Intent.....	9
3.02 Reference Standards.....	9
3.03 Reporting and Resolving Discrepancies.....	10
3.04 Requirements of the Contract Documents.....	10
3.05 Reuse of Documents.....	11
Article 4—Commencement and Progress of the Work.....	11
4.01 Commencement of Contract Times; Notice to Proceed.....	11
4.02 Starting the Work.....	11
4.03 Reference Points.....	11
4.04 Progress Schedule.....	12
4.05 Delays in Contractor’s Progress.....	12
Article 5—Site; Subsurface and Physical Conditions; Hazardous Environmental Conditions.....	13
5.01 Availability of Lands.....	13
5.02 Use of Site and Other Areas.....	14
5.03 Subsurface and Physical Conditions.....	15
5.04 Differing Subsurface or Physical Conditions.....	16

5.05	Underground Facilities.....	17
5.06	Hazardous Environmental Conditions at Site	19
Article 6—Bonds and Insurance.....		21
6.01	Performance, Payment, and Other Bonds.....	21
6.02	Insurance—General Provisions.....	22
6.03	Contractor’s Insurance.....	24
6.04	Builder’s Risk and Other Property Insurance.....	25
6.05	Property Losses; Subrogation	25
6.06	Receipt and Application of Property Insurance Proceeds	27
Article 7—Contractor’s Responsibilities		27
7.01	Contractor’s Means and Methods of Construction	27
7.02	Supervision and Superintendence	27
7.03	Labor; Working Hours	27
7.04	Services, Materials, and Equipment	28
7.05	“Or Equals”.....	28
7.06	Substitutes	29
7.07	Concerning Subcontractors and Suppliers.....	31
7.08	Patent Fees and Royalties.....	32
7.09	Permits.....	33
7.10	Taxes	33
7.11	Laws and Regulations.....	33
7.12	Record Documents.....	33
7.13	Safety and Protection	34
7.14	Hazard Communication Programs	35
7.15	Emergencies.....	35
7.16	Submittals	35
7.17	Contractor’s General Warranty and Guarantee	38
7.18	Indemnification.....	39
7.19	Delegation of Professional Design Services	39
Article 8—Other Work at the Site.....		40
8.01	Other Work	40
8.02	Coordination	41
8.03	Legal Relationships.....	41

Article 9—Owner’s Responsibilities	42
9.01 Communications to Contractor	42
9.02 Replacement of Engineer	42
9.03 Furnish Data	42
9.04 Pay When Due.....	42
9.05 Lands and Easements; Reports, Tests, and Drawings.....	43
9.06 Insurance.....	43
9.07 Change Orders	43
9.08 Inspections, Tests, and Approvals.....	43
9.09 Limitations on Owner’s Responsibilities	43
9.10 Undisclosed Hazardous Environmental Condition.....	43
9.11 Evidence of Financial Arrangements.....	43
9.12 Safety Programs	43
Article 10—Engineer’s Status During Construction	44
10.01 Owner’s Representative.....	44
10.02 Visits to Site.....	44
10.03 Resident Project Representative.....	44
10.04 Engineer’s Authority	44
10.05 Determinations for Unit Price Work	45
10.06 Decisions on Requirements of Contract Documents and Acceptability of Work	45
10.07 Limitations on Engineer’s Authority and Responsibilities	45
10.08 Compliance with Safety Program.....	45
Article 11—Changes to the Contract	46
11.01 Amending and Supplementing the Contract	46
11.02 Change Orders	46
11.03 Work Change Directives.....	46
11.04 Field Orders.....	47
11.05 Owner-Authorized Changes in the Work	47
11.06 Unauthorized Changes in the Work.....	47
11.07 Change of Contract Price	47
11.08 Change of Contract Times.....	49
11.09 Change Proposals.....	49
11.10 Notification to Surety.....	50

Article 12—Claims.....	50
12.01 Claims.....	50
Article 13—Cost of the Work; Allowances; Unit Price Work	51
13.01 Cost of the Work.....	51
13.02 Allowances	55
13.03 Unit Price Work.....	55
Article 14—Tests and Inspections; Correction, Removal, or Acceptance of Defective Work	56
14.01 Access to Work.....	56
14.02 Tests, Inspections, and Approvals.....	56
14.03 Defective Work	57
14.04 Acceptance of Defective Work.....	58
14.05 Uncovering Work	58
14.06 Owner May Stop the Work	58
14.07 Owner May Correct Defective Work.....	59
Article 15—Payments to Contractor; Set-Offs; Completion; Correction Period	59
15.01 Progress Payments.....	59
15.02 Contractor’s Warranty of Title	62
15.03 Substantial Completion.....	62
15.04 Partial Use or Occupancy	63
15.05 Final Inspection	64
15.06 Final Payment.....	64
15.07 Waiver of Claims	65
15.08 Correction Period	66
Article 16—Suspension of Work and Termination	67
16.01 Owner May Suspend Work	67
16.02 Owner May Terminate for Cause.....	67
16.03 Owner May Terminate for Convenience.....	68
16.04 Contractor May Stop Work or Terminate	68
Article 17—Final Resolution of Disputes	69
17.01 Methods and Procedures.....	69
Article 18—Miscellaneous	69
18.01 Giving Notice.....	69
18.02 Computation of Times.....	69

18.03	Cumulative Remedies	70
18.04	Limitation of Damages	70
18.05	No Waiver	70
18.06	Survival of Obligations	70
18.07	Controlling Law	70
18.08	Assignment of Contract.....	70
18.09	Successors and Assigns	70
18.10	Headings.....	70

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 Price or Contract Times; contesting an initial decision by Engineer concerning the

- requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract.
- b. A demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal, or seeking resolution of a contractual issue that Engineer has declined to address.
 - c. A demand or assertion by Owner or Contractor, duly submitted in compliance with the procedural requirements set forth herein, made pursuant to Paragraph 12.01.A.4, concerning disputes arising after Engineer has issued a recommendation of final payment.
 - d. A demand for money or services by a third party is not a Claim.
11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), lead-based paint (as defined by the HUD/EPA standard), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to Laws and Regulations regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
 12. *Contract*—The entire and integrated written contract between Owner and Contractor concerning the Work.
 13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
 14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents.
 15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
 16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
 17. *Cost of the Work*—See Paragraph 13.01 for definition.
 18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
 19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
 20. *Electronic Document*—Any Project-related correspondence, attachments to correspondence, data, documents, drawings, information, or graphics, including but not limited to Shop Drawings and other Submittals, that are in an electronic or digital format.
 21. *Electronic Means*—Electronic mail (email), upload/download from a secure Project website, or other communications methods that allow: (a) the transmission or communication of Electronic Documents; (b) the documentation of transmissions, including sending and receipt; (c) printing of the transmitted Electronic Document by the

recipient; (d) the storage and archiving of the Electronic Document by sender and recipient; and (e) the use by recipient of the Electronic Document for purposes permitted by this Contract. Electronic Means does not include the use of text messaging, or of Facebook, Twitter, Instagram, or similar social media services for transmission of Electronic Documents.

22. *Engineer*—The individual or entity named as such in the Agreement.
23. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.
24. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto.
 - a. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated into the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, is not a Hazardous Environmental Condition.
 - b. The presence of Constituents of Concern that are to be removed or remediated as part of the Work is not a Hazardous Environmental Condition.
 - c. The presence of Constituents of Concern as part of the routine, anticipated, and obvious working conditions at the Site, is not a Hazardous Environmental Condition.
25. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and binding decrees, resolutions, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
26. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
27. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date, or by a time prior to Substantial Completion of all the Work.
28. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.
29. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.
30. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
31. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising Contractor's plan to accomplish the Work within the Contract Times.
32. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.

33. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative (RPR) includes any assistants or field staff of Resident Project Representative.
34. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
35. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals.
36. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.
37. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.
38. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands or areas furnished by Owner which are designated for the use of Contractor.
39. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
40. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.
41. *Submittal*—A written or graphic document, prepared by or for Contractor, which the Contract Documents require Contractor to submit to Engineer, or that is indicated as a Submittal in the Schedule of Submittals accepted by Engineer. Submittals may include Shop Drawings and Samples; schedules; product data; Owner-delegated designs; sustainable design information; information on special procedures; testing plans; results of tests and evaluations, source quality-control testing and inspections, and field or Site quality-control testing and inspections; warranties and certifications; Suppliers' instructions and reports; records of delivery of spare parts and tools; operations and maintenance data; Project photographic documentation; record documents; and other such documents required by the Contract Documents. Submittals, whether or not approved or accepted by Engineer, are not Contract Documents. Change Proposals, Change Orders, Claims, notices, Applications for Payment, and requests for interpretation or clarification are not Submittals.
42. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion of such Work.

43. *Successful Bidder*—The Bidder to which the Owner makes an award of contract.
44. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
45. *Supplier*—A manufacturer, fabricator, supplier, distributor, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
46. *Technical Data*
- a. Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (1) existing subsurface conditions at or adjacent to the Site, or existing physical conditions at or adjacent to the Site including existing surface or subsurface structures (except Underground Facilities) or (2) Hazardous Environmental Conditions at the Site.
 - b. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then Technical Data is defined, with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06, as the data contained in boring logs, recorded measurements of subsurface water levels, assessments of the condition of subsurface facilities, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical, environmental, or other Site or facilities conditions report prepared for the Project and made available to Contractor.
 - c. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data, and instead Underground Facilities are shown or indicated on the Drawings.
47. *Underground Facilities*—All active or not-in-service underground lines, pipelines, conduits, ducts, encasements, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or systems at the Site, including but not limited to those facilities or systems that produce, transmit, distribute, or convey telephone or other communications, cable television, fiber optic transmissions, power, electricity, light, heat, gases, oil, crude oil products, liquid petroleum products, water, steam, waste, wastewater, storm water, other liquids or chemicals, or traffic or other control systems. An abandoned facility or system is not an Underground Facility.
48. *Unit Price Work*—Work to be paid for on the basis of unit prices.
49. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.
50. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 Terminology

- A. The words and terms discussed in Paragraphs 1.02.B, C, D, and E are not defined terms that require initial capital letters, but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:* The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.
- C. *Day:* The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:* The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
1. does not conform to the Contract Documents;
 2. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 3. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or Paragraph 15.04).
- E. *Furnish, Install, Perform, Provide*
1. The word “furnish,” when used in connection with services, materials, or equipment, means to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 2. The word “install,” when used in connection with services, materials, or equipment, means to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, means to furnish and install said services, materials, or equipment complete and ready for intended use.
 4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

- F. *Contract Price or Contract Times*: References to a change in “Contract Price or Contract Times” or “Contract Times or Contract Price” or similar, indicate that such change applies to (1) Contract Price, (2) Contract Times, or (3) both Contract Price and Contract Times, as warranted, even if the term “or both” is not expressed.
- G. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2—PRELIMINARY MATTERS

2.01 *Delivery of Performance and Payment Bonds; Evidence of Insurance*

- A. *Performance and Payment Bonds*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner the performance bond and payment bond (if the Contract requires Contractor to furnish such bonds).
- B. *Evidence of Contractor’s Insurance*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each additional insured (as identified in the Contract), the certificates, endorsements, and other evidence of insurance required to be provided by Contractor in accordance with Article 6, except to the extent the Supplementary Conditions expressly establish other dates for delivery of specific insurance policies.
- C. *Evidence of Owner’s Insurance*: After receipt of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each additional insured (as identified in the Contract), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

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

2.03 *Before Starting Construction*

- A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise required by the Contract Documents), Contractor shall submit to Engineer for timely review:
 - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
 - 2. a preliminary Schedule of Submittals; and
 - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work

into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

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

2.05 *Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review the schedules submitted in accordance with Paragraph 2.03.A. No progress payment will be made to Contractor until acceptable schedules are submitted to Engineer.
 - 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility, therefore.
 - 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
 - 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.
 - 4. If a schedule is not acceptable, Contractor will have an additional 10 days to revise and resubmit the schedule.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may send, and shall accept, Electronic Documents transmitted by Electronic Means.
- B. If the Contract does not establish protocols for Electronic Means, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. Subject to any governing protocols for Electronic Means, when transmitting Electronic Documents by Electronic Means, the transmitting party makes no representations as to long-term compatibility, usability, or readability of the Electronic Documents resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the Electronic Documents.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one Contract Document is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic versions of the Contract Documents (including any printed copies derived from such electronic versions) and the printed record version, the printed record version will govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.
- F. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation will be deemed stricken, and all remaining provisions will continue to be valid and binding upon Owner and Contractor, which agree that the Contract Documents will be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.
- G. Nothing in the Contract Documents creates:
 - 1. any contractual relationship between Owner or Engineer and any Subcontractor, Supplier, or other individual or entity performing or furnishing any of the Work, for the benefit of such Subcontractor, Supplier, or other individual or entity; or
 - 2. any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity, except as may otherwise be required by Laws and Regulations.

3.02 *Reference Standards*

- A. *Standards Specifications, Codes, Laws and Regulations*
 - 1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, means the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 - 2. No provision of any such standard specification, manual, reference standard, or code, and no instruction of a Supplier, will be effective to change the duties or responsibilities of Owner, Contractor, or Engineer from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner or Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility

inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

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

B. *Resolving Discrepancies*

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

3.04 *Requirements of the Contract Documents*

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer in writing all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work.

- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly notify Owner and Contractor in writing that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

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

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the 30th day after the Effective Date of the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract. In no event will the Contract Times commence to run later than the 60th day after the day of Bid opening or the 30th day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

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

4.03 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the

established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

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

4.05 *Delays in Contractor's Progress*

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

- D. Contractor's entitlement to an adjustment of Contract Times or Contract Price is limited as follows:
1. Contractor's entitlement to an adjustment of the Contract Times is conditioned on the delay, disruption, or interference adversely affecting an activity on the critical path to completion of the Work, as of the time of the delay, disruption, or interference.
 2. Contractor shall not be entitled to an adjustment in Contract Price for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor. Such a concurrent delay by Contractor shall not preclude an adjustment of Contract Times to which Contractor is otherwise entitled.
 3. Adjustments of Contract Times or Contract Price are subject to the provisions of Article 11.
- E. Each Contractor request or Change Proposal seeking an increase in Contract Times or Contract Price must be supplemented by supporting data that sets forth in detail the following:
1. The circumstances that form the basis for the requested adjustment;
 2. The date upon which each cause of delay, disruption, or interference began to affect the progress of the Work;
 3. The date upon which each cause of delay, disruption, or interference ceased to affect the progress of the Work;
 4. The number of days' increase in Contract Times claimed as a consequence of each such cause of delay, disruption, or interference; and
 5. The impact on Contract Price, in accordance with the provisions of Paragraph 11.07.
- Contractor shall also furnish such additional supporting documentation as Owner or Engineer may require including, where appropriate, a revised progress schedule indicating all the activities affected by the delay, disruption, or interference, and an explanation of the effect of the delay, disruption, or interference on the critical path to completion of the Work.
- F. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5, together with the provisions of Paragraphs 4.05.D and 4.05.E.
- G. Paragraph 8.03 addresses delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

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

5.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor in writing of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.

- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas*

1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas, or to improvements, structures, utilities, or similar facilities located at such adjacent lands or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.
 2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.13, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or in a court of competent jurisdiction; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris will conform to applicable Laws and Regulations.
 - C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment

and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

- D. *Loading of Structures*: Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

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

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

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

- C. *Reliance by Contractor on Technical Data*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b.

- D. *Limitations of Other Data and Documents*: Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:
1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto;
 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings;
 3. the contents of other Site-related documents made available to Contractor, such as record drawings from other projects at or adjacent to the Site, or Owner's archival documents concerning the Site; or
 4. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

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

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

- B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine whether it is necessary for Owner to obtain additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the subsurface or physical condition in question may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the condition in question has been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- E. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in

Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

- a. Such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
 - b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,
 - c. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
- a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise;
 - b. The existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
 - c. Contractor failed to give the written notice required by Paragraph 5.04.A.
3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.
- F. *Underground Facilities; Hazardous Environmental Conditions:* Paragraph 5.05 governs rights and responsibilities regarding the presence or location of Underground Facilities. Paragraph 5.06 governs rights and responsibilities regarding Hazardous Environmental Conditions. The provisions of Paragraphs 5.03 and 5.04 are not applicable to the presence or location of Underground Facilities, or to Hazardous Environmental Conditions.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* Unless it is otherwise expressly provided in the Supplementary Conditions, the cost of all of the following are included in the Contract Price, and Contractor shall have full responsibility for:
1. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 2. complying with applicable state and local utility damage prevention Laws and Regulations;

3. verifying the actual location of those Underground Facilities shown or indicated in the Contract Documents as being within the area affected by the Work, by exposing such Underground Facilities during the course of construction;
 4. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 5. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated on the Drawings, or was not shown or indicated on the Drawings with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing regarding such Underground Facility.
- C. *Engineer's Review:* Engineer will:
1. promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy;
 2. identify and communicate with the owner of the Underground Facility; prepare recommendations to Owner (and if necessary issue any preliminary instructions to Contractor) regarding the Contractor's resumption of Work in connection with the Underground Facility in question;
 3. obtain any pertinent cost or schedule information from Contractor; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and
 4. advise Owner in writing of Engineer's findings, conclusions, and recommendations.

During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the Underground Facility may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the Underground Facility in question and conditions affected by its presence have been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- F. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, to the extent that any existing Underground Facility at the Site that was not shown

or indicated on the Drawings, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

- a. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
 - b. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E; and
 - c. Contractor gave the notice required in Paragraph 5.05.B.
2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
 3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.
 4. The information and data shown or indicated on the Drawings with respect to existing Underground Facilities at the Site is based on information and data (a) furnished by the owners of such Underground Facilities, or by others, (b) obtained from available records, or (c) gathered in an investigation conducted in accordance with the current edition of ASCE 38, Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, by the American Society of Civil Engineers. If such information or data is incorrect or incomplete, Contractor's remedies are limited to those set forth in this Paragraph 5.05.F.

5.06 *Hazardous Environmental Conditions at Site*

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

1. those reports known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site;
2. drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
3. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures

- of construction to be employed by Contractor, and safety precautions and programs incident thereto;
2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.
- D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
- E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.
- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
- G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, as a result of such Work stoppage, such special conditions under which Work is agreed to be resumed by Contractor, or any costs or expenses incurred in response to the Hazardous Environmental Condition, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off. Entitlement to any such adjustment is subject to the provisions of Paragraphs 4.05.D, 4.05.E, 11.07, and 11.08.
- H. If, after receipt of such written notice, Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special

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

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

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of Contractor's obligations under the Contract. These bonds must remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the terms of a prescribed bond form, the Supplementary Conditions, or other provisions of the Contract.
- B. Contractor shall also furnish such other bonds (if any) as are required by the Supplementary Conditions or other provisions of the Contract.
- C. All bonds must be in the form included in the Bidding Documents or otherwise specified by Owner prior to execution of the Contract, except as provided otherwise by Laws or

- Regulations, and must be issued and signed by a surety named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Department Circular 570 (as amended and supplemented) by the Bureau of the Fiscal Service, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority must show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.
- D. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue bonds in the required amounts.
 - E. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer in writing and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which must comply with the bond and surety requirements above.
 - F. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.
 - G. Upon request to Owner from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Owner shall provide a copy of the payment bond to such person or entity.
 - H. Upon request to Contractor from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Contractor shall provide a copy of the payment bond to such person or entity.

6.02 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized in the state or jurisdiction in which the Project is located to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Alternative forms of insurance coverage, including but not limited to self-insurance and "Occupational Accident and Excess Employer's Indemnity Policies," are not sufficient to meet the insurance requirements of this Contract, unless expressly allowed in the Supplementary Conditions.
- D. Contractor shall deliver to Owner, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Contractor has obtained and is maintaining the policies and coverages required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, full disclosure of all relevant exclusions, and evidence of insurance required to be purchased and maintained by

Subcontractors or Suppliers. In any documentation furnished under this provision, Contractor, Subcontractors, and Suppliers may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those applicable to this Contract.

- E. Owner shall deliver to Contractor, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Owner has obtained and is maintaining the policies and coverages required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, and full disclosure of all relevant exclusions. In any documentation furnished under this provision, Owner may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those relevant to this Contract.
- F. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, will not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
- G. In addition to the liability insurance required to be provided by Contractor, the Owner, at Owner's option, may purchase and maintain Owner's own liability insurance. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.
- H. Contractor shall require:
 - 1. Subcontractors to purchase and maintain worker's compensation, commercial general liability, and other insurance that is appropriate for their participation in the Project, and to name as additional insureds Owner and Engineer (and any other individuals or entities identified in the Supplementary Conditions as additional insureds on Contractor's liability policies) on each Subcontractor's commercial general liability insurance policy; and
 - 2. Suppliers to purchase and maintain insurance that is appropriate for their participation in the Project.
- I. If either party does not purchase or maintain the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.
- J. If Contractor has failed to obtain and maintain required insurance, Contractor's entitlement to enter or remain at the Site will end immediately, and Owner may impose an appropriate set-off against payment for any associated costs (including but not limited to the cost of purchasing necessary insurance coverage), and exercise Owner's termination rights under Article 16.
- K. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect (but is in no way obligated) to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price will be adjusted accordingly.

- L. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests. Contractor is responsible for determining whether such coverage and limits are adequate to protect its interests, and for obtaining and maintaining any additional insurance that Contractor deems necessary.
- M. The insurance and insurance limits required herein will not be deemed as a limitation on Contractor's liability, or that of its Subcontractors or Suppliers, under the indemnities granted to Owner and other individuals and entities in the Contract or otherwise.
- N. All the policies of insurance required to be purchased and maintained under this Contract will contain a provision or endorsement that the coverage afforded will not be canceled, or renewal refused, until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured and Engineer.

6.03 Contractor's Insurance

- A. *Required Insurance:* Contractor shall purchase and maintain Worker's Compensation, Commercial General Liability, and other insurance pursuant to the specific requirements of the Supplementary Conditions.
- B. *General Provisions:* The policies of insurance required by this Paragraph 6.03 as supplemented must:
 - 1. include at least the specific coverages required;
 - 2. be written for not less than the limits provided, or those required by Laws or Regulations, whichever is greater;
 - 3. remain in effect at least until the Work is complete (as set forth in Paragraph 15.06.D), and longer if expressly required elsewhere in this Contract, and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract;
 - 4. apply with respect to the performance of the Work, whether such performance is by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable; and
 - 5. include all necessary endorsements to support the stated requirements.
- C. *Additional Insureds:* The Contractor's commercial general liability, automobile liability, employer's liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies, if required by this Contract, must:
 - 1. include and list as additional insureds Owner and Engineer, and any individuals or entities identified as additional insureds in the Supplementary Conditions;
 - 2. include coverage for the respective officers, directors, members, partners, employees, and consultants of all such additional insureds;
 - 3. afford primary coverage to these additional insureds for all claims covered thereby (including as applicable those arising from both ongoing and completed operations);

4. not seek contribution from insurance maintained by the additional insured; and
5. as to commercial general liability insurance, apply to additional insureds with respect to liability caused in whole or in part by Contractor's acts or omissions, or the acts and omissions of those working on Contractor's behalf, in the performance of Contractor's operations.

6.04 *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.
- 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 Paragraph 15.06, will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them, and that the insured is allowed to waive the insurer's rights of subrogation in a written contract executed prior to the loss, damage, or consequential loss.
1. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from fire or any of the perils, risks, or causes of loss covered by such policies.
- C. The waivers in this Paragraph 6.05 include the waiver of rights due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other insured peril, risk, or cause of loss.
- D. Contractor shall be responsible for assuring that each Subcontract contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from fire or other peril, risk, or cause of loss covered by builder's risk insurance, installation floater, and any other property insurance applicable to the Work.

6.06 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of property insurance required by Paragraph 6.04 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.
- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.04 shall maintain such proceeds in a segregated account, and distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, Contractor shall repair or replace the damaged Work, using allocated insurance proceeds.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.01 *Contractor's Means and Methods of Construction*

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

7.02 *Supervision and Superintendence*

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

7.03 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall maintain good discipline and order at the Site.

- B. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of Contractor's employees; of Suppliers and Subcontractors, and their employees; and of any other individuals or entities performing or furnishing any of the Work, just as Contractor is responsible for Contractor's own acts and omissions.
- C. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site will be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.04 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work must be new and of good quality, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications will expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment must be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.05 *"Or Equals"*

- A. *Contractor's Request; Governing Criteria:* Whenever an item of equipment or material is specified or described in the Contract Documents by using the names of one or more proprietary items or specific Suppliers, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material, or items from other proposed Suppliers, under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of equipment or material proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer will deem it an "or equal" item. For the purposes of this paragraph, a proposed item of equipment or material will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that the proposed item:
 - 1) is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

- 2) will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) has a proven record of performance and availability of responsive service; and
 - 4) is not objectionable to Owner.
- b. Contractor certifies that, if the proposed item is approved and incorporated into the Work:
- 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) the item will conform substantially to the detailed requirements of the item named in the Contract Documents.
- B. *Contractor's Expense*: Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.
- C. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal," which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.
- D. *Effect of Engineer's Determination*: Neither approval nor denial of an "or-equal" request will result in any change in Contract Price. The Engineer's denial of an "or-equal" request will be final and binding, and may not be reversed through an appeal under any provision of the Contract.
- E. *Treatment as a Substitution Request*: If Engineer determines that an item of equipment or material proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the item a proposed substitute pursuant to Paragraph 7.06.

7.06 *Substitutes*

- A. *Contractor's Request; Governing Criteria*: Unless the specification or description of an item of equipment or material required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material under the circumstances described below. To the extent possible such requests must be made before commencement of related construction at the Site.
1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of equipment or material from anyone other than Contractor.
 2. The requirements for review by Engineer will be as set forth in Paragraph 7.06.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.

3. Contractor shall make written application to Engineer for review of a proposed substitute item of equipment or material that Contractor seeks to furnish or use. The application:
 - a. will certify that the proposed substitute item will:
 - 1) perform adequately the functions and achieve the results called for by the general design;
 - 2) be similar in substance to the item specified; and
 - 3) be suited to the same use as the item specified.
 - b. will state:
 - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times;
 - 2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and
 - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
 - c. will identify:
 - 1) all variations of the proposed substitute item from the item specified; and
 - 2) available engineering, sales, maintenance, repair, and replacement services.
 - d. will contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.
- C. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- D. *Reimbursement of Engineer's Cost:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

- E. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute at Contractor's expense.
- F. *Effect of Engineer's Determination*: If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request will be final and binding, and may not be reversed through an appeal under any provision of the Contract. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.06.D, by timely submittal of a Change Proposal.

7.07 *Concerning Subcontractors and Suppliers*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner. The Contractor's retention of a Subcontractor or Supplier for the performance of parts of the Work will not relieve Contractor's obligation to Owner to perform and complete the Work in accordance with the Contract Documents.
- B. Contractor shall retain specific Subcontractors and Suppliers for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor or Supplier to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within 5 days.
- E. Owner may require the replacement of any Subcontractor or Supplier. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors or Suppliers for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor or Supplier so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor or Supplier.
- F. If Owner requires the replacement of any Subcontractor or Supplier retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.
- G. No acceptance by Owner of any such Subcontractor or Supplier, whether initially or as a replacement, will constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.

- H. On a monthly basis, Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors and Suppliers.
- J. The divisions and sections of the Specifications and the identifications of any Drawings do not control Contractor in dividing the Work among Subcontractors or Suppliers, or in delineating the Work to be performed by any specific trade.
- K. All Work performed for Contractor by a Subcontractor or Supplier must be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract for the benefit of Owner and Engineer.
- L. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor for Work performed for Contractor by the Subcontractor or Supplier.
- M. Contractor shall restrict all Subcontractors and Suppliers from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed in this Contract.

7.08 *Patent Fees and Royalties*

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

7.09 *Permits*

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

7.10 *Taxes*

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

7.11 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It is not Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this does not relieve Contractor of its obligations under Paragraph 3.03.
- C. Owner or Contractor may give written notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such written notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.12 *Record Documents*

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

7.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations.
- B. Contractor shall designate a qualified and experienced safety representative whose duties and responsibilities are the prevention of Work-related accidents and the maintenance and supervision of safety precautions and programs.
- C. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - 1. all persons on the Site or who may be affected by the Work;
 - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- D. All damage, injury, or loss to any property referred to in Paragraph 7.13.C.2 or 7.13.C.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- E. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection.
- F. Contractor shall notify Owner; the owners of adjacent property; the owners of Underground Facilities and other utilities (if the identity of such owners is known to Contractor); and other contractors and utility owners performing work at or adjacent to the Site, in writing, when Contractor knows that prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.
- G. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. Any Owner's safety programs that are applicable to the Work are identified or included in the Supplementary Conditions or Specifications.
- H. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

- I. Contractor's duties and responsibilities for safety and protection will continue until all the Work is completed, Engineer has issued a written notice to Owner and Contractor in accordance with Paragraph 15.06.C that the Work is acceptable, and Contractor has left the Site (except as otherwise expressly provided in connection with Substantial Completion).
- J. Contractor's duties and responsibilities for safety and protection will resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.14 *Hazard Communication Programs*

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

7.15 *Emergencies*

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

7.16 *Submittals*

A. *Shop Drawing and Sample Requirements*

1. Before submitting a Shop Drawing or Sample, Contractor shall:
 - a. review and coordinate the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determine and verify:
 - 1) all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal;
 - 2) the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - 3) all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto;
 - c. confirm that the Submittal is complete with respect to all related data included in the Submittal.
2. Each Shop Drawing or Sample must bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that Submittal, and that Contractor approves the Submittal.

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

document any such approved variation from the requirements of the Contract Documents in a Field Order or other appropriate Contract modification.

5. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for complying with the requirements of Paragraphs 7.16.A and B.
6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, will not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
7. Neither Engineer's receipt, review, acceptance, or approval of a Shop Drawing or Sample will result in such item becoming a Contract Document.
8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.C.4.

D. Resubmittal Procedures for Shop Drawings and Samples

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous Submittals.
2. Contractor shall furnish required Shop Drawing and Sample submittals with sufficient information and accuracy to obtain required approval of an item with no more than two resubmittals. Engineer will record Engineer's time for reviewing a third or subsequent resubmittal of a Shop Drawing or Sample, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved Shop Drawing or Sample, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

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

1. The following provisions apply to all Submittals other than Shop Drawings, Samples, and Owner-delegated designs:
 - a. Contractor shall submit all such Submittals to the Engineer in accordance with the Schedule of Submittals and pursuant to the applicable terms of the Contract Documents.
 - b. Engineer will provide timely review of all such Submittals in accordance with the Schedule of Submittals and return such Submittals with a notation of either Accepted or Not Accepted. Any such Submittal that is not returned within the time established in the Schedule of Submittals will be deemed accepted.
 - c. Engineer's review will be only to determine if the Submittal is acceptable under the requirements of the Contract Documents as to general form and content of the Submittal.

- d. If any such Submittal is not accepted, Contractor shall confer with Engineer regarding the reason for the non-acceptance, and resubmit an acceptable document.
 2. Procedures for the submittal and acceptance of the Progress Schedule, the Schedule of Submittals, and the Schedule of Values are set forth in Paragraphs 2.03, 2.04, and 2.05.
- F. Owner-delegated Designs: Submittals pursuant to Owner-delegated designs are governed by the provisions of Paragraph 7.19.

7.17 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer is entitled to rely on Contractor's warranty and guarantee.
- B. Owner's rights under this warranty and guarantee are in addition to, and are not limited by, Owner's rights under the correction period provisions of Paragraph 15.08. The time in which Owner may enforce its warranty and guarantee rights under this Paragraph 7.17 is limited only by applicable Laws and Regulations restricting actions to enforce such rights; provided, however, that after the end of the correction period under Paragraph 15.08:
1. Owner shall give Contractor written notice of any defective Work within 60 days of the discovery that such Work is defective; and
 2. Such notice will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the notice.
- C. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
1. abuse, or improper modification, maintenance, or operation, by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 2. normal wear and tear under normal usage.
- D. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents, a release of Contractor's obligation to perform the Work in accordance with the Contract Documents, or a release of Owner's warranty and guarantee rights under this Paragraph 7.17:
1. Observations by Engineer;
 2. Recommendation by Engineer or payment by Owner of any progress or final payment;
 3. The issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 4. Use or occupancy of the Work or any part thereof by Owner;
 5. Any review and approval of a Shop Drawing or Sample submittal;
 6. The issuance of a notice of acceptability by Engineer;
 7. The end of the correction period established in Paragraph 15.08;
 8. Any inspection, test, or approval by others; or

9. Any correction of defective Work by Owner.
- E. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract will govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from losses, damages, costs, and judgments (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising from third-party claims or actions relating to or resulting from the performance or furnishing of the Work, provided that any such claim, action, loss, cost, judgment or damage is attributable to bodily injury, sickness, disease, or death, or to damage to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A will not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

7.19 *Delegation of Professional Design Services*

- A. Owner may require Contractor to provide professional design services for a portion of the Work by express delegation in the Contract Documents. Such delegation will specify the performance and design criteria that such services must satisfy, and the Submittals that Contractor must furnish to Engineer with respect to the Owner-delegated design.
- B. Contractor shall cause such Owner-delegated professional design services to be provided pursuant to the professional standard of care by a properly licensed design professional, whose signature and seal must appear on all drawings, calculations, specifications, certifications, and Submittals prepared by such design professional. Such design professional must issue all certifications of design required by Laws and Regulations.
- C. If a Shop Drawing or other Submittal related to the Owner-delegated design is prepared by Contractor, a Subcontractor, or others for submittal to Engineer, then such Shop Drawing or other Submittal must bear the written approval of Contractor's design professional when submitted by Contractor to Engineer.

- D. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, and approvals performed or provided by the design professionals retained or employed by Contractor under an Owner-delegated design, subject to the professional standard of care and the performance and design criteria stated in the Contract Documents.
- E. Pursuant to this Paragraph 7.19, Engineer's review, approval, and other determinations regarding design drawings, calculations, specifications, certifications, and other Submittals furnished by Contractor pursuant to an Owner-delegated design will be only for the following limited purposes:
 - 1. Checking for conformance with the requirements of this Paragraph 7.19;
 - 2. Confirming that Contractor (through its design professionals) has used the performance and design criteria specified in the Contract Documents; and
 - 3. Establishing that the design furnished by Contractor is consistent with the design concept expressed in the Contract Documents.
- F. Contractor shall not be responsible for the adequacy of performance or design criteria specified by Owner or Engineer.
- G. Contractor is not required to provide professional services in violation of applicable Laws and Regulations.

ARTICLE 8—OTHER WORK AT THE SITE

8.01 *Other Work*

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

- E. If the proper execution or results of any part of Contractor's Work depends upon work performed by others, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.
- F. The provisions of this article are not applicable to work that is performed by third-party utilities or other third-party entities without a contract with Owner, or that is performed without having been arranged by Owner. If such work occurs, then any related delay, disruption, or interference incurred by Contractor is governed by the provisions of Paragraph 4.05.C.3.

8.02 *Coordination*

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

8.03 *Legal Relationships*

- A. If, in the course of performing other work for Owner at or adjacent to the Site, the Owner's employees, any other contractor working for Owner, or any utility owner that Owner has arranged to perform work, causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment will take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract, and any remedies available to Contractor under Laws or Regulations concerning utility action or inaction. When applicable, any such equitable adjustment in Contract Price will be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times or Contract Price is subject to the provisions of Paragraphs 4.05.D and 4.05.E.

- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site.
 - 1. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this Paragraph 8.03.B.
 - 2. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due Contractor.
- C. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9—OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

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

9.02 *Replacement of Engineer*

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

9.03 *Furnish Data*

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

9.04 *Pay When Due*

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

- 9.05 *Lands and Easements; Reports, Tests, and Drawings*
- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
 - B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
 - C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.
- 9.06 *Insurance*
- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.
- 9.07 *Change Orders*
- A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.
- 9.08 *Inspections, Tests, and Approvals*
- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.
- 9.09 *Limitations on Owner's Responsibilities*
- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- 9.10 *Undisclosed Hazardous Environmental Condition*
- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.
- 9.11 *Evidence of Financial Arrangements*
- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract (including obligations under proposed changes in the Work).
- 9.12 *Safety Programs*
- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
 - B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

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

10.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe, as an experienced and qualified design professional, the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.07. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Resident Project Representative*

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in the Supplementary Conditions and in Paragraph 10.07.
- B. If Owner designates an individual or entity who is not Engineer's consultant, agent, or employee to represent Owner at the Site, then the responsibilities and authority of such individual or entity will be as provided in the Supplementary Conditions.

10.04 *Engineer's Authority*

- A. Engineer has the authority to reject Work in accordance with Article 14.
- B. Engineer's authority as to Submittals is set forth in Paragraph 7.16.
- C. Engineer's authority as to design drawings, calculations, specifications, certifications and other Submittals from Contractor in response to Owner's delegation (if any) to Contractor of professional design services, is set forth in Paragraph 7.19.
- D. Engineer's authority as to changes in the Work is set forth in Article 11.

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

10.05 *Determinations for Unit Price Work*

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

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

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

10.07 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, will create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Engineer's review of the final Application for Payment and accompanying documentation, and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Contractor under Paragraph 15.06.A, will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 10.07 also apply to the Resident Project Representative, if any.

10.08 *Compliance with Safety Program*

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

ARTICLE 11—CHANGES TO THE CONTRACT

11.01 *Amending and Supplementing the Contract*

- A. The Contract may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
- B. If an amendment or supplement to the Contract includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order.
- C. All changes to the Contract that involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, must be supported by Engineer's recommendation. Owner and Contractor may amend other terms and conditions of the Contract without the recommendation of the Engineer.

11.02 *Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
 - 1. Changes in Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
 - 2. Changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
 - 3. Changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.05, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters; and
 - 4. Changes that embody the substance of any final and binding results under: Paragraph 11.03.B, resolving the impact of a Work Change Directive; Paragraph 11.09, concerning Change Proposals; Article 12, Claims; Paragraph 13.02.D, final adjustments resulting from allowances; Paragraph 13.03.D, final adjustments relating to determination of quantities for Unit Price Work; and similar provisions.
- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of Paragraph 11.02.A, it will be deemed to be of full force and effect, as if fully executed.

11.03 *Work Change Directives*

- A. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.07 regarding change of Contract Price.

- B. If Owner has issued a Work Change Directive and:
 - 1. Contractor believes that an adjustment in Contract Times or Contract Price is necessary, then Contractor shall submit any Change Proposal seeking such an adjustment no later than 30 days after the completion of the Work set out in the Work Change Directive.
 - 2. Owner believes that an adjustment in Contract Times or Contract Price is necessary, then Owner shall submit any Claim seeking such an adjustment no later than 60 days after issuance of the Work Change Directive.

11.04 *Field Orders*

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

11.05 *Owner-Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Changes involving the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters will be supported by Engineer's recommendation.
- B. Such changes in the Work may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work must be performed under the applicable conditions of the Contract Documents.
- C. Nothing in this Paragraph 11.05 obligates Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.06 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.C.2.

11.07 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment of Contract Price must comply with the provisions of Article 12.
- B. An adjustment in the Contract Price will be determined as follows:

1. Where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03);
 2. Where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.07.C.2); or
 3. Where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.07.C).
- C. *Contractor's Fee:* When applicable, the Contractor's fee for overhead and profit will be determined as follows:
1. A mutually acceptable fixed fee; or
 2. If a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. For costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee will be 15 percent;
 - b. For costs incurred under Paragraph 13.01.B.3, the Contractor's fee will be 5 percent;
 - c. Where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.07.C.2.a and 11.07.C.2.b is that the Contractor's fee will be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of 5 percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted Work the maximum total fee to be paid by Owner will be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the Work;
 - d. No fee will be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
 - e. The amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in Cost of the Work will be the amount of the actual net decrease in Cost of the Work and a deduction of an additional amount equal to 5 percent of such actual net decrease in Cost of the Work; and
 - f. When both additions and credits are involved in any one change or Change Proposal, the adjustment in Contractor's fee will be computed by determining the sum of the costs in each of the cost categories in Paragraph 13.01.B (specifically, payroll costs, Paragraph 13.01.B.1; incorporated materials and equipment costs, Paragraph 13.01.B.2; Subcontract costs, Paragraph 13.01.B.3; special consultants costs, Paragraph 13.01.B.4; and other costs, Paragraph 13.01.B.5) and applying to each such cost category sum the appropriate fee from Paragraphs 11.07.C.2.a through 11.07.C.2.e, inclusive.

11.08 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment in the Contract Times must comply with the provisions of Article 12.
- B. Delay, disruption, and interference in the Work, and any related changes in Contract Times, are addressed in and governed by Paragraph 4.05.

11.09 *Change Proposals*

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

B. *Change Proposal Procedures*

1. *Submittal:* Contractor shall submit each Change Proposal to Engineer within 30 days after the start of the event giving rise thereto, or after such initial decision.
2. *Supporting Data:* The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal.
 - a. Change Proposals based on or related to delay, interruption, or interference must comply with the provisions of Paragraphs 4.05.D and 4.05.E.
 - b. Change proposals related to a change of Contract Price must include full and detailed accounts of materials incorporated into the Work and labor and equipment used for the subject Work.

The supporting data must be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event.

3. *Engineer's Initial Review:* Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal. If in its discretion Engineer concludes that additional supporting data is needed before conducting a full review and making a decision regarding the Change Proposal, then Engineer may request that Contractor submit such additional supporting data by a date specified by Engineer, prior to Engineer beginning its full review of the Change Proposal.
4. *Engineer's Full Review and Action on the Change Proposal:* Upon receipt of Contractor's supporting data (including any additional data requested by Engineer), Engineer will conduct a full review of each Change Proposal and, within 30 days after such receipt of the Contractor's supporting data, either approve the Change Proposal in whole, deny it in whole, or approve it in part and deny it in part. Such actions must be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change

Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

5. *Binding Decision*: Engineer's decision is final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- C. *Resolution of Certain Change Proposals*: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties in writing that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice will be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.
- D. *Post-Completion*: Contractor shall not submit any Change Proposals after Engineer issues a written recommendation of final payment pursuant to Paragraph 15.06.B.

11.10 *Notification to Surety*

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

ARTICLE 12—CLAIMS

12.01 *Claims*

- A. *Claims Process*: The following disputes between Owner and Contractor are subject to the Claims process set forth in this article:
 1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
 2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents;
 3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters; and
 4. Subject to the waiver provisions of Paragraph 15.07, any dispute arising after Engineer has issued a written recommendation of final payment pursuant to Paragraph 15.06.B.
- B. *Submittal of Claim*: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim rests with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge

and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.

- C. *Review and Resolution*: The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim will be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation*
 - 1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate will stay the Claim submittal and response process.
 - 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process will resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process will resume as of the date of the conclusion of the mediation, as determined by the mediator.
 - 3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.
- E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action will be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim will be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.
- G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim will be incorporated in a Change Order or other written document to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

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

13.01 *Cost of the Work*

- A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
 - 1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or

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

consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

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

c. *Construction Equipment Rental*

- 1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner as to price (including any surcharge or special rates applicable to overtime use of the construction equipment or machinery), and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the Work.
- 2) Costs for equipment and machinery owned by Contractor or a Contractor-related entity will be paid at a rate shown for such equipment in the equipment rental rate book specified in the Supplementary Conditions. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs.
- 3) With respect to Work that is the result of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, must cease to accrue when the use thereof is no longer necessary for the changed Work.

- d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
- e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
- f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of builder's risk or other property insurance established in accordance with Paragraph 6.04), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will be included in the Cost of the Work for the purpose of determining Contractor's fee.

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
 - h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
 - i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.
- C. *Costs Excluded:* The term Cost of the Work does not include any of the following items:
- 1. Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
 - 2. The cost of purchasing, renting, or furnishing small tools and hand tools.
 - 3. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
 - 4. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
 - 5. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
 - 6. Expenses incurred in preparing and advancing Claims.
 - 7. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.
- D. *Contractor's Fee*
- 1. When the Work as a whole is performed on the basis of cost-plus-a-fee, then:
 - a. Contractor's fee for the Work set forth in the Contract Documents as of the Effective Date of the Contract will be determined as set forth in the Agreement.
 - b. for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work, Contractor's fee will be determined as follows:
 - 1) When the fee for the Work as a whole is a percentage of the Cost of the Work, the fee will automatically adjust as the Cost of the Work changes.
 - 2) When the fee for the Work as a whole is a fixed fee, the fee for any additions or deletions will be determined in accordance with Paragraph 11.07.C.2.
 - 2. When the Work as a whole is performed on the basis of a stipulated sum, or any other basis other than cost-plus-a-fee, then Contractor's fee for any Work covered by a Change

Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work will be determined in accordance with Paragraph 11.07.C.2.

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

13.02 Allowances

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

13.03 Unit Price Work

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision

thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, and the final adjustment of Contract Price will be set forth in a Change Order, subject to the provisions of the following paragraph.

E. *Adjustments in Unit Price*

1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:
 - a. the quantity of the item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 - b. Contractor's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.
2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to perform such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.
3. Adjusted unit prices will apply to all units of that item.

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

14.01 *Access to Work*

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

14.02 *Tests, Inspections, and Approvals*

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work will be governed by the provisions of Paragraph 14.05.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
 2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
 3. by manufacturers of equipment furnished under the Contract Documents;
 4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
 5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

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

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

14.03 *Defective Work*

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

losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

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

14.05 *Uncovering Work*

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

14.06 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work,

or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work will not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace defective Work as required by Engineer, then Owner may, after 7 days' written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.
- C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

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

15.01 *Progress Payments*

- A. *Basis for Progress Payments:* The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments for Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. *Applications for Payments*
 - 1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents.
 - 2. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment must also be accompanied by: (a) a bill of sale, invoice, copies of subcontract or purchase order payments, or other documentation

establishing full payment by Contractor for the materials and equipment; (b) at Owner's request, documentation warranting that Owner has received the materials and equipment free and clear of all Liens; and (c) evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

3. Beginning with the second Application for Payment, each Application must include an affidavit of Contractor stating that all previous progress payments received by Contractor have been applied to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
4. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. *Review of Applications*

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work;
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto;
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work;
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid by Owner; or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.
6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or
 - e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. Payment Becomes Due

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

E. Reductions in Payment by Owner

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
 - a. Claims have been made against Owner based on Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages resulting from Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

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

15.02 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than 7 days after the time of payment by Owner.

15.03 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time

submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which will fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have 7 days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.
- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without

significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. At any time, Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through 15.03.E for that part of the Work.
2. At any time, Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.04 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

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

15.06 *Final Payment*

A. *Application for Payment*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.12), and other documents, Contractor may make application for final payment.
2. The final Application for Payment must be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents;
 - b. consent of the surety, if any, to final payment;
 - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.

- d. a list of all duly pending Change Proposals and Claims; and
 - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.
- B. *Engineer's Review of Final Application and Recommendation of Payment:* If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within 10 days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the final Application for Payment to Owner for payment. Such recommendation will account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.
- C. *Notice of Acceptability:* In support of its recommendation of payment of the final Application for Payment, Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to stated limitations in the notice and to the provisions of Paragraph 15.07.
- D. *Completion of Work:* The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment and issuance of notice of the acceptability of the Work.
- E. *Final Payment Becomes Due:* Upon receipt from Engineer of the final Application for Payment and accompanying documentation, Owner shall set off against the amount recommended by Engineer for final payment any further sum to which Owner is entitled, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions of this Contract with respect to progress payments. Owner shall pay the resulting balance due to Contractor within 30 days of Owner's receipt of the final Application for Payment from Engineer.

15.07 *Waiver of Claims*

- A. By making final payment, Owner waives its claim or right to liquidated damages or other damages for late completion by Contractor, except as set forth in an outstanding Claim,

appeal under the provisions of Article 17, set-off, or express reservation of rights by Owner. Owner reserves all other claims or rights after final payment.

- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted as a Claim, or appealed under the provisions of Article 17.

15.08 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the Supplementary Conditions or the terms of any applicable special guarantee required by the Contract Documents), Owner gives Contractor written notice that any Work has been found to be defective, or that Contractor's repair of any damages to the Site or adjacent areas has been found to be defective, then after receipt of such notice of defect Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. correct the defective repairs to the Site or such adjacent areas;
 - 2. correct such defective Work;
 - 3. remove the defective Work from the Project and replace it with Work that is not defective, if the defective Work has been rejected by Owner, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting from the corrective measures.
- B. Owner shall give any such notice of defect within 60 days of the discovery that such Work or repairs is defective. If such notice is given within such 60 days but after the end of the correction period, the notice will be deemed a notice of defective Work under Paragraph 7.17.B.
- C. If, after receipt of a notice of defect within 60 days and within the correction period, Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others). Contractor's failure to pay such costs, losses, and damages within 10 days of invoice from Owner will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the failure to pay.
- D. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- E. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

- F. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph are not to be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

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

16.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:
 - 1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment, or failure to adhere to the Progress Schedule);
 - 2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
 - 3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or
 - 4. Contractor's repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) 10 days' written notice that Owner is considering a declaration that Contractor is in default and termination of the Contract, Owner may proceed to:
 - 1. declare Contractor to be in default, and give Contractor (and any surety) written notice that the Contract is terminated; and
 - 2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within 7 days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects,

attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond will govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate for Convenience*

- A. Upon 7 days' written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and
 - 3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid for any loss of anticipated profits or revenue, post-termination overhead costs, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon 7 days' written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, 7 days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The

provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17—FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this article:
1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full, pursuant to Article 12; and
 2. Disputes between Owner and Contractor concerning the Work, or obligations under the Contract Documents, that arise after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this article, Owner or Contractor may:
1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions;
 2. agree with the other party to submit the dispute to another dispute resolution process; or
 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18—MISCELLANEOUS

18.01 *Giving Notice*

- A. Whenever any provision of the Contract requires the giving of written notice to Owner, Engineer, or Contractor, it will be deemed to have been validly given only if delivered:
1. in person, by a commercial courier service or otherwise, to the recipient's place of business;
 2. by registered or certified mail, postage prepaid, to the recipient's place of business; or
 3. by e-mail to the recipient, with the words "Formal Notice" or similar in the e-mail's subject line.

18.02 *Computation of Times*

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

18.03 *Cumulative Remedies*

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

18.04 *Limitation of Damages*

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

18.05 *No Waiver*

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

18.06 *Survival of Obligations*

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

18.07 *Controlling Law*

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

18.08 *Assignment of Contract*

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

18.09 *Successors and Assigns*

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

18.10 *Headings*

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

SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

TABLE OF CONTENTS

	Page
Article 1— Definitions and Terminology.....	1
Article 2— Preliminary Matters.....	1
Article 3— Contract Documents: Intent, Requirements, Reuse.....	5
Article 4— Commencement and Progress of the Work.....	5
Article 5— Site, Subsurface and Physical Conditions, Hazardous Environmental Conditions.....	6
Article 6— Bonds and Insurance.....	6
Article 7— Contractor’s Responsibilities.....	11
Article 8— Other Work at the Site.....	11
Article 9— Owner’s Responsibilities.....	12
Not used.....	12
Article 10— Engineer’s Status During Construction.....	12
Article 11— Changes to the Contract.....	13
Article 12— Claims.....	13
Article 13— Cost of Work; Allowances, Unit Price Work.....	14
Not used.....	14
Article 14— Tests and Inspections; Correction, Removal, or Acceptance of Defective Work.....	14
Article 15— Payments to Contractor, Set Offs; Completions; Correction Period.....	14
Article 16— Suspension of Work and Termination.....	15
Article 17— Final Resolutions of Disputes.....	15
Article 18— Miscellaneous.....	17
Not used.....	17
Article 19— Federal Requirements.....	17

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

Not used.

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 zero printed copies of the Contract Documents (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF).

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

- A. Owner shall furnish to Contractor zero printed copies of conformed Contract Documents incorporating and integrating all Addenda and any amendments negotiated prior to the Effective Date of the Contract (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies of the conformed Contract Documents will be furnished upon request at the cost of reproduction.

2.06 *Electronic Transmittals*

SC-2.06 Delete Paragraphs 2.06.B and 2.06.C in their entirety and insert the following in their place:

B. *Electronic Documents Protocol*: The parties shall conform to the following provisions in Paragraphs 2.06.B and 2.06.C, together referred to as the Electronic Documents Protocol (“EDP” or “Protocol”) for exchange of electronic transmittals.

1. *Basic Requirements*

- a. To the fullest extent practical, the parties agree to and will transmit and accept Electronic Documents in an electronic or digital format using the procedures described in this Protocol. Use of the Electronic Documents and any information contained therein is subject to the requirements of this Protocol and other provisions of the Contract.
- b. The contents of the information in any Electronic Document will be the responsibility of the transmitting party.
- c. Electronic Documents as exchanged by this Protocol may be used in the same manner as the printed versions of the same documents that are exchanged using non-electronic format and methods, subject to the same governing requirements, limitations, and restrictions, set forth in the Contract Documents.
- d. Except as otherwise explicitly stated herein, the terms of this Protocol will be incorporated into any other agreement or subcontract between a party and any third party for any portion of the Work on the Project, or any Project-related services, where that third party is, either directly or indirectly, required to exchange Electronic Documents with a party or with Engineer. Nothing herein will modify the requirements of the Contract regarding communications between and among the parties and their subcontractors and consultants.
- e. When transmitting Electronic Documents, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the receiving party’s use of software application packages, operating systems, or computer hardware differing from those established in this Protocol.
- f. Nothing herein negates any obligation 1) in the Contract to create, provide, or maintain an original printed record version of Drawings and Specifications, signed and sealed according to applicable Laws and Regulations; 2) to comply with any applicable Law or Regulation governing the signing and sealing of design documents or the signing and electronic transmission of any other documents; or 3) to comply with the notice requirements of Paragraph 18.01 of the General Conditions.

2. *System Infrastructure for Electronic Document Exchange*

- a. Each party will provide hardware, operating system(s) software, internet, e-mail, and large file transfer functions (“System Infrastructure”) at its own cost and sufficient for complying with the EDP requirements. With the exception of minimum standards set forth in this EDP, and any explicit system requirements specified by attachment to this EDP, it is the obligation of each party to determine, for itself, its own System Infrastructure.

- 1) The maximum size of an email attachment for exchange of Electronic Documents under this EDP is 24 MB. Attachments larger than that may be exchanged using large file transfer functions or physical media.
 - 2) Each Party assumes full and complete responsibility for any and all of its own costs, delays, deficiencies, and errors associated with converting, translating, updating, verifying, licensing, or otherwise enabling its System Infrastructure, including operating systems and software, for use with respect to this EDP.
- b. Each party is responsible for its own system operations, security, back-up, archiving, audits, printing resources, and other Information Technology ("IT") for maintaining operations of its System Infrastructure during the Project, including coordination with the party's individual(s) or entity responsible for managing its System Infrastructure and capable of addressing routine communications and other IT issues affecting the exchange of Electronic Documents.
 - c. Each party will operate and maintain industry-standard, industry-accepted, ISO-standard, commercial-grade security software and systems that are intended to protect the other party from: software viruses and other malicious software like worms, trojans, adware; data breaches; loss of confidentiality; and other threats in the transmission to or storage of information from the other parties, including transmission of Electronic Documents by physical media such as CD/DVD/flash drive/hard drive. To the extent that a party maintains and operates such security software and systems, it shall not be liable to the other party for any breach of system security.
 - d. In the case of disputes, conflicts, or modifications to the EDP required to address issues affecting System Infrastructure, the parties shall cooperatively resolve the issues; but, failing resolution, the Owner is authorized to make and require reasonable and necessary changes to the EDP to effectuate its original intent. If the changes cause additional cost or time to Contractor, not reasonably anticipated under the original EDP, Contractor may seek an adjustment in price or time under the appropriate process in the Contract.
 - e. Each party is responsible for its own back-up and archive of documents sent and received during the term of the contract under this EDP, unless this EDP establishes a Project document archive, either as part of a mandatory Project website or other communications protocol, upon which the parties may rely for document archiving during the specified term of operation of such Project document archive. Further, each party remains solely responsible for its own post-Project back-up and archive of Project documents after the term of the Contract, or after termination of the Project document archive, if one is established, for as long as required by the Contract and as each party deems necessary for its own purposes.
 - f. If a receiving party receives an obviously corrupted, damaged, or unreadable Electronic Document, the receiving party will advise the sending party of the incomplete transmission.
 - g. The parties will bring any non-conforming Electronic Documents into compliance with the EDP. The parties will attempt to complete a successful transmission of the

Electronic Document or use an alternative delivery method to complete the communication.

- h. The Owner will operate a Project information management system (also referred to in this EDP as "Project Website") for use of Owner, Engineer and Contractor during the Project for exchange and storage of Project-related communications and information. Except as otherwise provided in this EDP or the General Conditions, use of the Project Website by the parties as described in this Paragraph will be mandatory for exchange of Project documents, communications, submittals, and other Project-related information. The following conditions and standards will govern use of the Project Website:
 - 1) Describe the period of time during which the Project Website will be operated and be available for reliance by the parties;
 - 2) Provide any minimum system infrastructure, software licensing and security standards for access to and use of the Project Website;
 - 3) Describe the types and extent of services to be provided at the Project Website (such as large file transfer, email, communication and document archives, etc.); and
 - 4) Include any other Project Website attributes that may be pertinent to Contractor's use of the facility and pricing of such use.

C. *Software Requirements for Electronic Document Exchange; Limitations*

- 1. Each party will acquire the software and software licenses necessary to create and transmit Electronic Documents and to read and to use any Electronic Documents received from the other party (and if relevant from third parties), using the software formats required in this section of the EDP.
 - a. Prior to using any updated version of the software required in this section for sending Electronic Documents to the other party, the originating party will first notify and receive concurrence from the other party for use of the updated version or adjust its transmission to comply with this EDP.
- 2. The parties agree not to intentionally edit, reverse engineer, decrypt, remove security or encryption features, or convert to another format for modification purposes any Electronic Document or information contained therein that was transmitted in a software data format, including Portable Document Format (PDF), intended by sender not to be modified, unless the receiving party obtains the permission of the sending party or is citing or quoting excerpts of the Electronic Document for Project purposes.
- 3. Software and data formats for exchange of Electronic Documents will conform to the requirements set forth in Exhibit A to this EDP, including software versions, if listed.

SC-2.06 Supplement Paragraph 2.06 of the General Conditions by adding the following paragraph:

D. *Requests by Contractor for Electronic Documents in Other Formats*

- 1. Release of any Electronic Document versions of the Project documents in formats other than those identified in the Electronic Documents Protocol (if any) or elsewhere in the Contract will be at the sole discretion of the Owner.

2. To extent determined by Owner, in its sole discretion, to be prudent and necessary, release of Electronic Documents versions of Project documents and other Project information requested by Contractor (“Request”) in formats other than those identified in the Electronic Documents Protocol (if any) or elsewhere in the Contract will be subject to the provisions of the Owner’s response to the Request, and to the following conditions to which Contractor agrees:
 - a. The content included in the Electronic Documents created by Engineer and covered by the Request was prepared by Engineer as an internal working document for Engineer’s purposes solely, and is being provided to Contractor on an “AS IS” basis without any warranties of any kind, including, but not limited to any implied warranties of fitness for any purpose. As such, Contractor is advised and acknowledges that the content may not be suitable for Contractor’s application, or may require substantial modification and independent verification by Contractor. The content may include limited resolution of models, not-to-scale schematic representations and symbols, use of notes to convey design concepts in lieu of accurate graphics, approximations, graphical simplifications, undocumented intermediate revisions, and other devices that may affect subsequent reuse.
 - b. Electronic Documents containing text, graphics, metadata, or other types of data that are provided by Engineer to Contractor under the request are only for convenience of Contractor. Any conclusion or information obtained or derived from such data will be at the Contractor’s sole risk and the Contractor waives any claims against Engineer or Owner arising from use of data in Electronic Documents covered by the Request.
 - c. Contractor shall indemnify and hold harmless Owner and Engineer and their subconsultants from all claims, damages, losses, and expenses, including attorneys’ fees and defense costs arising out of or resulting from Contractor’s use, adaptation, or distribution of any Electronic Documents provided under the Request.
 - d. Contractor agrees not to sell, copy, transfer, forward, give away or otherwise distribute this information (in source or modified file format) to any third party without the direct written authorization of Engineer, unless such distribution is specifically identified in the Request and is limited to Contractor’s subcontractors. Contractor warrants that subsequent use by Contractor’s subcontractors complies with all terms of the Contract Documents and Owner’s response to Request.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

SC-3.01 Delete Paragraph 3.01.C in its entirety.

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.

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

Not used.

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).

6.02 *Insurance—General Provisions*

SC-6.02 Add the following paragraph immediately after Paragraph 6.02.B:

1. Contractor may obtain worker’s compensation insurance from an insurance company that has not been rated by A.M. Best, provided that such company (a) is domiciled in the state in which the Project is located, (b) is certified or authorized as a worker’s compensation insurance provider by the appropriate state agency, and (c) has been accepted to provide worker’s compensation insurance for similar projects by the state within the last 12 months.

SC-6.02 Add the following paragraph immediately after Paragraph 6.02.H.2 of the General Conditions:

3. For the following Subcontractors, Suppliers, or categories of Subcontractor or Supplier, Contractor shall require the following specified insurance, with policy limits as stated: [Identify Subcontractors, Suppliers, or categories of same, and insert specific insurance requirements and policy limits]

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:

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

Workers' Compensation and Related Policies	Policy limits of not less than:
Workers' Compensation	
State	Statutory
Applicable Federal (e.g., Longshoreman's)	Statutory
Foreign voluntary workers' compensation (employer's responsibility coverage), if applicable	Statutory
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.
 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
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 \$0 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	\$
General Aggregate	\$

- 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.

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 Delete Paragraph 6.04.A and insert the following in its place:

- A. Owner 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.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.03 *Labor; Working Hours*

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

1. Regular working hours will be 7 AM to 6 PM.
2. Owner's legal holidays during the project schedule are Memorial Day, 4th of July, Labor 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 Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday."

SC-7.03 Delete Paragraph 7.03.C in its entirety, and insert the following:

- C. In the absence of any Laws or Regulations to the contrary, Contractor may perform the Work on holidays, during any or all hours of the day, and on any or all days of the week, at Contractor's sole discretion.

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

- D. Contractor 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 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.

SC-7.03 Add the following new subparagraph immediately after Paragraph SC-7.03.D:

1. For purposes of administering the foregoing requirement, additional overtime costs are defined as Work on a Saturday, Sunday, or any legal holiday.

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.

7.13 *Safety and Protection*

ARTICLE 8—OTHER WORK AT THE SITE

Not used.

ARTICLE 9—OWNER’S RESPONSIBILITIES

Not used.

ARTICLE 10—ENGINEER’S STATUS DURING CONSTRUCTION

10.03 *Resident Project Representative*

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

1. On this Project, by agreement with the Owner, the Engineer will not furnish a Resident Project Representative to represent Engineer at the Site or assist Engineer in observing the progress and quality of the Work.

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*
 - 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 11—CHANGES TO THE CONTRACT

No suggested Supplementary Conditions in this Article.

ARTICLE 12—CLAIMS

Replace Article 12 with the following:

12.01 Claims

- A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 15.07, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.

- B. Notice: Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 11.07. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 11.08. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).
- C. Engineer's Action: Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
 - 1. deny the Claim in whole or in part;
 - 2. approve the Claim; or
 - 3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.
- E. Engineer's written action under Paragraph 12.01.C or denial pursuant to Paragraphs 12.01.C.3 or 12.01.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 17 within 30 days of such action or denial.
- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 12.01.

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

Not used.

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

Not used.

ARTICLE 15—PAYMENTS TO CONTRACTOR, SET OFFS; COMPLETIONS; CORRECTION PERIOD

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.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

No suggested Supplementary Conditions in this Article.

ARTICLE 17—FINAL RESOLUTIONS OF DISPUTES

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:
 - 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. [Note: If there is no Paragraph 17.02, because neither arbitration nor any other dispute resolution process has been specified here in the Supplementary Conditions, then revise this to state "Add the following new Paragraph immediately after Paragraph 17.01" and revise the numbering accordingly].

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.

ARTICLE 18—MISCELLANEOUS

Not used.

ARTICLE 19—FEDERAL REQUIREMENTS

Not used.

WORK CHANGE DIRECTIVE NO.: [Number of Work Change Directive]

Owner: Village of Elk Rapids
Engineer: Gosling Czubak Engineering Sciences, Inc.
Contractor:
Project:
Contract Name:
Date Issued: Effective Date of Work Change Directive:
Owner's Project No.:
Engineer's Project No.:
Contractor's Project No.:

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

Description:

[Description of the change to the Work]

Attachments:

[List documents related to the change to the Work]

Purpose for the Work Change Directive:

[Describe the purpose for the change to the Work]

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

Notes to User—Check one or both of the following

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

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

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

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

Basis of estimated change in Contract Price:

Lump Sum Unit Price Cost of the Work Other

Recommended by Engineer

Authorized by Owner

By:

Title:

Date:

CHANGE ORDER NO.: [Number of Change Order]

Owner: Village of Elk Rapids
 Engineer: Gosling Czubak Engineering Sciences, Inc.
 Contractor:
 Project:
 Contract Name:
 Date Issued: Effective Date of Change Order:

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

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

Description:

[Description of the change]

Attachments:

[List documents related to the change]

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: _____

<u>Recommended by Engineer (if required)</u>	<u>Accepted by Contractor</u>
By: _____	_____
Title: _____	_____
Date: _____	_____
<u>Authorized by Owner</u>	<u>Approved by Funding Agency (if applicable)</u>
By: _____	_____
Title: _____	_____
Date: _____	_____

Technical Specifications

Phase 2 Water and Sewer Improvements
Various Locations

Village of Elk Rapids MI

Owner:

Elk Rapids

315 Bridge Street

Elk Rapids, MI 49629

Engineer:

Gosling Czubak Engineering Sciences, Inc.

1280 Business Park Drive

Traverse City, Michigan

(231) 946-9191

www.goslingczubak.com

April 1, 2026

GCES Project # 240424



- CIVIL ENGINEERING
- SURVEYING
- ENVIRONMENTAL SERVICES
- CONSTRUCTION SERVICES
- GEOTECHNICAL
- DRILLING
- LANDSCAPE ARCHITECTURE

**INDEX
TECHNICAL SPECIFICATIONS**

<u>INDEX</u>	<u>PAGES</u>
<u>DIVISION 1 – GENERAL REQUIREMENTS</u>	
01 00 01	SUMMARY OF WORK 1
01 20 00	PRICE AND PAYMENT PROCEDURE 4
01 25 13	PRODUCT SUBSTITUTION PROCEDURES 2
01 29 76	PROGRESS PAYMENT PROCEDURES 1
01 31 19	PROJECT MEETINGS 2
01 32 16	CONSTRUCTION PROGRESS SCHEDULE 1
01 32 36	VIDEO MONITORING AND DOCUMENTATION 2
01 33 23	SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES 1
01 41 00	REGULATORY REQUIREMENTS 1
01 42 13	ABBREVIATIONS AND SYMBOLS 1
01 45 29	TESTING LABORATORY SERVICES 1
01 51 36	TEMPORARY WATER 3
01 56 00	TEMPORARY BARRIERS AND ENCLOSURES 2
01 56 23	TRAFFIC REGULATION 1
01 66 00	MATERIALS AND EQUIPMENT 1
01 71 23	FIELD ENGINEERING 1
01 78 00	CONTRACT CLOSEOUT SUBMITTALS 1
01 78 23	OPERATION AND MAINTENANCE DATA 1
<u>DIVISION 3 - CONCRETE</u>	
03 30 53	MISCELLANEOUS CAST IN PLACE CONCRETE 8
<u>DIVISION 31 – EARTHWORK</u>	
31 00 00	EARTHWORK 5
31 23 19	DEWATERING 2
31 25 00	EROSION CONTROL 6
31 40 00	SHORING AND UNDERPINNING 1
<u>DIVISION 32 – EXTERIOR IMPROVEMENTS</u>	
32 12 16	APHALT PAVING 3
32 13 13	CONCRETE PAVING 2
32 15 00	AGGREGATE SURFACES 1
32 16 13	CURBS AND GUTTERS 2
32 16 23	SIDEWALKS 2
32 17 23	PAVEMENT MARKING 2
32 90 00	PLANTING 2
<u>DIVISION 33 – UTILITIES</u>	
33 01 30.11	TELEVISION INSPECTION OF SEWERS 4
33 01 30.41	CLEANING OF SEWERS 4
33 01 30.42	CLEANING OF MANHOLES 2
33 01 30.51	SANITARY SEWER BYPASS PUMPING 3
33 01 30.61	CURED IN PLACE PIPE LINING 17
33 01 30.81	SANITARY SEWERAGE MANHOLE REHABILITATION 2
33 05 17.13	UTILITY DIRECTIONAL DRILLING 8
33 09 10	INSTRUMENTATION AND CONTROLS 1
33 11 00.19	ABANDONMENT OF WATER MAINS 5
33 14 13	PUBLIC WATER UTILITY DISTRIBUTION PIPING 11

VILLAGE OF ELK RAPIDS
PHASE 2 WATER AND SEWER IMPROVEMENTS

INDEX

33 31 00.13	ABANDONMENT OF SEWER MAINS	6
33 31 11	PUBLIC SANITARY SEWERAGE GRAVITY PIPING	4
33 40 00	STORMWATER UTILITIES	3

APPENDICIES

APPENDIX A	WATER AND SEWER SERVICE SCHEDULE	3
APPENDIX B	SOIL BORING LOGS	15
APPENDIX C	EPA A GUIDE TO NORMAL DEMOLITION PRACTICES UNDER THE ASBESTOS NESHAP	31
APPENDIX D	UNDERSTANDING THE ASBESTOS NESHAP	14
APPENDIX E	ACT 399 PERMIT	2

SECTION 01 00 10
SUMMARY OF WORK

PART 1 GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

Work will include:

A. Sanitary Sewer System Improvements

1. 1,975 feet of 6" sanitary sewer forcemain in Lake and Ames Streets between Iroquois and Golf View Lane.
2. 1,104 feet of 8" sanitary sewer in Lake Street between Brand and Bass Streets; remove and replace.
3. 1,293 feet of 8" sanitary sewer in Loomis Street between US-31 and Pump Station 6; remove and replace and new.
4. 708 feet of 8" sanitary sewer in Loomis Street between US-31 and Pump Station 6; abandon sewer demo structures.
5. 692 feet of 10" sanitary sewer in Traverse Street alley between Spruce Street and Pine Street; remove and replace.
6. 1,205 feet of 12" sanitary sewer in 1st Street between US-31 and Pine Street; clean and line.
7. 766 feet of 10" sanitary sewer in Lake Street between Loomis Street and Pump Station 6; clean and line.
8. 253 feet of 10" sanitary sewer truss pipe in Iron Treatment Plant Property between Lake Street and Pump Station 6; clean and line.

B. Water System Improvements

1. 1,118 feet of 8" PVC C900 water main in Loomis Street between US-31 and Lake Street.
2. 3,298 feet of 8" PVC C900 water main in Lake Street between Loomis Street and Ames Street.
3. 306 feet of 8" PVC C900 water main in Henry Street between Ames Street and Buckley Street.
4. 140 feet of 14" HDPE water main in US-31 crossing from east to west at Elk Lake Road.

1.02 CONTRACTS

All work will be awarded in one contract.

1.03 ALTERNATES

A. Alternate A - Select Street Improvements

1. Resurface a total of 4,410 SYD of Village Streets in the following locations:
 - a. Center Road from Ames Street to Second Street.
 - b. Elm Street from River Street to Traverse Street.
 - c. North Bay Shore Drive from Dexter Street to approximately 450 feet north of Dexter.

B. Alternate B - Fiber Conduit, Installation of 7,125 feet of 1.25" SDR 11 HDPE Conduit in the following locations.

- a. Lake Street from Loomis to Ames
- b. Loomis Street from Lake to east of US-31
- c. Ames from Lake to Golf View Lane
- d. Henry Street from Ames to Buckley

1.04 WORK BY OTHERS

Pump Station 2 Improvements at the intersection of Lake Street and Iroquois will connect to the proposed gravity sanitary sewer and new force main. Contractors will need to coordinate working in same proximity and connections.

- 1.05 FUTURE WORK
No future work is anticipated that will affect work under this project.
- 1.06 WORK SEQUENCE
No special sequencing is required.
- 1.07 COORDINATION
Coordinate all work with the OWNER to minimize any inconvenience.
- 1.08 AVAILABILITY OF LANDS
All work will take place on property owned or controlled by the OWNER or within the public right-of-way.
- 1.09 PRE-ORDERED ITEMS
No items have been pre-ordered for this project.
- 1.10 OWNER FURNISHED ITEMS
No items are to be Owner furnished for this project.
- 1.11 PROJECT IDENTIFICATION AND SIGNS
Project identification signs are required.
- 1.12 AUDIO-VIDEO ROUTE SURVEY
Contractor shall be required to provide an audio-video route survey for prior to start of construction. The audio-video survey shall be in accordance with Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 20 00

PRICE AND PAYMENT PROCEDURE

PART 1 GENERAL

1.01 SUMMARY

- A. Refer to Article 14 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 his agents 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.

1.02 APPLICATION FOR PAYMENT

- A. Pay period: 30 days.
- 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 14.2.
- 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:

- A. Item No. 1 Mobilization
 - 1. Payment includes obtaining bond, preparatory work and operation, for the movement of personnel, equipment, supplies, and incidentals to the project site; establishment of a project office and other facilities needed to undertake the Work.
 - 2. Unit of measure: Lump Sum.

- B. Item No. 2 Audio Visual Route Survey
 - 1. Payment includes two copies of an audio-video recording of the proposed site construction area submitted to Engineer for review prior to the preconstruction meeting. Any recorded coverage not acceptable to the Owner shall be redone at no additional charge. No materials or equipment are to be on the construction site prior to review and approval of the audio-video tape.
 - 2. Unit of measure: Lump Sum

- C. Item No. 3 Traffic Control
 - 1. Payment includes furnishing and operating all barricades, signing, detour routes, flagmen, fencing, warning devices and other materials and equipment to control traffic and safeguard the work site.
 - 2. Unit of measure: Lump Sum.

- D. Item No. 4 Soil Erosion and Sedimentation Control
 - 1. Payment includes installation, monitoring, cleaning and replacement as required of inlet filters or approved protection measures at all storm water collection structures throughout the construction area. Other measures as required to prevent sand and sediment from entering open drains, ditches, culverts and discharging to adjacent lakes and all other needed work as stated in Section 31 25 00 or as directed by the engineer.
 - 2. Unit of Measure: Lump Sum.

- E. Item No. 5 Dewatering
 - 1. Payment includes all material and labor necessary for proper dewatering of areas under construction for the installation of underground utilities according to Section 31 23 19.
 - 2. Unit of measure: Lump Sum.

- F. Item No. 6 Asphalt Removal
 - 1. Payment includes crushing and salvaging pavement and stockpiling as necessary to perform underground work.
 - 2. Unit of measure: Square yard of pavement crushed, based on existing pavement width shown on plans.

- G. Item No. 7 Concrete Removal
 - 1. Payment includes saw cutting, removing, and disposing of concrete sidewalk, driveway or other miscellaneous pavement.
 - 2. Unit of measure: Square foot of concrete removed.

- H. Item No. 8 Curb and Gutter Removal
 - 1. Payment includes removing and disposing of concrete curb and gutter.
 - 2. Unit of measure: LF based on plans.

- I. Item No.9 Tree Removal
 - 1. Payment includes removing tree trunk, limbs, branches, and stump grinding to 6" below grade and disposal of materials where indicated on plans.
 - 2. Unit of measure: EA.

- J. Item No. 10 Exploratory Digging
 - 1. Payment includes field verify location of watermain in Lake Street from Iroquois to Ames to determine if remove and replacement is required.
 - 2. Unit of measure: LS.

- K. Item No. 11 Temporary Water Service
 - 1. Payment includes installation of temporary water main, pressure testing, disinfection and testing, temporary water services, operation and maintenance, and removal.
 - 2. Unit of measure: Lump sum.

- L. Item No. 12 Watermain Removal
 - 1. Payment includes removal and disposal of existing watermain needed for installation of new. Removal includes all safety measures for handling and incidental materials needed for disposal of Asbestos Cement pipe.
 - 2. Unit of measure: Linear feet of watermain for each size listed in the Bid Schedule.

- M. Item Nos. 13&14 Water Main, Open Cut
 - 1. Payment includes all material and labor necessary for proper installation of the watermain including but not limited to piping, fittings, joint restraints, bedding, backfill, fill materials, thrust blocks, locators, flushing and testing.
 - 2. Unit of measure: Lineal foot installed, measured along center of pipe from center of fitting to center of fitting for each size and material of pipe listed in the Bid Schedule.

- N. Item Nos. 15 Water Main, Horizontal Directional Drill
 - 1. Payment includes all material and labor necessary for proper installation of the watermain including but not limited to piping, fittings, joint restraints, bedding, backfill, fill materials, thrust blocks, locators, flushing and testing.
 - 2. Unit of measure: Lineal foot installed, measured along center of pipe from center of fitting to center of fitting for each size and material of pipe listed in the Bid Schedule.

- O. Item Nos. 16 & 17 Gate Valve & Box
 - 1. Payment includes furnishing and installation of valve, valve box with lid, restraints, and testing.
 - 2. Unit of measure: Each valve installed for each size listed in the Bid Schedule.

- P. Item Nos. 18 & 19 Tapping Sleeve & Valve
 - 1. Payment includes installation, tapping sleeve, tapping valve, valve box with lid, piping, fittings and tapping the water main.
 - 2. Unit of measure: Each tapping sleeve and valve installed for each size listed in the Bid Schedule.

- Q. Item Nos. 20 & 21 New Water Service
 - 1. Payment includes installation (either open cut or directional bore) excavation, compaction, trimming, piping, fittings, flushing, disinfection, adapter if necessary, and connection to existing building piping. New service line shall be 1" unless otherwise noted.
 - 2. Unit of measure: Lineal foot installed, measured from corporation stop to end of service line for each size listed in the Bid Schedule.

- R. Item Nos. 22 & 23 Corporation Stops
 - 1. Payment includes installation of corporation stop and connecting to service line.
 - 2. Unit of measure: Each corporation stop installed for each size listed in the Bid Schedule.

- S. Item No. 24 & 25 Curb Stops
 - 1. Payment includes installation of curb stop valve, box, lid, stationary rod, supporting block under the box, connection to service line, and temporary cap or plug.
 - 2. Unit of measure: Each curb stop installed, for each size listed in the Bid Schedule.

- T. Item No. 26 Hydrant Assembly
 - 1. Payment includes installation of hydrant including snow barrel, shut off valve, valve box with lid, tee, piping from main to hydrant, and pipe restraints as shown on plans.
 - 2. Unit of measure: Each hydrant assembly installed.

- U. Item No. 27 Salvage Existing Hydrant Assembly
 - 1. Payment includes removal of existing hydrants, hydrant valve and box, and delivery of hydrants to Village DPW or disposal.

2. Unit of measure: Each existing hydrant assembly removed as indicated on the Plans and listed in the Bid Schedule.
- V. Item No. 28 Salvage Existing Gate Valve
1. Payment includes removal of existing valve and box and delivery to Village DPW or disposal.
 2. Unit of measure: Each existing valve assembly removed as indicated on the Plans and listed in the Bid Schedule.
- W. Item No. 29 Connect and Abandon Existing Water Main
1. Payment includes making connection, plugging existing main, remove existing valve (valve housing, assembly, box and lid) delivery of valves to Village DPW or disposal, piping, fittings, joint restraints, bedding, backfill, fill materials, thrust blocks, locators, flushing, testing and material removal.
 2. Unit of measure: EA
- X. Item Nos. 30 Sanitary Sewer Manhole
1. Payment includes installation of sanitary sewer manholes, frame and cover castings, excavation, bedding, backfill, and testing for each manhole shown on the plans.
 2. Unit of measure: Each size listed in the Bid Schedule.
- Y. Item Nos. 31, 32, 33 Sanitary Sewer
1. Payment includes installation of sanitary sewer force main as shown on the plans.
 2. Unit of measure: Linear feet of sanitary sewer force main for each size and type listed in the Bid Schedule.
- Z. Item Nos. 34 New Sanitary Sewer Services
1. Payment includes installation of sanitary sewer piping from new sewer connection to the ROW, WYE, fittings, and connection to existing customer piping.
 2. Unit of measure: Each sanitary service installed or for each size listed in the Bid Schedule.
- AA. Item No. 35 Sanitary Sewer Removal
1. Payment includes removal and disposal of existing sanitary sewer as needed for installation of new.
 2. Unit of measure: Linear feet of sanitary sewer listed in the Bid Schedule.
- BB. Item No. 36 Sanitary Sewer Structure Removal
1. Payment includes removal and disposal of existing sanitary sewer structure as needed for installation of new.
 2. Unit of measure: Each.
- CC. Item No. 37 Sanitary Sewer Structure Abandonment
1. Payment includes abandonment of existing sanitary sewer structures according to the specifications, capping and abandoning existing piping, and disposal of materials.
 2. Unit of measure: Each.
- DD. Item No. 38 Sanitary Sewer Abandonment
1. Payment includes abandonment of existing sanitary sewer according to the specifications, filling with flowable fill, capping and abandoning existing piping, and disposal of materials.
 2. Unit of measure: LF.
- EE. Item No. 39 Connect to Existing Sewer
1. Payment includes making connection to existing sanitary manhole, piping, fittings, joint

restraints, bedding, backfill, fill materials, thrust blocks, locators, flushing, testing and material removal.

2. Unit of measure: Lump Sum.

FF. Item No. 40 Sanitary Sewer Bypass Pumping

1. Payment includes bypass pumping of sanitary wastewater for the replacement of existing sewer, lining of existing sewer, service connections, and connections to existing sewer as shown on the plans.
2. Unit of measure: Lump Sum.

GG. Item No. 41 Sewer Manholes (4' Diameter) Rehab

1. Payment includes cleaning and coating of 4' diameter sanitary sewer manholes.
2. Unit of measure: Each structure listed in the Bid Schedule.

HH. Item Nos. 42, 43, 44, 45, & 46 Sanitary Sewer, Cure in Place

1. Payment includes cleaning, pre-video, installation of liner testing, and post-video as shown on the plans.
2. Unit of measure: Linear feet of sanitary sewer for each size listed in the Bid Schedule.

II. Item No. 47 Sanitary Sewer Force Mains

1. Payment includes installation, piping, fittings, joint restraints, flushing and testing.
2. Unit of measure: Lineal foot installed, measured along center of pipe from center of fitting to center of fitting for each size and material of pipe listed in the Bid Schedule.

JJ. Item No. 48 Sewage Air Release and Vacuum Valve

1. Payment includes installation of air release valve with inlet valve, fittings, and back flushing accessories, force main gate valve where specified, 4 foot diameter manhole, flushing and testing.
2. Unit of measure: Each structure listed in the Bid Schedule.

KK. Item No. 49 Connect Force Main to Existing Sanitary Sewer Manhole

1. Payment includes tapping manhole, modifying flow channel as required, installation of piping and fittings, joint restraints, flushing, and testing.
2. Unit of measure: Each connection of force main to existing sanitary sewer manhole.

LL. Item No. 50 Abandon Existing Force Main

1. Payment includes cutting, capping or plugging existing force main, disposal, bedding, backfill, fill materials, thrust blocks, locators, flushing, testing and material removal.
2. Unit of measure: Lump Sum.

MM. Item No. 51 & 52 Storm Sewer Structure Removal

1. Payment includes removal and disposal of existing storm sewer structure as needed for installation of new for each size listed in the bid schedule.
2. Unit of measure: Each.

NN. Item No. 53, 54, 55, 56, & 57 Storm Sewer Removal

1. Payment includes removal and disposal of existing storm sewer as needed for installation of new.
2. Unit of measure: Linear feet of storm sewer for each size listed in the Bid Schedule.

- OO. Item No. 58 Storm Structure (2' Diameter)
1. Payment includes installation or replacement with new 2' diameter storm sewer manholes and watertight boots, frames and castings.
 2. Unit of measure: Each structure listed in the Bid Schedule.
- PP. Item No. 59 Storm Structure (4' Diameter)
1. Payment includes installation or replacement with new 4' diameter storm sewer manholes and watertight boots, frames and castings.
 2. Unit of measure: Each structure listed in the Bid Schedule.
- QQ. Item Nos. 60, 61, 62, 63, & 64 Storm Sewer
1. Payment includes new storm sewer, installation, fittings, bedding, backfill, fill materials, testing, and video as shown on the plans.
 2. Unit of measure: Linear feet of storm sewer for each size listed in the Bid Schedule.
- RR. Item No. 65 Storm Sewer Connect to Existing System
1. Payment includes connection to existing storm sewer system piping or structure where indicated on the plans. Including but not limited to materials, fittings, coring, boots, backfill, bedding, plugging, and incidentals.
 2. Unit of measure: Each.
- SS. Item No. 66 Grading
1. Payment includes the movement and or redistribution of the soil, sand, rock, gravel, sediment, or other material and compaction.
 2. Unit of measure: Lump Sum.
- TT. Items No. 67 Aggregate Base Course
1. Payment includes preparation of subbase, placement of salvaged crushed material, furnishing and placement of 22A aggregate to achieve 6-inch base, compaction, traffic control and testing.
 2. Unit of measure: Tons placed.
- UU. Item No. 68 HMA Restoration
1. Payment includes bituminous material, placement of pavement, and testing.
 2. Unit of measure: Tons of asphalt measured from truck loads and placed to the limits as shown on Drawings, for the type of bituminous restoration listed in the Bid Schedule as defined within the Specifications.
- VV. Item No. 69 Aggregate Surfaces
1. Payment includes removal of existing, preparation of base, base material, placement of aggregate, compaction and testing in accordance with Section 32 15 00.
 2. Unit of measure: Ton placed.
- WW. Item No. 70 2-foot Aggregate Shoulder
1. Payment includes aggregate material, placement, and testing.
 2. Unit of measure: Ton placed.
- XX. Item No. 71 Install 4-inch Concrete Sidewalk
1. Payment includes preparation of base, base material, placement of aggregate, compaction, reinforcement, placement of concrete, finishing, and testing.
 2. Unit of measure: Square Foot of concrete surface measured in place.
- YY. Item No. 72 Driveway, 6-inch Nonreinforced Concrete
1. Payment includes preparation of base, base material, placement of aggregate, compaction, placement of concrete, finishing, and testing.
 2. Unit of measure: Square yard of concrete surface measured in place.

ZZ. Item No. 73 Curb and/or Gutter

1. Payment includes placement of curb and/or gutter as required or as shown on plans, preparation of base, base material, placement of concrete curb and gutter of the type shown on the plans, traffic control and testing.
2. Unit of measure: Lineal foot installed.

AAA. Item No. 74 Pavement Marking

1. Payment includes pavement markings for street centerlines, edge lines, stop bars, and cross walks where listed in Section 32 17 23.
2. Unit of measure: Lump Sum.

BBB. Item No. 75 Restoration

1. Payment includes providing, placing and grading topsoil, providing and placing seed, fertilizer, and mulch, finish raking and restoration of all areas disturbed by construction activities.
2. Unit of measure: Lump Sum.

CCC. Item No. II Alternate A Milling

1. Payment includes cold milling top course 1.5" of asphalt from existing streets, removal and disposal of spoil and bond coat.
2. Unit of measure: Square Yards.

DDD. Item No. III Alternate B

1. Payment: See Sheet CCC2 of the plan set
2. Unit of Measure: See Sheet CCC2 of the plan set

END OF SECTION

SECTION 01 25 13

PRODUCT SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes substitution of materials, articles, and equipment.
- B. Recommend substitutions in accordance with this section and Section 6.05 of the General Conditions.
- C. Products of equal capacities, quality and function shall be considered.

PART 2 PRODUCTS

2.01 GENERAL

- A. Submit an electronic copy or five hard copies of a complete list of all products proposed for installation within 30 days after date of Contract, unless otherwise indicated in the Contract Documents.
- B. Tabulate the list by each Specification Section.
- C. Include the following for referenced products:
 - 1. Name and address of manufacturer.
 - 2. Trade name.
 - 3. Model or catalog designation.
 - 4. Manufacturer's data including performance and test data, and reference standards.

PART 3 EXECUTION

3.01 CONTRACTOR'S OPTIONS

- A. For products specified by reference, select any product meeting the standards.
- B. Submit a request for substitution for products specified by name.

3.02 GENERAL

- A. Written requests from Bidders will only be considered if received at least ten working days prior to Bid date.
- B. The Engineer will consider formal requests from the Contractor for substitution of specified products within thirty days of Contract unless specified elsewhere in the Contract Documents.
- C. Submit three copies of all substitution requests, plus the number the Contractor would like returned.

- D. Substitutions will not be considered if:
 - 1. Indicated or implied on Shop Drawings or project data submittals without formal request submitted in accordance with this Section and Section 6.05 of the General Conditions.
 - 2. Acceptance will require substantial revision of the Contract Documents.

3.03 SUBMITTALS

- A. Complete data substantiating compliance with the Contract Documents.
- B. For products:
 - 1. Product identification, including manufacturer's name and address.
 - 2. Manufacturer's literature, including product description, performance and test data, and reference standards.
 - 3. Samples.
 - 4. Name and address of similar projects on which the product was used and date of installation.
 - 5. Detailed drawings for modifications to other aspects of the project required for the substitution in accordance with Section 6.05.A.2 of the General Conditions.
- C. For construction methods:
 - 1. Detailed description of the proposed method.
 - 2. Drawings illustrating methods.

3.04 CONTRACTOR'S RESPONSIBILITIES

- A. Investigate the proposed product or method and determine that it is equal or superior in all respects to that which is specified.
- B. Provide the same guarantee for the substitution as for the product or method specified.
- C. Coordinate installation of the accepted substitution into the work, making changes as required for the work to be completed in all respects.
- D. Waive all claims for additional costs related to the substitution.
- E. Include itemized cost estimate in accordance with Section 6.05.A.2 of the General Conditions.

END OF SECTION

SECTION 01 29 76
PROGRESS PAYMENT PROCEDURES

PART 1 GENERAL

1.01 APPLICATION FOR PAYMENT

- A. Preparation:
 - 1. Applications for payment to be submitted in accordance with Article 14 of the General Conditions.
 - 2. Application for payment shall be made on forms provided by or approved by the Engineer.

- B. Schedule of Values:
 - 1. Contractor shall submit a schedule of values for all lump sum items in the Bid Schedule.
 - 2. A preliminary schedule of values shall be submitted to the Engineer for review and approval prior to the preconstruction meeting.
 - 3. Schedule of values will be used only as the basis for the Contractor's application for payment.

- C. Submittals
 - 1. Contractor shall submit an electronic copy or three signed hard copies to the Engineer for review.
 - 2. Application for payment shall be submitted to the Engineer as agreed to at the preconstruction meeting.

PART 2 PRODUCT - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 31 19
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
 - 3. CONTRACTOR
 - 4. Major Subcontractors
 - 5. Utility Companies
 - 6. Safety Representatives
 - 7. Governmental Agencies
- D. Agenda:
 - 1. Distribution by Contractor and discussion of:
 - a. List of names and telephone numbers for superintendent, foreman and other key personnel.
 - b. List of major subcontractors and suppliers.
 - c. Projected Construction Schedules.
 - 2. Critical work sequencing.
 - 3. Major equipment deliveries and priorities.
 - 4. Project coordination
 - 5. Responsibilities of Owner, Engineer, Contractor and other agencies.
 - 6. Utility Discussions
 - a. Critical Utilities
 - 7. Permit Issues
 - 8. Procedures and processing of:
 - a. Field decisions.
 - b. Proposal requests.
 - c. Submittals.
 - d. Change orders.
 - e. Application for payment.
 - 9. Adequacy of distribution of Contract Documents.
 - 10. Procedures for maintaining Record Documents.
 - 11. Use of premises.
 - 12. Construction facilities, controls and construction aids.
 - 13. Temporary utilities.
 - 14. Safety and first aid procedures.
 - 15. Security procedures.
 - 16. Housekeeping procedures.
 - 17. Testing and Staking
 - 18. Record Documents
 - 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. Periodic 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. 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 01 32 16

CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 CONSTRUCTION SCHEDULE

- A. Preparation:
 - 1. Prepare in the form of a horizontal bar chart, CPM network, or other form previously approved by the Engineer.
 - 2. Provide a separate horizontal bar column or path for each trade or operation.
 - 3. Prepare the schedule in the chronological order of the beginning of each item of work.
 - 4. Allow space for updating.
 - 5. The schedule sheets shall be 11" x 17" unless otherwise approved by the Engineer.

- B. Content of schedule:
 - 1. Provide a complete sequence of construction by activity.
 - 2. For Shop Drawings, project data, and samples show the following:
 - a. Submittal dates.
 - b. Dates review copies will be required.
 - 3. Show product procurement and delivery dates.
 - 4. Show dates for beginning and completion of each element of construction.
 - 5. Show projected percentage of completion for each item of work as of the first day of each month.

- C. Updating Schedule:
 - 1. Show all changes occurring since previous submission of the updated schedule.
 - 2. Indicate progress of each activity and show completion dates.
 - 3. Other items required in schedule updates are:
 - a. Major changes in scope.
 - b. Activities modified since previous updating.
 - c. Revised projections due to changes
 - d. Other identifiable changes.

- D. Submittals:
 - 1. Submit initial schedule within 15 days after receipt of a Notice to Proceed.
 - 2. Submit updated schedules accurately depicting progress to the first day of each month.
 - 3. Progress schedules shall be included with the Contractor's monthly application for payment

PART 2 PRODUCT - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 31 32 36

VIDEO MONITORING AND DOCUMENTATION

PART 1 GENERAL

1.01 AUDIO-VIDEO ROUTE SURVEY

A. General:

1. When required in Section 01 00 01 SUMMARY OF WORK, the Contractor shall furnish the engineer with an Audio-Video Route Survey record of the existing conditions.
2. Audio-Video Route Surveys shall:
 - a. Be recorded to a USB portable drive.
 - b. By electronic means, display continuously the date (month, day and year) and time (hours, minutes and seconds).
 - c. Be made on continuously running USB portable drives.
 - d. Be recorded at a rate of speed, equal to a slow walk (2 mph), in the general direction of travel. Panning rates and zoom-in, zoom-out rates shall be controlled sufficiently such that stop action during play-back will produce clarity of detail of the object viewed.
 - e. Be done during times of good visibility. No recording shall be done during periods of visible precipitation, standing water or snow cover unless approved by the Engineer.

B. Content:

1. Complete coverage including all surface features located within the public right-of-way, easement areas and adjacent private properties up to building line when such properties lie within the zone of influence of construction.
2. Coverage shall include but not limited to:
 - a. Driveways
 - b. Sidewalks
 - c. Curbs
 - d. Ditches
 - e. Roadway
 - f. Landscaping
 - g. Trees
 - h. Culverts, headwalls, and retaining walls
 - i. Buildings located within the zone of influence
3. Houses and buildings shall be identified visually by house number, when visible, in such a manner that structures can be located by reference.
4. All locations shall be identified by audio or visual means at intervals not to exceed 100 linear feet in the general direction of travel.

C. Submittals:

- a. One copy of the video shall be submitted to Engineer for review before the preconstruction meeting.
- b. The Engineer shall review the video within five full working days of receipt.
- c. Any recorded coverage not acceptable to the Owner shall be redone at no additional charge.
- d. Contractor shall not place materials or equipment on the construction site prior to review and approval of the audio-video recording.

PART 2 PRODUCT - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 33 23

SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 GENERAL

1.01 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

- A. General:
 - 1. Provide shop drawings in accordance with Article 6 of the General Conditions.
 - 2. Shop Drawings are to be scaled drawings large enough to show all pertinent features of the item and its method of connection to the Work.
 - 3. 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.
 - 4. Samples shall illustrate materials, equipment, or workmanship and establish standards by which completed work is judged.
 - 5. Unless otherwise specifically directed by the Engineer, all samples shall be of the precise article proposed to be furnished.

- B. Submittals:
 - 1. Submit the number of copies that the Contractor requires to be returned, plus three copies that will be retained by the Engineer.
 - 2. All submittals are to be accompanied with a transmittal form that will be provided by or approved by the Engineer.
 - 3. Contractor to thoroughly check Shop Drawings for compliance with the Contract Documents and verify field dimensions and construction criteria:
 - 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.
 - 4. Clearly indicate all deviations in the Shop Drawings from the requirements in the Contract Documents.
 - 5. Make submittals in groups containing all associated items.
 - 6. Provide submittals in advance of scheduled dates of installation to allow time for Engineer review, possible revision, and re-submittal; and for placing orders and securing delivery.
 - 7. Allow 15 working days for Engineer review after receipt of submittal.
 - 8. Cost of delays caused by late submittals shall be the responsibility of the Contractor.

- C. Review of submittals:
 - 1. Submittals will be returned marked with Engineer's review comments.
 - 2. Rejected submittals shall be revised by the Contractor and resubmitted.
 - 3. Engineer's checking of Shop Drawings does not relieve the Contractor of responsibility for errors or omissions.

PART 2 PRODUCT - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 41 00

REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 PERMITS AND FEES

- A. Owners responsibility: The owner will obtain the following permits where applicable.
 - 1. EGLE permit in accordance with Part 41 of Act 451, P.A. 1994 for construction of sanitary sewer facilities.
 - 2. EGLE permit in accordance with Part of Act 399, P.A. 1976.
 - 3. MDOT permit for work within state right-of-way.
 - 4. Soil Erosion and Sedimentation Control Act, Part 91 of Act 451, P.A. 1994.
 - 5. County Road Commission permit for work within county right-of-way.
 - 6. EGLE Wetland permit in accordance with Part 303 of Act 451, P.A. 1994.
 - 7. EGLE Inland Lakes and Streams permit in accordance with Part 301 of Act 451, P.A. 1994.
- B. Contractors responsibility:
 - 1. Meet provisions and requirements of all permits obtained by the Owner.
 - 2. All local or state permits and fees required that are not listed in Section 01 41 00 1.01.A.
 - 3. If applicable, contractor shall get bonding for construction within state highway right-of-way.
- C. All permits obtained to date are attached at the end of the specifications.

1.02 APPLICABLE CODES

- A. All references to codes, specifications, and standards shall refer to the latest edition, amendment, or revision of the reference in effect on the BID due date.
- B. Abbreviations used for codes and references are listed in Section 01 42 13 ABBREVIATIONS AND SYMBOLS.

PART 2 PRODUCT - Not Used

PART 3 EXECUTION - Not Used

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
ACI	- American Concrete Institute
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
FAA	- Federal Aviation Association
EGLE	- Michigan Department of Environment Great Lakes and Energy
MDOT	- Michigan Department of Transportation
MDNR	- Michigan Department of Natural Resources
MI-OSHA	- Michigan Department of Occupational Safety and Health Association
NEC	- National Electric Code
NEMA	- National Electrical Manufacturers Association
NFPA	- National Fire Protection Association
RECD	- Rural Economic Community Development
USEPA	- United States Environmental Protection Agency
UL	- Underwriter's Laboratories

PART 2 PRODUCT - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 42 29
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.
 - 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

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 reports to the Engineer and one copy to the Contractor.

END OF SECTION

TEMPORARY WATER

SECTION 01 51 36
TEMPORARY WATER

1 PART 1 GENERAL

1.01 DESCRIPTION

- A. This section of the Project Specifications includes work related to furnishing and installing temporary water service.
- B. References made to ASTM, ANSI, AWWA, USASI or AASHTO designations shall be the latest revision at the time of call for bids; all specified material included herein shall conform to these standards where such standards exist.
- C. The Contractor shall provide temporary water service to all residential and commercial service connections interrupted by water system replacement. The Contractor shall verify with the Engineer and Owner at least 72 hours (excluding weekends and holidays) prior to the suspension of service the areas where consumers will require a temporary water supply. Temporary water service shall not include temporary service for commercial fire protection unless specifically indicated on the drawings.
- D. The Contractor shall not disrupt a residential water service for more than 4 hours without providing temporary water. At no time shall overnight outages be allowed. The Contractor shall provide homes that are subject to more than two water shut downs with temporary water.
- E. The Contractor also shall not disrupt service to commercial customers unless:
 - 1. The Contractor obtains an authorization letter from the property owner and business owner (if different) at least 48 hours prior to the interruption of service. The owners shall agree in the letter to the time and dates of the interruption of the water service; and
 - 2. The Contractor submits a comprehensive work plan to the Engineer for approval that details the planned methodology to be used to ensure the commercial facility is not out of water for more than the time detailed in the above letter.
- F. The extent of the water system to be taken out of service to perform the work is identified on the plans. The configuration of the temporary water system to provide service to all affected water customers is the Contractors responsibility.
- G. Contractor shall comply with all applicable codes, laws, and regulations.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. The following items of related work are specified and included in other sections of these Specifications:
 - a SECTION 01 11 00 SUMMARY OF WORK
 - b SECTION 01 29 76 - PROGRESS PAYMENT PROCEDURES
 - c SECTION 01 33 23 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES
 - d SECTION 33 14 13 - PUBLIC WATER UTILITY DISTRIBUTION PIPING

TEMPORARY WATER

1.03 SUBMITTALS

- A. Shop drawings and product data shall be submitted for Piping, Fittings, and Appurtenances in accordance with SECTION 01 33 23 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES of these Specifications.
- B. Shop drawings shall include all materials proposed to be used for temporary water. Additionally, a temporary water plan shall be submitted for each area prior to starting the layout of the temporary water system. This submittal shall include as a minimum, connection points, hydrants and/or valves to be operated by the Owner, layout for connection to each service, and the location of all street crossings. Depending on the circumstances of the area, additional information may be required by the Engineer.
- C. Contractor shall notify the Fire Department at least 48 hours in advance whenever the fire supply to any commercial buildings is interrupted.

2 PART 2 PRODUCTS

2.01 TEMPORARY WATER PIPING

- A. The water piping of temporary hoses, piping, etc. shall be a 160-psi rating, NSF approved hose, flexible polyethylene pipe, or PVC pipe. All pipe used for the temporary water system must have a visible NSF approval stamp by the manufacturer. A short section of high-pressure flexible rubber hose may be used for the connection to each residence. The temporary system must be leak proof.
- B. SHUT OFF VALVE
 - 1. The distribution pipe shall have a manual shut-off valve at each service tee. Shutoff valves shall be NSF approved valves.
- C. BACKFLOW PREVENTER
 - 1. The backflow prevention assembly shall be approved by the Engineer and the Owner during the submittal process. Backflow prevention devices shall be designed in accordance with the current AWWA Standard for Double Check Valve or Reduced Pressure Zone Valve Backflow-Prevention Assembly.
 - 2. Each backflow preventer shall be properly supported to protect the assembly and the attached piping from breakage.
 - 3. The first time a backflow prevention assembly is set up on a project, it shall be tested to verify its integrity. If the project is suspended over the winter, all backflow preventers shall be re-tested in the spring. All costs associated with this testing shall be the responsibility of the Contractor.
 - 4. Each backflow prevention assembly shall be tested upon relocation. The cost for all subsequent tests shall be the responsibility of the Contractor

3 PART 3 EXECUTION

3.01 GENERAL

- A. Following the Engineer's and Owner's review and approval of any proposed shutdown request, the Contractor shall be required to give a minimum 48-hour advance notice

TEMPORARY WATER

- (excluding weekends and holidays) to all residential customers whose service will be temporarily affected, by means of individual notices delivered to each consumer. If the notices are not issued or the temporary service is not ready to be put in use, the Owner shall be free to exercise their authority in not closing down the existing valves and water main system.
- B. The Contractor must have available all the necessary materials to complete the restoration of water to each residential service within four (4) hours after the suspension begins or before 5:00 p.m., whichever comes first. House-to-house or building-to-building connections will not be allowed unless approved by the Owner.
 - C. Special arrangements shall be made by the Contractor to provide temporary water service for all commercial services regardless of the length of time the water main is out of service. The Contractor shall supply all hoses, fittings, etc., for providing temporary water service at their expense. Copper piping or other non-taste inducing pipe shall be necessary if the commercial consumer serves food or water products as part of the business.
 - D. Fire protection is not included unless specifically shown by the Engineer. The Fire Department may require the Contractor to provide personnel for continuous fire watch assistance.
 - E. No component of the temporary distribution system may be in contact with, or at risk of being in contact with, sources of contamination.
 - F. Temporary Water System shall maintain pressures within a minimum pressure of 35 psi, or within 20 psi of the pressure at the source (usually a hydrant) prior to installation of the backflow preventer; and maintain said minimum pressure at all times, at all points along the system, including service lines.

END OF SECTION

SECTION 01 56 00

TEMPORARY BARRIERS AND ENCLOSURES

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 6 of General Conditions.

1.02 UNIT PRICES

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

1.03 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 shall 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.

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 general 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. All barricades, signs, lights, and other protective devices shall be installed and maintained in conformance with the transportation authority having jurisdiction.
- C. Designate all streets or roads that are closed with barricades and warning signs. Closing of roads shall be approved by the authority having jurisdiction. Properly notify the local emergency services prior to closing of any road.

- D. Maintain temporary fencing throughout the duration of construction.
- E. Remove temporary fencing at project completion or after permanent fencing is installed.

END OF SECTION

SECTION 01 56 26
TRAFFIC REGULATION

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Provide and maintain traffic control equipment and personnel to protect the work and workmen, and to ensure the least possible obstruction to traffic and inconvenience to the general public.
 - 2. Meet all the requirements of the construction permit issued by the right-of-way owner.
- B. Related Sections:
 - Section 01 20 00 - PRICE AND PAYMENT PROCEDURE
 - Section 01 29 76 - PROGRESS PAYMENT PROCEDURES

1.02 UNIT PRICES

All work under this Section shall be considered as incidental to construction, unless specifically indicated on the BID SCHEDULE and referred to in Section 01 20 00 - PRICE AND PAYMENT PROCEDURE

1.03 REFERENCED STANDARDS

MDOT Michigan Manual of Uniform Traffic Control Devices (MMUTCD)

PART 2 PRODUCTS

2.01 GENERAL

All products shall be in accordance with the Michigan Manual of Uniform Traffic Control Devices.

PART 3 EXECUTION

3.01 DETOURS

- A. Contractor shall be solely responsible for acts or omissions resulting in any legal proceedings due to improper or inadequate detour or safety controls.
- B. Submit proposed detour route to the Engineer, the municipality, and all emergency services for approval prior to construction in the detour area.
- C. Keep fire hydrants adjacent to the work accessible to firefighting equipment at all times.
- D. Keep police, fire, and other emergency services informed of the status of road closings.

3.02 PUBLIC ACCESS

- A. Maintain traffic access in accordance with local laws and regulations having jurisdiction.
- B. Minimize the time that vehicular and pedestrian access to any occupied home, or other building is interrupted. Maintain continuous access to businesses.
- C. Maintain temporary driveways, roadways, and crosswalks in good, usable condition until they are fully restored. As a minimum, provide 6 inches of compacted 22-A aggregate at all driveways.

END OF SECTION

SECTION 01 66 00

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.

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 their quality and fitness for the work.
- B. Store packaged materials in their original containers until ready for use.
- C. Protect all materials and equipment before, during, and after installation.
- D. Provide suitable weather tight storage sheds with raised floors to store and protect materials and equipment that could be damaged by exposure to weather.
- E. Repair or replace all damaged materials and equipment, subject to Engineer approval.
- F. No damaged material shall be used in the work.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 71 23
FIELD ENGINEERING

PART 1 GENERAL

1.01 STAKEOUT AND SURVEYING

- A. Owners responsibility: Provide staking in accordance with Supplementary Conditions SC-4.05.A.
- B. Contractors responsibility:
 - 1. Obtain field measurements, line and grade control, and facility locations based on guideline staking provided by the Owner.
 - 2. Preserve and protect all field staking provided by the Owner.
 - 3. Compensate the Owner for all costs of replacement of staking damaged by the Contractor.

1.02 SOIL BORINGS

- A. Soil borings were conducted at the site. Boring logs are shown on the plans and included in the Appendix.

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 - Not Used

END OF SECTION

SECTION 01 78 00
CONTRACT CLOSEOUT SUBMITTAL

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 CLEANING

- A. Clean the site in accordance with Section 6.11 of the General Conditions.

1.03 PROJECT RECORD DOCUMENTS

- A. Provide one set of record documents in accordance with Section 6.12 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 6.19 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 14.04 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 14.06 through 14.09 of the General Conditions.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.01 OPERATION AND MAINTENANCE MANUALS

A. General:

1. Manuals shall be in durable plastic binders approximately 8½ " x 11" in size with at least the following:
 - a. Identification on, or readable through, the front cover stating general nature of the manual;
 - b. Neatly typewritten index near the front of the manual;
 - c. Complete instructions regarding operation and maintenance of all equipment involved;
 - d. Complete nomenclature of all replaceable parts, their part numbers, and name and address of nearest vendor of parts;
 - e. Copies of all guarantees and warranties issued;
 - f. Copy of the approved Shop Drawing and all data concerning all changes made during construction.
2. Manuals that include manufacturer's catalog pages shall, clearly indicate the precise items included in this installation and delete or otherwise clearly indicate all manufacturers' data with which this installation is not concerned.

B. Submittals:

1. Provide 3 copies of the manual to the Engineer unless indicated otherwise in pertinent Sections.
2. Submit operation and maintenance manuals prior to initial equipment startup.

PART 2 PRODUCT - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 03 30 53
MISCELLANEOUS CAST IN PLACE CONCRETE

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 01 20 00 - PRICE AND PAYMENT PROCEDURE
 - 2. Section 01 33 23 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES
 - 3. Section 01 45 29 - TESTING LABORATORY SERVICES

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 01 45 29 - 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 01 33 23 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- 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 coarse 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 01 45 29 - TESTING LABORATORY SERVICES.
 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:
 Concessive 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 01 33 23 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- 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

	<u>Max.</u>	<u>Min.</u>
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 placed 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 $\frac{3}{8}$ 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 31 00 00

EARTHWORK

PART 1 GENERAL

1.01 SUMMARY

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

1.02 QUALITY ASSURANCES

- A. Materials:
 - 1. All materials used as fill or sub-base shall be approved by the Engineer.
 - 2. Determine gradation in accordance with ASTM C-136.
 - 3. Determine percent loss by washing in accordance with ASTM C-117.
- B. Compaction:
 - 1. Determine maximum density using the Modified Proctor Method, ASTM D-1557.
 - 2. Engineer may approve other field determinations of maximum density, such as Michigan Cone.
 - 3. Field determination of in place density shall be by Nuclear Density Method, ASTM D-2922, or other approved method.
- C. Except as modified by this Section, perform earthwork in accordance with Division 2, MDOT Standard Specifications.

1.03 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

PART 2 PRODUCTS

2.01 MATERIALS

- A. General:
 - 1. All fill material shall be approved by the Engineer prior to placement.
 - 2. Fill material shall be free from clay, organic matter, roots, debris, and frozen soil.
 - 3. Obtain fill material from on-site excavations, or from an approved borrow area.
 - 4. Provide Testing Laboratory with access to material source.
- B. Class II and III backfill:
Granular material meeting requirements of Section 8.02.06 of the MDOT Standard Specifications for construction.

- C. Pipe Bedding:
Granular material meeting requirements of ASTM D2321
- D. Topsoil:
Dark brown or black loam, clay loam, or sandy loam, of a fertile, humus soil origin.

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 4 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 54 FR 45894.
- C. Protect excavation bottoms from frost.
- D. Dispose of excess excavated material off site or on site at a location approved by the Engineer.
- E. Enlarge excavations laterally to provide adequate room for construction or provide shoring and bracing in accordance with Section 31 40 00, as necessary.

3.04 EXCAVATING, BACKFILLING, AND COMPACTING FOR STRUCTURES

- A. Over-excavation:
 - 1. In the event clay or stone is encountered at the bottom of the excavation, undercut bottom a minimum of 12 inches.
 - 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 Class II material.
 - 4. Compact backfill in lifts not exceeding 9 inches to 95% Modified Proctor density.

- B. 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 be Class II sand.
 - 4. Do not backfill against cast in place structures until approved by the Engineer.
 - 5. Do not backfill on only one side of a vertical wall unless the walls are adequately shored or the permanent structure is in place.
 - 6. Compact backfill in lifts not exceeding 9 inches to 95% Modified Proctor density.

3.05 EXCAVATING, BACKFILLING, AND COMPACTING FOR ROAD SUBGRADE, PAVED SURFACES AND APPURTENANCES

- A. Subgrade undercutting:
 - 1. Remove all peat, muck, topsoil and other organic matter from the roadway subgrade.
 - 2. Remove all soils other than granular materials within 15 inches of the proposed subgrade elevation.
 - 3. Place Class II sand and compact to 95% Modified Proctor density to proposed subgrade elevation.
 - 4. Extend undercutting of unsuitable materials to the limit of a 1 on 1 slope spreading outward from the grade and location of the outside edge of the finished pavement, curb, or other improved surface.
- B. Backfilling around curbs, sidewalks, and appurtenances:
 - 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 be Class II sand.
 - 4. Do not backfill against cast in place structures until approved by the Engineer.
 - 5. Compact backfill in lifts not exceeding 9 inches to 95% Modified Proctor density.

3.06 EXCAVATING, BACKFILLING, AND COMPACTING FOR UTILITIES

- A. Trench excavation:
 - 1. Conduct excavation in a safe and orderly manner at all times, in compliance with all applicable safety regulations.
 - 2. Use hand tools where mechanical equipment will cause damage to adjacent trees, structures, or utilities.
 - 3. Excavate trench to the cross-section shown on the trench detail.
 - 4. Do not excavate the trench ahead of the pipe laying operation more than the Contractor can reasonably expect to backfill by the end of the work day.
 - 5. Support and protect all existing utilities encountered within the trench.
 - 6. Place excavated material where it will not obstruct sidewalks, driveways, roadways, or the work of others.
 - 7. Undercutting
 - a. In the event clay or stone is encountered at the bottom of the excavation, undercut the bottom a minimum of 6 inches.
 - b. Undercut the trench a minimum of 6 inches for plastic water main or sanitary sewers in all soils.
 - c. If muck or other deleterious material is encountered, remove this material suitable soil, unless modified by the Engineer.
 - d. Backfill to proposed pipe grade with material meeting ASTM D2321 compacted to 95% Modified Proctor density.

- B. Pipe bedding:
 - 1. Grade trench bottom to provide uniform, firm, and stable surface, free from rocks and other unsuitable materials.
 - 2. Provide a tamped sand bedding for the full length of the pipe barrel, with recesses excavated for the joints.
 - 3. Bedding material shall meet requirements of ASTM D2321.
 - 4. Place bedding simultaneously on each side of the pipe for the full width of the trench, to a depth of 1 foot above the pipe.
 - 5. Place bedding in 9 inch layers and compact to 95% Modified Proctor Density, being careful not to displace the pipe laterally.

- C. Trench backfill, critical areas:
 - 1. Class II material in areas under or within 10 feet of structures or improved surfaces.
 - 2. Place in layers not exceeding 9 inches and compact each layer, by mechanical means, to 95% Modified Proctor density.
 - 3. If trench settles greater than 1 inch within the one year following Owner's acceptance of project, the Contractor shall bring the trench back to grade and restore the surface at no additional cost to the Owner.

- D. Trench backfill, non-critical areas:
 - 1. Class III material approved by the Engineer, free from frozen soil, vegetation, and debris.
 - 2. Place in layers not exceeding 12 inches and compact each layer by mechanical means to a minimum of 90% Modified Proctor density.

- E. Pipe protection:
 - 1. Mound and compact additional granular backfill over pipe, if required, to provide a minimum cover depth of 3 feet to protect pipe while construction equipment is operating on site.
 - 2. Remove additional backfill when grading to achieve finished grade.

3.07 CONTROLLED FILLS AND EMBANKMENTS

- A. General:
 - 1. All filling under or within a 1:1 slope from the outer edge of buildings, structures, or improved surfaces shall be controlled fill.
 - 2. Material: Class II granular material, unless otherwise specified by the Engineer.

- B. Placing fill:
 - 1. Remove topsoil roots and stumps to a depth of 12 inches prior to placing fill.
 - 2. Compact existing ground to 95% Modified Proctor density prior to placing fill.
 - 3. Spread fill in uniform layers not exceeding 9 inches and compact to 95% Modified Proctor density.

- C. Compaction:
 - 1. Compacting equipment shall be heavy duty, rolling drum, vibrating type (if approved by Village Manager).
 - 2. Use pneumatic tire rollers in predominantly granular soils.
 - 3. Use sheepsfoot type roller in predominantly clay soils.
 - 4. Use hand operated vibrating sled for compaction around structures.
 - 5. Other methods of producing equivalent results will be allowed when approved by the Engineer.
 - 6. Density in areas under or adjacent to structures or improved surfaces shall be to 95% Modified Proctor density.
 - 7. Density in other locations shall be to 90% Modified Proctor density.

- D. Moisture:
If material is too wet or dry for satisfactory compaction, adjust moisture content as required.

3.08 GRADING

- A. Conform to lines, contours, and spot elevations shown on the plans.
- B. Perform finish grading on ground surfaces to an accuracy of plus or minus 0.1 feet.
- C. Perform finish grading on improved surfaces to an accuracy of plus or minus 0.05 feet.

END OF SECTION

SECTION 31 23 19

DEWATERING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes providing and maintaining dewatering equipment to dispose of surface water and ground water from all excavations and trenches.

1.02 UNIT PRICES

Dewatering will be considered incidental to the construction, unless specifically indicated on the BID SCHEDULE and referred to in Section 01 20 00 PRICE AND PAYMENT PROCEDURE.

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.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.01 PERFORMANCE REQUIREMENTS

- A. Duration of dewatering:
 - 1. Continuously until the structure or pipe is installed.
 - 2. Prevent damage from hydrostatic pressure, flotation, or other causes.
- B. 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.
- C. Discharge:
 - 1. Prevent sand and silt from discharging into sewer drains or natural waterways.
 - 2. Provide silt fencing, sediment traps, or other methods to protect surface water discharges.
 - 3. Remove all sediment deposits created as a result of the dewatering process.
 - 4. Do not interfere with the rights of the public, owners of private property, pedestrians, vehicular traffic, or the work of other Contractors.
- D. 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.
- E. Remove all dewatering wells and equipment after project completion.

END OF SECTION

SECTION 31 25 00
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 01 20 00 PRICE AND PAYMENT PROCEDURE
 - 2. Section 31 00 00 EARTHWORK
 - 3. Section 32 90 00 PLANTINGS

1.02 UNIT PRICES

Temporary and permanent erosion control measures will be considered incidental to the construction, unless specifically indicated on the BID SCHEDULE and referred to in Section 01 20 00 PRICE AND PAYMENT PROCEDURE.

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 32 90 00 - PLANTING.
- B. Provide temporary and permanent structures and materials in accordance with the Michigan Department of management and Budget Keying System. See Figure 1 at the end of this section.
- C. Mulch blanket:
 - 1. Materials: 100% straw sewn into a lightweight, photo degradable netting.
 - 2. Model: S75.
 - 3. Straw content: 0.5 pounds per square yard.
 - 4. Manufacturer: North American Green.
- 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).
- E. Rip rap stone: (4-6")
 1. Material: native fieldstone from local gravel pits, exhibiting sound structure and strength for the intended use.
 2. Size: 1" to 6" stone.
 3. Gradation:
 - a. $D_{100} = 6$ inch
 - b. $D_{50} = 4$ inch
 - c. $D_{10} = 2$ inch
- F. Rip rap stone: (10-12")
 1. Material: native fieldstone from local gravel pits, exhibiting sound structure and strength for the intended use.
 2. Size: 6" to 12" stone.
 3. Gradation:
 - a. $D_{100} = 12$ inch
 - b. $D_{50} = 10$ inch
 - c. $D_{10} = 8$ inch
- G. 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, provide topsoil, seed, fertilizer, and mulch.
- B. Water all seeded areas as necessary to establish proper vegetative cover.
- C. Should erosion occur within the guarantee period, regrade and reseed the disturbed area at no additional cost to the Owner.

3.04 MULCH BLANKET

- A. Provide mulch blanket on all slopes 3:1 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.

END OF SECTION

SECTION 31 40 00
SHORING AND BRACING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes, all materials and labor to install and maintain sheeting, shoring, bracing, and trench boxes as required to support the sides of the excavation.
- B. Prevent movement of earth that would damage the Work or existing structures, or cause injury to workmen.
- C. Related Sections:
 - 1. Section 01 20 00 PRICE AND PAYMENT PROCEDURE

1.02 UNIT PRICES

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 01 20 00 PRICE AND PAYMENT PROCEDURE.

1.04 QUALITY ASSURANCES

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

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.

3.02 REMOVAL

- A. Remove sheeting without damage to the installed structure or pipe, and adjacent utilities or structures.
- B. Fill all voids caused by withdrawal of sheeting with clean compacted sand.

3.03 SHEETING LEFT IN PLACE

Sheeting may be left in place with the permission of the Owner.

END OF SECTION

SECTION 32 12 16

ASPHALT PAVING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes all labor, materials, tools and equipment necessary for complete construction of bituminous surfaces.
- B. Related Sections:
 - 1. Section 01 20 00 PRICE AND PAYMENT PROCEDURE
 - 2. Section 31 00 00 EARTHWORK

1.02 UNIT PRICES

Refer to Section 01 20 00 PRICE AND PAYMENT PROCEDURE

1.03 QUALITY ASSURANCES

- A. Provide and place in accordance with Division 4.0 of the MDOT Standard Specifications.
- B. Testing:
 - 1. Provide material for bituminous extractions and aggregate analysis as requested by the Engineer.
 - 2. Determine pavement density by Nuclear Gage Method using the test strip method.
 - 3. All materials used as fill or sub-base shall be approved by the Engineer.
 - 4. Determine gradation in accordance with ASTM C-136.
 - 5. Determine percent loss by washing in accordance with ASTM C-117.
- C. Base compaction:
 - 1. Determine maximum density using the Modified Proctor Method, ASTM D-1557 or other engineer approved method.
 - 2. Field determination of in place density shall be by Nuclear Density Method, ASTM D-2922, or other engineer approved method.
- D. Furnish weight slips for all bituminous material.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Base material: MDOT 22A Aggregate.
- B. Leveling course: MDOT 4EL
- C. Wearing course: MDOT 4EL
- D. Bond Coat: MDOT SS-1h.

PART 3 EXECUTION

3.01 AGGREGATE PAVING BASE

- A. Place a minimum depth of 6 inches compacted in place.
- B. Extend paving base to the width required for gravel shoulders. Provide a minimum depth of 8 inches compacted in place for gravel shoulders.
- C. Compact to 98% maximum density.
- D. Adjust moisture content as required to achieve compaction.
- E. Grading:
 - 1. Finish grade base to the elevations and cross sections shown on the Drawings.
 - 2. Do not place paving until the Engineer has approved the base.

3.02 BITUMINOUS SURFACE

- A. Apply bituminous paving in 2 course(s) of 1.5 inches and 1.5 inches.
- B. Compact by rolling to 95% maximum density.
- C. Apply bond coat at a rate of 0.10 gal/syd between each pavement course.
- D. Paver shall not lay pavement faster than 110 feet per minute.
- E. Vibratory rollers must be approved by Village DPW Superintendent before use.

3.03 PRESERVATION OR REMOVAL OF PAVEMENT SURFACES

- A. Minimize the amount of existing pavement which must be removed.
- B. Protect pavement outside of the payment limits.
- C. Repair any damage to pavement surfaces outside of the payment limits at no cost to the Owner.
- D. Saw cut pavement to full depth at removal limits.

3.04 TEMPERATURE AND SEASONAL LIMITATIONS

According to MDOT Specifications 2012 Section 501.03:

- A. Weather Limitations
 - a. Do not pave when moisture content prevents the bituminous from properly curing.
 - b. Paving may occur if the surface temperature of the ground is at least 35°F and there is no presence of frost on paving section or nearby.
 - c. Place greater than 200 pounds per square yard if temperature is above 35°F.
 - d. Place greater than 120 pounds per square yard if temperature is above 40°F.
 - e. Place any amount if temperature is above 50°F.
- B. Seasonal Limitations
Paving may occur from May 15 to November 1 unless otherwise approved by Engineer in writing.

3.05 PAVEMENT PATCHING

- A. Trench preparation: Place and compact backfill as specified in Section 31 00 00 EARTHWORK.
- B. Joint preparation:
 - 1. Saw cut pavement a minimum of 1 foot beyond the damaged area.
 - 2. Sweep adjacent road surfaces clean of all dirt and debris.
 - 3. Apply a bond coat at a rate of 0.10 gal/syd on all saw cut edges of the existing pavement.
 - 4. Butt joint new pavement to existing pavement.
- C. Payment limits:
 - 1. Trench crossing road:
 - a. A distance equal to the excavation depth plus the diameter of the pipe; measured perpendicular to and extending to both sides of the pipe line.
 - 2. Trench longitudinal to road:
 - a. ¼ of pavement width to be replaced if less than ¼ is removed.
 - b. ½ of pavement width to be replaced if more than ¼ but less than ½ is removed.
 - c. full width to be replaced if more than ½ of pavement is removed.
- D. Place aggregate paving base and bituminous surface as specified in paragraph 3.01 and 3.02.

3.06 BITUMINOUS RATES

	<u>Base</u>	<u>Top</u>
Residential, Local Access and Commercial:	165	165
Industrial, Collector and Arterial:	165	165

3.07 TESTING FREQUENCY

<u>Subgrade:</u>	One Density Test every 500 feet, per lane (95% max. modified proctor)
<u>Subbase:</u>	One Gradation Test every 10,000 cubic yards – Class II material One Density Test every 500 feet, per lane (95% max. modified proctor)
<u>Base:</u>	One Gradation Test every 3,000 cubic yards – Class II material One Density Test every 500 feet, per lane (95% max. modified proctor)
<u>Asphalt:</u>	One Gradation Test every 1,000 tons – 22A material Three Cores per 1,000 tons (per course) Minimum Core Density 92% TMD Maximum Core Density 97% TMD Air Voids +/- 1.0% VMA +/- 1.2% Maximum Specific Gravity +/- 0.19 Asphalt Content +/- 0.5% Crushed +/- 15%

END OF SECTION

SECTION 32 13 13
CONCRETE PAVING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes, all materials, labor, tools, and equipment necessary for the construction of concrete surfaces, including sidewalks and curb and gutter.
- B. Related Sections:
 - 1. Section 01 20 00 PRICE AND PAYMENT PROCEDURE
 - 2. Section 31 00 00 EARTHWORK

1.02 UNIT PRICES

Refer to Section 01 20 00 PRICE AND PAYMENT PROCEDURE.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Concrete reinforcement:
 - 1. Conform to MDOT Section 905.
- B. Concrete:
 - 1. Conform to MDOT Table 601-2.
 - 2. MDOT Grade P1, 3500 psi concrete mix.
- C. Joint filler:
 - 1. Fiber joint filler conforming to ASTM D-1751.
- D. Sand base:
 - 1. Provide compacted sand base as specified in Section 31 00 00, EARTHWORK.
- E. Mix Design:
 - 1. Mix design shall be submitted to Engineer.

PART 3 EXECUTION

3.01 EARTHWORK

- A. Perform all earthwork necessary to conform to the finish grades shown on the Plans.
- B. Prepare base as specified in Section 31 00 00, EARTHWORK.
- C. Backfill and compact all voids remaining after forms are removed.

3.02 CONCRETE PAVEMENT

- A. Construct concrete pavement as shown on plans in conformance with Section 602 of the MDOT Standard Specifications and Section 801 for Concrete Driveways.

CONCRETE PAVING

B. Dimensions:

1. Length: As required to replace existing, or as shown on Plans.
2. Width: Meet existing, or as shown on Plans.
3. Thickness: 9" minimum or greater if required to meet existing.
4. Slope: Meet existing, slope to drain.

C. Joints:

1. Concrete pavement joints shall be placed in a pattern as shown in MDOT Standard Plan II-42 series, Sheet 5 of 6, "Joints for Concrete Pavement Widening".
2. Transverse construction joints, Symbol C, shall be placed to match joints in the existing pavement.

D. Reinforcement:

1. Wire fabric reinforcement shall be placed in all concrete pavement in accordance with MDOT Standard Plan II-45 series.

E. Finish: Finish surface in accordance with MDOT Specification 602.

END OF SECTION

SECTION 32 15 00
AGGREGATE SURFACES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes all labor, materials, tools, and equipment necessary for the complete installation of aggregate surfaces, including roadways, driveways, and parking areas. Also includes providing, shaping and grading the sand base.
- B. Related sections:
 - 1. Section 01 20 00 PRICE AND PAYMENT PROCEDURE
 - 2. Section 01 45 29 TESTING LABORATORY SERVICES

1.02 UNIT PRICES

Aggregate surfaces will be considered incidental to the performance of the work, unless specifically indicated on the BID SCHEDULE and in Section 1 20 00 PRICE AND PAYMENT PROCEDURE.

1.03 QUALITY ASSURANCES

- A. Testing:
 - 1. Test in accordance with Section 01 45 29, TESTING LABORATORY SERVICES.
 - 2. All materials used as fill or sub-base shall be approved by the Engineer.
 - 3. Determine gradation in accordance with ASTM D-136.
 - 4. Determine percent loss by washing in accordance with ASTM D-117.
- B. Compaction:
 - 1. Determine maximum density using the Modified Proctor Method, ASTM D-1557. Engineer may approve other field determinations of maximum density, such as Michigan Cone.
 - 2. Field determination of in place density shall be by Nuclear Density Method, ASTM D-2922, or other approved method.

PART 2 PRODUCTS

2.01 MATERIALS

Aggregate Surface Material: MDOT 23A Aggregate

PART 3 EXECUTION

3.01 AGGREGATE SURFACES

- A. Place a minimum depth of 6 inches compacted in place.
- B. Compact to 98% maximum density.
- C. Adjust moisture content as required to achieve compaction.
- D. Grading:
 - 1. Finish surface grade to conform to the elevations and cross sections shown on Plans.
 - 2. Contractor is responsible for verifying proper finish grades.

END OF SECTION

SECTION 32 16 13
CURBS AND GUTTERS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes, all materials, labor, tools, and equipment necessary for the construction of concrete surfaces, including sidewalks and curb and gutter.
- B. Related Sections:
 - 1. Section 01 20 00 PRICE AND PAYMENT PROCEDURE
 - 2. Section 31 00 00 EARTHWORK

1.02 UNIT PRICES

Refer to Section 01 20 00 PRICE AND PAYMENT PROCEDURE

PART 2 PRODUCTS

2.01 MATERIALS

- A. Concrete reinforcement:
 - 1. Conform to MDOT Section 905.
- B. Concrete:
 - 1. Conform to MDOT Table 601-2.
 - 2. MDOT Grade P1, 3500 psi concrete mix.
- C. Joint filler:
 - 1. Fiber joint filler conforming to ASTM D-1751.
- D. Sand base:
 - 1. Provide compacted sand base as specified in Section 31 00 00, EARTHWORK.
- E. Mix Design:
 - 1. Mix design shall be submitted to Engineer.

PART 3 EXECUTION

3.01 EARTHWORK

- A. Perform all earthwork necessary to conform to the finish grades shown on the Plans.
- B. Prepare base as specified in Section 31 00 00, EARTHWORK.
- C. Backfill and compact all voids remaining after forms are removed.

3.02 CURB AND GUTTER

- A. Construct curb and gutter in accordance with Section 802 of the MDOT Standard Specifications.
- B. All new curb and gutter shall be the Type, shown on the Plans.

CURBS AND GUTTERS

- C. Curb openings as detailed on Plans, installed at existing driveways at the location of existing curb openings shall be constructed in accordance with MDOT R-29 Series.
- D. Depressed curbs to 1" height at sidewalk ramps and driveway openings.
- E. Joints:
 - 1. Provide 1" expansion joints at:
 - a. Saw cut curb ends.
 - b. Curb radius spring points.
 - c. Approximately 10 feet each side of all catch basins.
 - 2. Provide contraction joints at:
 - a. Opposite all transverse contraction joints in concrete pavement.
 - b. At 40 foot maximum intervals.
 - 3. Joints shall conform with MDOT Standard Plan II-30 series.
- F. Finish: Finish surface in accordance with MDOT Specification 803.

END OF SECTION

SECTION 32 16 23
SIDEWALKS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes, all materials, labor, tools, and equipment necessary for the construction of concrete surfaces, including sidewalks and curb and gutter.
- B. Related Sections:
 - 1. Section 01 20 00 PRICE AND PAYMENT PROCEDURE
 - 2. Section 31 00 00 EARTHWORK
 - 3. Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

1.02 UNIT PRICES

Refer to Section 01 20 00 PRICE AND PAYMENT PROCEDURE

PART 2 PRODUCTS

2.01 MATERIALS

- A. Concrete reinforcement:
 - 1. Conform to MDOT Section 905.
- B. Concrete:
 - 1. Conform to MDOT Table 601-2.
 - 2. MDOT Grade P1, 3500 psi concrete mix.
- C. Joint filler:
 - 1. Fiber joint filler conforming to ASTM D-1751.
- D. Sand base:
 - 1. Provide compacted sand base as specified in Section 31 00 00, EARTHWORK.
- E. Mix Design:
 - 1. Mix design shall be submitted to Engineer.

PART 3 EXECUTION

3.01 EARTHWORK

- A. Perform all earthwork necessary to conform to the finish grades shown on the Plans.
- B. Prepare base as specified in Section 31 00 00, EARTHWORK.
- C. Backfill and compact all voids remaining after forms are removed.

3.02 SIDEWALKS

- A. Construct in conformance with Section 803 of the MDOT Standard Specifications.
- B. Dimensions:

1. Length: As shown on the Plans.
 2. Width: As noted on Plans or a minimum of 5'.
 3. Thickness:
 - a. 4" except where thickened at drive approaches.
 - b. 6" at drive approaches as detailed on plans.
 4. Slope: ¼" per foot toward curb.
- C. Joints:
1. Expansion joints:
 - a. Provide ½" expansion joints as shown on the Plans and as follows:
 - i. At ends of thickened sidewalk.
 - ii. At a maximum spacing of 50 feet.
 - iii. Around permanent structures in sidewalk.
 - iv. Between back of curb and sidewalk.
 - v. Sidewalk ramps meet back of curb.
 2. Plane of weakness joints:
 - a. At intervals equal to the sidewalk width, or at a maximum 10 feet.
 - b. In thickened sidewalk at outer edges of driveways.
 - c. Where permanent structures are located in sidewalk.
- D. Finish: Finish surface in accordance with MDOT Specification 803.

3.03 SIDEWALK RAMPS

- A. Construct MDOT ADA sidewalk ramps with detectable warning strips (tactile strips) at all locations where new sidewalks meet curbs. Submit detectable warning strip and other sidewalk appurtenance materials in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES
- B. Construct in accordance with MDOT Special Detail R-28-F and Section 803 of the MDOT Standard Specifications.
- C. Dimensions:
 1. Length: As shown on the Plans.
 2. Width: 4 feet, unless noted otherwise.
 3. Thickness:
 - a. 6" unless otherwise noted on Plans.
 - b. Special thickness requirements are noted on the Plans.
- D. Joints:
 1. Provide control joints at 5 feet on center.
 2. Provide expansion joints at intervals not exceeding 50 feet and between all abutting buildings and structures.
- E. Finish: Finish surface in accordance with MDOT Standard Specification Section 803.

END OF SECTION

SECTION 32 17 23

PAVEMENT MARKING

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Removal of existing pavement markings.
2. Application of new pavement markings.

B. Related Sections:

1. Section 01 20 00 PRICE AND PAYMENT PROCEDURE
2. Section 01 56 00 TEMPORARY BARRIERS AND ENCLOSURES
3. Section 01 56 23 TRAFFIC REGULATION

1.02 UNIT PRICES

Refer to Section 01 20 00, PRICE AND PAYMENT PROCEDURE

1.03 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. Michigan Manual of Uniform Traffic Control Devices (MMUTCD)
2. ASTM - American Society for Testing and Materials
3. Michigan Department of Transportation (MDOT) Standard Specifications

1.04 LOCATIONS

A. Location and pavement markings locations is summarized in the table below.

Pavement Markings

Location	Stop Bar	Cross Walk	Center Line	Edge Line
Henry & Ames	Yes	Yes		
Henry - Ames to Buckley			Yes	
Henry & Buckley	Yes	Yes		
Lake & Ames	Yes			
Lake & Bass	Yes			
Lake & Washington	Yes			
Lake & Iroquois	Yes			
Lake & Brand	Yes			
Lake & Rivershore	Yes			
Lake & Olds	Yes			
Lake & Loomis	Yes			
Lake - Ames to Loomis			Yes	Yes
Loomis - Lake to US-31			Yes	Yes
Cairns HWY			Yes	Yes
Center & Ames	Yes	Yes		
Center - Ames to 2nd			Yes	
Elm & River	Yes	Yes		
North Bayshore & Dexter	Yes			
North Bayshore - Dexter to 450 north of Dexter			Yes	Yes

PART 2 PRODUCTS

2.01 MATERIALS

MDOT approved and selected from the qualified products list.

2.02 SUBMITTALS

- A. Certification from the manufacturer that the materials comply with MDOT requirements.
- B. Material Safety Data Sheets (MSDS)

PART 3 EXECUTION

3.01 GENERAL

- A. Apply pavement markings in accordance with the MMUTCD and MDOT Standard Specifications. Pavement shall be swept clean prior to application of pavement markings.

- B. Remove and reapply improperly located markings at the Contractor's expense in a manner consistent with specifications and approved by the OWNER.

3.02 WEATHER AND SEASONAL LIMITATIONS

- A. Do not apply markings to a damp surface.
- B. Do not apply markings when the surface temperature is less than 40°F.

3.03 PROTECTION OF PAVEMENT MARKINGS

- A. Keep traffic moving at all times and perform striping in a manner to prevent traffic from crossing the uncured markings.
- B. The Contractor may furnish a pavement marking convoy of three vehicles as indicated on the PAVEMENT MARKING CONVOY illustration sheets (if included) to protect the wet paint.
- C. Markings obliterated by traffic shall be retraced at the contractor's expense.

END OF SECTION

SECTION 32 90 00
PLANTING

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
 - 1. Section 01 20 00 PRICE AND PAYMENT PROCEDURE
 - 2. Section 31 00 00 EARTHWORK
 - 3. Section 31 25 00 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 01 20 00, PRICE AND PAYMENT PROCEDURE.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Topsoil: Provide topsoil as specified in Section 31 00 00, 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 (P₂O₅), and Potash (K₂O).
 - 2. Provide net weight of contents and guaranteed analysis.
- D. Mulching: Provide straw, hay, or other material conforming to MDOT Specification 8.21.11, as approved by the Engineer.

PART 3 EXECUTION

3.01 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.

3.02 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.

3.03 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.
- G. Maintenance:
 - 1. Mow areas in the ROW to facilitate growth as directed by the engineer until substantial completion is achieved.

3.04 MULCHING

- A. Apply at a rate of 2 bales per 1000 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 33 01 30.11

TELEVISION INSPECTION OF SEWERS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: all labor, equipment, materials, and supervision, and perform all work necessary to televise the sanitary sewer lines identified in the plan drawings.
- B. The work progression is as follows:
 - 1. Flow Control
 - 2. TV Inspection
- C. Immediately after cleaning of a sewer section has been performed, the sewer is to be TV Inspected by use of CCTV. Cleaning and TV Inspection must occur hand in hand to provide the clearest report of the sewer inspection.

1.02 UNIT PRICES

Refer to Section 01 20 00 PRICE AND PAYMENT PROCEDURE

1.03 STANDARDS AND QUALITY

- A. Perform all work in accordance with NASSCO PACP Specifications and guidelines.
- B. Perform all CCTV inspections by CCTV personnel trained and certified in the use of NASSCO's Pipeline Assessment and Certification Program (PACP)
- C. Contractor shall utilize software capable of video recording and maintaining the pipe condition database in accordance with NASSCO's PACP.

PART 2 PRODUCTS

2.01 TELEVISION INSPECTION EQUIPMENT

- A. CCTV inspections shall be performed by CCTV personnel trained and certified to use the NASSCO's Pipeline Assessment and Certification Program (PACP).
- B. Closed circuit television equipment specifically designed and constructed for sewer line inspection.
- B. Lighting suitable to allow a clear picture for the entire periphery of the pipe.
- C. Operative in 100% humidity conditions.
- D. Capable of producing a minimum 500 line resolution video picture.
- E. Picture quality and definition satisfactory to Owner and Engineer; refer to NASSCO Specifications for guidance.

- F. Above ground measurement feet, accurate to 0.2 feet over the length of the section being inspected.

2.02 CONTRACTOR'S REPORT

- A. Submit two (2) copies of the report to Engineer including each video recording in digital form and electronic reports of the televising activities. These reports are to be submitted to the Engineer on a weekly basis within seven (7) business days of the video being recorded. The reporting is to be performed using PACP certified software with PACP template.
 - 1. Television inspection logs are to be filled out using NASSCO PACP coding
 - a. Each observed defect recorded during inspection must clearly state the location of the defect in relation to an adjacent manhole. The defects recorded must be printed and kept by the Contractor. Structural defects, operational and maintenance defects, construction observations, or miscellaneous feature observations must be in accordance with NASSCO's PACP guidelines. This includes assigning a condition grade (1-5) for effect defect in accordance with NASSCO's PACP Condition Grading System.
 - b. In reference to NASSCO PACP header template, all NASSCO mandated fields shall be provided pipe reach inspected by CCTV. These data fields include:
 - 1. Name of Surveyor
 - 2. Certificate Number
 - 3. Date of CCTV Survey
 - 4. Pre-cleaning Method
 - 5. Direction of Survey
 - 6. Inspection Status
 - 7. Street Address of Starting Manhole
 - 8. Pipe Use
 - 9. Pipe Diameter/Height/Width as applicable
 - 10. Pipe Shape
 - 11. Pipe Material
 - 12. Upstream MH Number
 - 13. Downstream MH Number
 - c. The following NASSCO PACP Optional fields shall also be completed for each pipe reach inspected by CCTV:
 - 1. Date of Pre-cleaning
 - 2. Flow Control Method
 - 3. Length Surveyed
 - 2. Video recordings
 - a. Visual and audio record of inspection of entire length of lines inspected that may be replayed on standard DVD video equipment.
 - b. Video recording shall begin and end within the associated manhole structures and document the initial and final pipe to manhole connections.
 - c. Lateral Video Inspection
 - 1. Pause at each lateral a minimum of 15 seconds.
 - 2. Rotate camera to see into lateral.
 - 3. Identify and quantify any clear water flow.
 - d. Video shall incorporate a running distance feet and reference to location.
 - e. Provide two copies of the video report on DVDs or USB flash drives with file names based on the following nomenclature:

Three Digit Township Identified – Three Digit Original Contract Number – 140 – Upstream Manhole Number

The following three-digit township identifiers are used:

- 593 – Bear Creek North
- 598 – Little Traverse West
- 600 – Littlefield
- 601 – Alanson
- 610 – Regional Alanson/Littlefield

- f. Direction of travel shall be noted as Upstream or Downstream.
 - g. If multiple videos of the same reach are made on the same day, denote each attempt with a letter suffix (i.e. a, b, c, and so on)
3. Electronic Database
- a. Provide the Engineer with the exported PACP database. The database shall include all fields required in 2.04-A.1 above and provide PACP ratings in the following formats:
 - Structure Quick Rating
 - O&M Quick Rating
 - Segment Grade Scores for structure and O&M
 - Pipe Rating Index (combined)
 - b. Export the database in the most current PACP export conversion unless otherwise directed by the Engineer.

PART 3 EXECUTION

3.01 SEWER FLOW CONTROL

- A. General
When sewer line flows at any point during the inspection exceed the allowable requirements for television inspection, reduce flow rate to required levels by manual operation of pump stations, plugging or blocking of flow, or bypass pumping.
- B. Maximum sewer flows:
- 1. For television inspection:
 - a. 6" - 10" pipe: 20% of pipe diameter
 - b. 12" - 24" pipe: 25% of pipe diameter
 - c. Over 24" pipe: 30% of pipe diameter
 - 2. For joint testing and sealing:
 - a. 6" - 12" pipe: 25% of pipe diameter
 - b. 15" - 24" pipe: 30% of pipe diameter
 - c. Over 24" pipe: 35% of pipe diameter
- C. Plugging or blocking
- 1. Insert sewer line plug into line at a manhole upstream from the section being inspected and/or sealed.
 - 2. Plug shall be capable of releasing all or any portion of the sewage flow as necessary.
 - 3. Shut off flow or reduce it to within the maximum limits specified above.
 - 4. Restore flow to normal when work tasks have been completed.
- D. Pumping and bypassing
- 1. When required, furnish all necessary pumps, conduits, other equipment, labor and supervision to divert sewage flow around pipe section in which work is to be performed.
 - 2. Bypass system shall be of sufficient capacity to handle existing flows plus additional flow that may occur during precipitation or other event.
 - 3. If pumping is required on a 24 hour basis, all engines shall be equipped in a manner to minimize pump noise.
 - 4. When flows in sewer lines are blocked, plugged, or bypassed, take sufficient precautions to

protect sewer lines from damage by surcharging and to prevent flooding or damage to property served by the sewers involved.

3.03 TELEVISION INSPECTION

- A. Perform inspection one sewer span at a time.
- B. Control flow in sewer as necessary as specified in 3.02.
- C. Move camera through sewer line in either direction at a uniform rate not exceeding 30 feet per minute.
- D. Use manual winches, power winches, TV cable, powered rewinds and other devices that do not obstruct the camera view or interfere with proper documentation of the sewer conditions to move the camera through the sewer line.
- E. If, during the inspection operation, the camera will not pass through the entire sewer section (such as blockage or high water level refer to section 3.02 for flow control), end the inspection for that section of sewer and re-set equipment and perform an additional inspection from the manhole at the opposite end of the span.
- F. Whenever non-remote powered and controlled winches are used to pull the camera through the line, use telephones or other suitable means of communication between crew members at opposite ends of the sewer section being inspected.
- G. Verify accuracy of measurement feet daily with measuring wheel, tape, or other suitable device.

END OF SECTION

SECTION 33 01 30.41
CLEANING OF SEWERS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: all labor, equipment, materials, and supervision, and perform all work necessary to clean the sanitary sewer lines identified in the plan drawings.
- B. The work progression is as follows:
 - 1. Sewer Line Cleaning
 - 2. Flow Control
 - 3. Root Cutting, as required
- C. Immediately after cleaning of a sewer section has been performed, the sewer is to be TV Inspected by use of CCTV. Cleaning and TV Inspection must occur hand in hand to provide the clearest report of the sewer inspection.

1.02 UNIT PRICES

Refer to Section 01 20 00 PRICE AND PAYMENT PROCEDURE

1.03 STANDARDS AND QUALITY

- A. Perform all work in accordance with NASSCO PACP Specifications and guidelines.
- B. If after Engineer review of television inspections shows the sewer cleaning to be unsatisfactory or does not meet the NASSCO PACP Specifications, the Contractor will be required to clean and inspect said section of sewer line at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 SEWER CLEANING EQUIPMENT

- A. General:
 - 1. Mechanically powered, hydraulically propelled or high velocity sewer cleaning equipment.
 - 2. Select equipment based on conditions in sewer lines and as approved by the Engineer.
 - 3. Equipment shall be capable of removing dirt, grease, rocks, sand and other deleterious materials and obstructions from sewer lines and manholes.
- B. Hydraulic cleaning equipment:
 - 1. Movable dam type, constructed in such a way that a portion of the dam may be collapsed any time during the cleaning operation to protect against flooding of the sewer.
 - 2. Movable dam shall be of a diameter equal to that of the pipe being cleaned and shall provide a flexible scraper around the outer periphery to insure total removal of grease.
- C. High velocity hydro-cleaning equipment:
 - 1. Constructed for ease and safety of operation.
 - 2. Selection of two or more high velocity nozzles, capable of producing a scouring action from 15 degrees to 45 degrees in all line sizes designated to be cleaned.

3. High velocity gun for washing and scouring manhole walls and floors, capable of producing flows from a fine spray to a long-distance solid stream.
 4. Equipment shall carry its own water tank, auxiliary engines, pumps, and hydraulically driven hose reel.
 5. All controls shall be located so that equipment can be operated from above ground.
- D. Mechanical cleaning equipment:
1. Bucket machines shall be in pairs with sufficient power to perform the work in an efficient manner.
 2. Machine shall be belt operated or have an overload device.
 3. Machines with direct drive that could cause damage to the pipe will not be allowed.
 4. Power rodding machines shall be either a sectional or continuous type capable of holding a minimum of 750 feet of rod.
 5. Rod shall be specifically treated steel.
 6. To ensure safe operation, the machine shall have a fully enclosed body and an automatic safety throw-out clutch or relief valve.

2.02 ROOT CUTTING EQUIPMENT

- A. Mechanical equipment specifically designed for removal of roots in sewer lines.
- B. Capable of removing roots sufficiently to allow television inspection of the sewer lines to be performed properly.
- C. Capable of removing roots without damaging the pipe.
- D. Capable of being operated from above ground.

PART 3 EXECUTION

3.01 SEWER LINE CLEANING

- A. General
 1. Clean all sewer lines designated for TV inspection using equipment as specified in 2.01.
 2. Select appropriate equipment based on conditions of sewer lines.
 3. It is recognized that there may be some conditions such as badly broken or eroded pipe or major blockages that prevent cleaning from being accomplished or where additional sewer line damage would result if cleaning is attempted or continued. Notify Owner and Engineer if conditions of this nature are encountered.
 4. If cleaning of an entire section of sewer cannot be successfully performed from one manhole, the equipment shall be re-setup on the other manhole and cleaning again attempted. If successful cleaning can still not be performed or the equipment fails to traverse the entire sewer section, it will be assumed that a major blockage exists and the cleaning efforts shall be abandoned. Notify Owner and Engineer of any such blockages prior to suspension of cleaning operations.
- B. Material removal and disposal
 1. Remove all sludge, dirt, sand, rocks, grease, and solid or semi-solid materials resulting from the cleaning operations at the downstream manhole of the section being cleaned. Passing materials to the next manhole section will not be permitted.
 2. Remove all solids or semi-solids resulting from the cleaning operations from the site and dispose of them in a legal manner off site.
 3. Transport and remove materials from the site no less often than at the end of each working day.

4. Contractor may accumulate debris at the site only in totally enclosed containers and as approved by the Owner.
 5. Removal and disposal are part of the cleaning costs and the Owner will not provide a disposal site.
- C. Cleaning precautions
1. Protect sewer lines from damage that may be inflicted by improper use of cleaning equipment.
 2. Take necessary precautions to ensure that water pressure does not cause any damage or flooding to public or private property served by the sewer section being cleaned.
 3. Utilize wastewater flow in sewer lines to provide necessary pressures for hydraulic cleaning whenever possible to minimize the quantity of water needed from the distribution system.
 4. Coordinate obtaining water from the Owner's fire hydrants. Connections to the water supply shall be made with a Michigan Department of Environmental Quality approved backflow prevention device.
- C. Incidentals
- Weekly submittals of videos and reports will allow the Engineer to verify the cleanliness of the sewers. No payment will be made to the Contract for sewers which are not clean as verified by the CCTV inspection and reviewed by the Engineer. If a sewer section is to be cleaned and CCTV inspected again, this additional work will be incidental.

3.02 SEWER FLOW CONTROL

- A. General
- When sewer line flows at any point during the inspection exceed the allowable requirements for television inspection, reduce flow rate to required levels by manual operation of pump stations, plugging or blocking of flow, or bypass pumping.
- B. Maximum sewer flows:
1. For television inspection:
 - a. 6" - 10" pipe: 20% of pipe diameter
 - b. 12" - 24" pipe: 25% of pipe diameter
 - c. Over 24" pipe: 30% of pipe diameter
 2. For joint testing and sealing:
 - a. 6" - 12" pipe: 25% of pipe diameter
 - b. 15" - 24" pipe: 30% of pipe diameter
 - c. Over 24" pipe: 35% of pipe diameter
- C. Plugging or blocking
1. Insert sewer line plug into line at a manhole upstream from the section being inspected and/or sealed.
 2. Plug shall be capable of releasing all or any portion of the sewage flow as necessary.
 3. Shut off flow or reduce it to within the maximum limits specified above.
 4. Restore flow to normal when work tasks have been completed.
- D. Pumping and bypassing
1. When required, furnish all necessary pumps, conduits, other equipment, labor and supervision to divert sewage flow around pipe section in which work is to be performed.
 2. Bypass system shall be of sufficient capacity to handle existing flows plus additional flow that may occur during precipitation or other event.
 3. If pumping is required on a 24 hour basis, all engines shall be equipped in a manner to minimize pump noise.
 4. When flows in sewer lines are blocked, plugged, or bypassed, take sufficient precautions to

protect sewer lines from damage by surcharging and to prevent flooding or damage to property served by the sewers involved.

3.03 ROOT CUTTING

Remove all roots that would obscure any portion of the pipe from satisfactory television inspection.

If root cutting is required, the payment including all labor, materials, and equipment required to perform the root cutting will fall under root cutting in the bid schedule.

END OF SECTION

SECTION 33 01 30.42
CLEANING OF MANHOLES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: all labor, equipment, materials, and supervision, and perform all work necessary to clean the sanitary sewer manholes identified in the plan drawings.
- B. The work progression is as follows:
 - 1. Manhole Cleaning
 - 2. Flow Control
- C. Immediately after cleaning of a sewer section has been performed, the sewer is to be TV Inspected by use of CCTV. Cleaning and TV Inspection must occur hand in hand to provide the clearest report of the sewer inspection.

1.02 UNIT PRICES

Refer to Section 01 20 00 PRICE AND PAYMENT PROCEDURE

1.03 STANDARDS AND QUALITY

- A. Perform all work in accordance with NASSCO PACP Specifications and guidelines.
- B. If after Engineer review of television inspections shows the sewer cleaning to be unsatisfactory or does not meet the NASSCO PACP Specifications, the Contractor will be required to clean and inspect said section of sewer line at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 MANHOLE CLEANING EQUIPMENT

- A. General:
 - 1. Mechanically powered, hydraulically propelled or high velocity sewer cleaning equipment.
 - 2. Select equipment based on conditions in manholes and as approved by the Engineer.
 - 3. Equipment shall be capable of removing dirt, grease, rocks, sand and other deleterious materials and obstructions from manholes.
 - 4. Manholes shall be cleaned from surface rim to flow channel using methods approved by the engineer.
 - 5. Manhole cleaning shall remove all deposits of grease and debris adhered to the manhole structure.
 - 6. Contractor shall discontinue manhole cleaning and notify Engineer if cleaning effort causes damage to manhole structure.
 - 7. Only those manholes designated by the Engineer in the preconstruction meeting shall be eligible for payment. Additional manholes are not eligible for payment without prior approval by the engineer.
 - 8. Passing of a sewer pipe jetting, or similar, tool is not sufficient to receive payment for manhole cleaning.

PART 3 EXECUTION

3.01 SEWER FLOW CONTROL

A. General

When sewer line flows at any point during the inspection exceed the allowable requirements for television inspection, reduce flow rate to required levels by manual operation of pump stations, plugging or blocking of flow, or bypass pumping.

B. Maximum sewer flows:

1. For television inspection:
 - a. 6" - 10" pipe: 20% of pipe diameter
 - b. 12" - 24" pipe: 25% of pipe diameter
 - c. Over 24" pipe: 30% of pipe diameter
2. For joint testing and sealing:
 - a. 6" - 12" pipe: 25% of pipe diameter
 - b. 15" - 24" pipe: 30% of pipe diameter
 - c. Over 24" pipe: 35% of pipe diameter

C. Plugging or blocking

1. Insert sewer line plug into line at a manhole upstream from the section being inspected and/or sealed.
2. Plug shall be capable of releasing all or any portion of the sewage flow as necessary.
3. Shut off flow or reduce it to within the maximum limits specified above.
4. Restore flow to normal when work tasks have been completed.

D. Pumping and bypassing

1. When required, furnish all necessary pumps, conduits, other equipment, labor and supervision to divert sewage flow around pipe section in which work is to be performed.
2. Bypass system shall be of sufficient capacity to handle existing flows plus additional flow that may occur during precipitation or other event.
3. If pumping is required on a 24 hour basis, all engines shall be equipped in a manner to minimize pump noise.
4. When flows in sewer lines are blocked, plugged, or bypassed, take sufficient precautions to protect sewer lines from damage by surcharging and to prevent flooding or damage to property served by the sewers involved.

3.02 MANHOLE CLEANING

Cleaning manhole interior surfaces (steps, walls, bench, etc.) will remove debris and sediment via the direct application of hydraulic cleaning, high velocity hydro-cleaning, mechanical cleaning or other method approved by the Engineer. Passing pipe cleaning equipment through the flow channel of a manhole will not be considered proper cleaning of any manhole surface.

END OF SECTION

SANITARY SEWER BYPASS PUMPING

SECTION 33 01 30.51

SANITARY SEWER BYPASS PUMPING

1 PART 1 – GENERAL

1.01 SUMMARY

1.02 Description of Work

A. This section specifies the requirements for providing, operating, and maintaining a temporary sanitary sewer bypass pumping system to divert wastewater flow around an existing pump station during construction activities. Work includes furnishing all labor, equipment, materials, piping, monitoring, controls, fuel, temporary power, standby systems, traffic control, and incidentals necessary to implement and maintain a fully functional bypass system.

B. Purpose

1. The purpose of the bypass pumping system is to ensure continuous and uninterrupted sanitary sewer service, preventing overflows, backups, or environmental releases during pump station isolation.

C. Contractor Responsibilities

1. Design, furnish, install, test, operate, and maintain a complete bypass pumping system.
2. Prevent sewage spills, overflows, or service disruptions.
3. Protect public health, safety, and the environment.
4. Coordinate all bypass operations with the Owner and Engineer.

D. Submittals

1. Bypass Plan including equipment, pump curves, expected flows, system layout, and emergency procedures.
2. Pump sizing calculations based on peak wet-weather flow.
3. Operational procedures including monitoring, alarms, and spill response.
4. Site safety plan and erosion and sediment control plan.

1.03 Regulatory Requirements

A. All bypass pumping work shall comply with Michigan EGLE requirements, Village of Elk Rapids standards, OSHA regulations, and all applicable federal, state, and local laws.

1.04 UNIT PRICES

A. Payment for sanitary sewer bypass pumping shall be made in accordance with Section 01 20 00 – Price and Payment Procedures. Unit prices shall include all labor, equipment, materials, fuel, maintenance, standby systems, piping, controls, and monitoring necessary for continuous operation.

SANITARY SEWER BYPASS PUMPING

2 PART 2 – PRODUCTS

2.01 PUMPS

A. Primary Pumps

1. Pumps shall be diesel-driven or electric, non-clog, solids-handling, self-priming centrifugal or submersible units capable of continuous 24-hour operation and sized to convey a minimum of the pump capacities list below.
 - a Pump Station 2 (Lake Street) Capacity: 250 GPM @ 95 TDH
 - b Pump Station 11 (Honcho Rest) Capacity: 400 GPM @ 44 TDH

B. Standby Pumps

1. Provide a minimum of one fully redundant standby pump equal in capacity to the largest duty pump, equipped for automatic startup in the event of primary pump failure.

C. Pump Controls

1. Provide automatic level controls, manual override capability, and high-level audible and visual alarms.

D. PIPING AND HOSES

1. Discharge piping shall consist of HDPE pipe, PVC pipe, or high-pressure lay-flat hose rated for the maximum operating pressure. All joints shall be leak-free and adequately restrained. Piping installed in traffic or public areas shall be protected with ramps, trenching, signage, and reflective markings.

E. ANCILLARY EQUIPMENT

1. Temporary power generators as required.
2. Fuel storage with secondary containment.
3. Flow monitoring equipment if required by the Owner.
4. Noise attenuation enclosures where bypass pumping occurs near residences.

3 PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install the bypass pumping system in accordance with the approved bypass plan. Bypass pumping shall not commence until the system has been fully installed, tested, and approved by the Owner.

3.02 TESTING

- A. Perform a full-system operational test using clean water or live flow to verify pump performance, control functionality, leak-free piping, priming capability, and automatic restart. Testing shall be witnessed by the Owner or Engineer.

3.03 OPERATION AND MONITORING

- A. Bypass pumping shall be monitored 24 hours per day. Physical site inspections shall occur at least every two hours. Maintain logs documenting pump operation, fuel levels, maintenance, and alarms.

SANITARY SEWER BYPASS PUMPING

B. EMERGENCY RESPONSE

1. Provide and implement an emergency response plan addressing pump failure, power loss, pipeline rupture, and sewage spills. Response personnel shall be available within 30 minutes of any alarm.

C. REMOVAL AND RESTORATION

- D. Upon completion of bypass pumping operations, remove all temporary equipment and restore all disturbed areas to their original or better condition.

END OF SECTION

CURED-IN-PLACE PIPE LINING

SECTION 33 01 30.16

CURED-IN-PLACE PIPE LINING

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes furnishing all labor, materials, equipment, and incidentals required to install and test the cured-in-place pipe (CIPP) lining and appurtenances.
- B. Related sections:
 - 1. Section 01 20 00 PRICE AND PAYMENT PROCEDURE
 - 2. Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES
 - 3. Section 31 00 00 EARTHWORK

1.02 UNIT PRICES

Refer to Section 01 20 00, PRICE AND PAYMENT PROCEDURE

1.02 SUBMITTALS

- A. Submit product data, design calculations, installation details, and shop drawings to the Owner. Submittals shall include the following:
 - 1. CIPP lining supplier's name and a materials list.
 - 2. CIPP lining schedules including field-verified lengths and diameters for all CIPP linings and appurtenances required.
 - 3. Shop drawings and product data to demonstrate compliance with these specifications and identify construction materials including resins, catalysts, felt, etc., felt manufacturer and facility location, wet-out facility location, etc.
 - 4. Manufacturers' shipping, storage, and handling recommendations for all CIPP system components.
 - 5. MSDS sheets for all materials to be furnished for the project.
 - 6. Detailed installation procedures including CIPP lining production schedule, acceptable inversion heads and pressures, inversion procedures, curing and cool-down procedures and temperatures, and times for each process stage
 - 7. Prior to each CIPP lining shipment, certified test reports showing the CIPP lining for this

CURED-IN-PLACE PIPE LINING

Contract was manufactured and tested in accordance with all ASTM Standards specified and referenced herein.

8. A detailed public notification plan shall be prepared and submitted including detailed staged notification to residences affected by the CIPP installation.
9. A complete description for the proposed wet-out procedure for the proposed technology. Wet-outs "over-the-hole" for large CIPP diameters/lengths shall be identified for the segment(s) and include full details of the procedure including environmental conditions control, resin temperature control, quality assurance procedures and etc.
10. Wet-out forms with detailed information including, but not limited to resin volumes and/or weights, CIPP liner length, roller gap settings, start times, finish times, gel times, resin injection locations, and any other pertinent data documenting the wet-out for each CIPP liner section manufactured.
11. Design data and specification data sheets listing all parameters used in the CIPP liner design and thickness calculations based on ASTM F1216. All calculations shall be prepared under and stamped by a State of Michigan registered professional engineer.
12. A list with all service laterals abandoned or reconnected as part of the work as further defined herein.
13. Manufacturer's recommended cure method for each CIPP liner diameter and thickness to be installed including detailed curing procedures describing the curing medium and the application method.
14. CIPP lining curing reports documenting the liner installation for all sewer segments. The CIPP lining reports shall document all lining installation details including manhole numbers, street names/sewer location, project number, date, time, temperature, curing temperature, curing time, CIPP liner thickness, etc. A sample report shall be submitted to the OWNER for approval prior to installing any CIPP lining.
15. Pre- and post-rehabilitation CCTV inspection data.
16. Ten reports from projects within the past 2 years from independent testing laboratory for liner materials analysis showing the elasticity modulus as determined by appropriate ASTM standard and flexural stress as determined by appropriate ASTM standard. The lining must be the same resin system and felt tube materials as proposed for this project.
17. Installed liner(s) samples for testing to be performed by an ASTM-certified independent testing laboratory, as described further herein.
18. Data on the maximum allowable stresses and elongation of the tube during installation and the

CURED-IN-PLACE PIPE LINING

means the Contractor will use to monitor stress and elongation.

19. A detailed summary about the proposed quality controls to be performed by the Contractor including:
 - a. Proposed procedures for quality control.
 - b. Product sampling and testing method and frequency for product sampling and testing in raw material form and cured product form.
 - c. Inspection forms and guidelines for quality control inspections
- B. Submit the name and experience for lead personnel including verifiable references, as described in the Qualifications subsection below.

1.03 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)
 1. ASTM D543 – Standard and Practice for Evaluating the Resistance of Plastics to Chemical Reagents
 2. ASTM D638 – Standard Test Method for Tensile Properties of Plastics
 3. ASTM D790 – Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
 4. ASTM D792 – Standard Test Methods for Density and Specific Gravity of Plastics by Displacement
 5. ASTM D2412 – Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
 6. ASTM F1216 – Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube
 7. ASTM F1743 – Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP)
 8. ASTM D638 – Standard Test Method for Tensile Properties of Plastics
 9. ASTM D5813 – Standard Specification for Cured-in-Place Thermosetting Resin Sewer Piping Systems
 10. ASTM D2990 – Standard Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics

CURED-IN-PLACE PIPE LINING

- B. National Association of Sewer Service Companies (NASSCO)
 - 1. Recommended Specifications for Sewer Collection System Rehabilitation
- C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.04 EXPERIENCE AND CERTIFICATIONS

- A. The Contractor performing the CIPP lining work shall be experienced and equipped to complete this work and shall be certified and/or licensed as an installer by the CIPP lining manufacturer.
- B. The lead personnel including the supervisor, the foreman, and the lead crew personnel for the CIPP lining installation, lining curing and the robotic service reconnections each must have a 3-year total continuous experience with the CIPP technology proposed for this Contract and must have demonstrated competency and experience to perform the scope of work contained in this Contract. Personnel replaced by the Contractor during the execution of the work shall have similar verifiable experience as personnel originally submitted for project.

1.05 GUARANTEE

- A. All placed CIPP linings shall be guaranteed by the Contractor and manufacturer for a 3-year period from the final acceptance date. During this period, the Contractor shall remove and replace any and all serious defects discovered in the CIPP lining, as determined by the Owner, which may materially affect the pipe's integrity, strength, function, and/or operation in a satisfactory manner to the Owner at no cost to the Owner. Defects replaced during this 3-year period shall be fully warranted by the Contractor and manufacturer for a period of two years from date the defect was repaired.
- B. CIPP tube manufacturer shall warrant the tube and resin materials to be free from any defects for a 10-year minimum from the manufacture date.

1.06 QUALITY ASSURANCE

- A. All CIPP linings shall be from a single manufacturer. The suppliers shall be responsible for providing all test requirements specified herein as applicable. In addition, all CIPP linings to be installed under this Contract may be inspected at the plant for compliance with these specifications by an independent testing laboratory provided by the Owner. The Contractor shall require the manufacturer's cooperation with these inspections.
- B. The Owner may inspect CIPP lining after delivery. The CIPP lining shall be subject to rejection at any time if it fails to meet any requirements specified. CIPP lining rejected after delivery shall be marked for identification and removed from the job site.

CURED-IN-PLACE PIPE LINING

- C. In the event that an installation is rejected based on review of the post-rehabilitation CCTV inspection, the Contractor shall repair the sewer segment to the satisfaction of the Owner at no additional cost.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Care shall be taken in shipping, handling, and laying to avoid damaging the CIPP liner. Any CIPP liner damaged in shipment shall be replaced as directed by the Owner.
- B. Any CIPP lining showing a split or tear or which has received a blow that may have caused damage, even though no such damage can be seen, shall be marked as rejected and removed at once from the work.
- C. While stored, CIPP shall be adequately supported and protected in a manner as recommended by manufacturer.
- D. The CIPP lining shall be maintained at a proper temperature in refrigerated facilities at all times prior to installation to prevent premature curing. The CIPP lining shall be protected from UV light. Any CIPP lining showing evidence of premature curing shall be rejected for use and immediately removed from the site.

1.08 WATER

- A. Water for all construction operations shall be available from the Owner's water supply.
- B. Water usage shall be in accordance with the Owner's backflow and metering policies.

1.09 SEWER CHECK VALVES

- A. If an existing sewer service includes a check valve, then that check valve should remain in place or be replaced with a new check valve during construction.
- B. Removal of an existing check valve shall only occur for the hours of explicit construction for service lateral lining or replacement.
- C. Notify the OWNER immediately of the presence of a service line check valve and maintain the sewage backup prevention aspect of the valve.

PART 2 - PRODUCTS

2.01 CIPP FELT LINER AND RESIN

- A. CIPP lining shall be Inliner Technologies by Layne Inliner, Inc.; Insituform by Insituform Technologies, Inc.; MooreLiner by Moore Construction Co.; SAK Liner by SAK Construction; CIPP Corporation liner

CURED-IN-PLACE PIPE LINING

by American Infrastructures Technologies; Inverta A Pipe liner by Inland Pipe Rehabilitation (IPR Southeast); or pre-bid approved equal.

- B. The CIPP liner shall have tubing material with one or more layers of a flexible non-woven polyester felt with or without additives such as woven fiberglass or other fibers and shall meet ASTM F1216, ASTM F1743, ASTM D5813, and ASTM D2990 requirements. The CIPP liner's felt content shall be determined by the Contractor but shall not exceed 15 percent of the total impregnated liner volume. The fabric tube shall be able to absorb and carry resins, be constructed to withstand installation pressures and curing temperatures, and have sufficient strength to bridge missing pipe segments and stretch to fit irregular pipe sections.
- C. The CIPP liner tube may be single or multiple layer construction with any layer not less than 1.5 mm thick. The wet-out fabric tube shall have a uniform thickness and excess resin distribution which, when compressed at installation pressures, will meet or exceed the design thickness after cure.
- D. The tube's outside layer prior to being inverted shall be coated with an impermeable material compatible with the resin and fabric.
- E. The manufactured tube's exterior shall have distance markings along its length at regular intervals not to exceed 5 feet. Use these marks as a gauge to measure elongation during insertion. Should a reach's overall elongation exceed 5 percent, the liner tube shall be rejected and replaced.
- F. The tube shall be homogenous across the entire wall thickness, containing no intermediate or encapsulated layers. No material shall be included in the tube that may cause delamination in the cured CIPP. No dry or unsaturated layers shall be evident upon visual inspection as evident by color contrast between felt fabric and activated resin containing a colorant.
- G. Seams in the tube shall be stronger than the non-seamed felt material and shall meet the requirements of ASTM D5813.
- H. The CIPP's interior wall color after installation shall be a relatively light reflective color so a clear detailed examination with CCTV equipment may be made. Hue of the color shall be dark enough to distinguish a contrast between fully resin saturated felt fabric and dry or resin lean areas.
- I. Resin: Shall be a corrosion resistant polyester or vinyl ester resin and catalyst system or epoxy and hardener system that, when properly cured within the tube composite, meets the requirements of ASTM F 1216, ASTM F 1743 or ASTM F 2019, the physical properties herein, and those, which are to be utilized in the design of CIPP for this project. Resin shall produce CIPP which will comply with or exceed structural and chemical resistance requirements of this specification. Liner material and resin shall be completely compatible. Generally, resin shall not contain fillers, except those required for viscosity control or fire retardance or increase strength, and with applications for which inert fillers would facilitate better heat transfer and retention during installation. Liner contractor may add up to 5 percent by mass, a thixotropic agent for viscosity control, which will not interfere with visual inspection.

CURED-IN-PLACE PIPE LINING

- J. The felt tubing shall be vacuum impregnated with a thermosetting polyester resin and catalyst, vinyl ester resin and catalyst, or epoxy resin, inhibitors and hardener.
- K. The resins may contain pigments, dyes, or colorants which shall not interfere with visually inspecting cured lining. The resin quantity used for tube impregnation shall be sufficient to fill the volume of air voids in the tube with additional allowances for polymerization shrinkage and the resin loss through cracks and irregularities in the original pipe wall. Use a serial vacuum impregnation process (or equal) to provide maximum resin impregnation throughout the tube.
- L. The Contractor shall identify the wet-out facility where all CIPP linings under this Contract will be manufactured. All CIPP linings shall be manufactured from this designated wet-out facility throughout the entire Contract, unless specifically approved otherwise in writing by the OWNER. Multiple wet-out facilities shall not be allowed except for identified and approved "over-the-hole" on-site wet-out facilities for large diameter CIPP.
- M. The Owner or its representatives may inspect the CIPP lining during manufacturing and wet-out. The Owner and its representatives must be given an opportunity to witness the manufacturing for all CIPP linings for this project. If the Owner decides to inspect the CIPP lining manufacturing, the Contractor shall provide full access to witness the wet-out process and any and all information related to the manufacturing as requested without delay and without claims about confidentiality or product privacy. The Owner is responsible for costs associated with witnessing the CIPP lining manufacturing.
- N. Applying resin to the felt tubing (wet-out) shall be conducted under factory or controlled on-site conditions using vacuum impregnation, and the materials shall be fully protected against UV light, excessive heat, and contamination at all times.
- O. Liners that are impregnated at the factory and transported to the project site in refrigerated trucks shall be installed as soon as possible and no more than ten (10) days after the date of impregnation at the factory.
- P. When cured, the CIPP lining shall form a continuous, hard, impermeable lining which is chemically resistant to any chemicals normally found in domestic sewage per Table 2.1 in ASTM F1216. The CIPP lining shall be chemically resistant to trace amounts of gasoline and other oil products commonly found in municipal sewerage and soils adjacent to the sewer pipe to be lined. The CIPP lining shall provide the maximum available abrasion resistance.
- Q. The Contractor shall measure the existing pipelines in the field prior to ordering lining. The CIPP lining's length shall be as deemed necessary by the Contractor to effectively carry out inserting and sealing the CIPP lining at the outlet and inlet manholes.
 - 1. The CIPP lining tube shall be manufactured or fabricated to a size that will tightly fit the internal circumference of the sewer being rehabilitated after being installed and cured.

CURED-IN-PLACE PIPE LINING

2. The CIPP lining shall be able to fit into irregularly shaped pipe sections and through bends (up to 45 degrees) and dips within the pipeline.
 3. Allowance for longitudinal and circumferential expansion shall be taken into account when sizing and installing the CIPP lining.
 4. The tube shall be properly sized to the existing pipe's diameter and the length to be rehabilitated and be able to stretch to fit irregular pipe sections and negotiate bends.
 5. Contractor shall verify lengths in field prior to ordering and prior to impregnation of tube with resin, to ensure that tube will have sufficient length to extend entire length of the run, which is defined as the length of the existing host pipe measured from the interior walls of the manholes, and/or from the ends of the pipe when/if the pipe extends into the manholes. Contractor shall also measure inside diameter and circumference of existing pipelines at face of each manhole in field prior to ordering liner so that liner can be installed in a tight-fitted condition with little or no wrinkling.
- R. The Contractor shall verify the proposed CIPP lining thicknesses and submit the associated calculations. The CIPP lining for 8-inch through 10-inch host pipe shall be designed in accordance with the applicable ASTM F1216 provisions for "fully deteriorated gravity pipe conditions." The CIPP lining for other pipe sizes may be designed in accordance with the applicable ASTM F1216 provisions for "partially deteriorated gravity pipe conditions," unless it is noted on the Drawings that "fully deteriorated gravity pipe conditions" shall apply based on reviewing the CCTV video. For sewers where previous CCTV inspection data was not available, the Contractor should submit the completed inspection to determine if "partially deteriorated" or "fully deteriorated" apply. The CIPP lining shall meet the following minimum design conditions, unless the Owner agrees to the change or as noted on the Drawings:
1. AASHTO H-20 Live Load with two trucks passing
 2. Constrained soil modulus of native soil in the pipe zone = 1,000 psi
 3. Soil weight with 120 pounds per cubic foot and a coefficient of friction of $K_u' = 0.130r$ shall be used for the installed depths.
 4. The long-term flexural modulus used in the design calculations shall be estimated by multiplying the lowest short-term flexural modulus specified in the ASTM standards by a long-term retention of mechanical properties factor equal to 50 percent.
 5. Design safety factor = 2.0
 6. Typical groundwater levels shall be estimated at 1/2 the distance between the pipe's invert and the ground surface. If actual groundwater depth information is available from USGS or

CURED-IN-PLACE PIPE LINING

other sources, it may be used in the calculations. If the sewer is within 50 feet of a creek or other water body or if indicated on the Drawings, the groundwater depth used in the calculations should be the maximum depth from the ground surface to the pipe crown.

7. Service temperature range shall be 40 °F to 100 °F.
8. Maximum long-term deflection shall be 5 percent.
9. Minimum pipe ovality shall be 2 percent.
10. The CIPP lining thickness to be used shall be the largest thickness as determined by calculations for deflection, bending, buckling, and minimum stiffness.
11. The CIPP shall be designed to withstand all imposed loads, including live loads and, if applicable, hydrostatic pressure. The liner shall have sufficient wall thickness to withstand all anticipated external pressures and loads that may be imposed after installation.
12. Submit to the OWNER for approval the structural design for other size sewers and depths or “fully deteriorated” gravity sewers when conditions apply.
13. The minimum lining thickness after installation and curing shall be as follows:

Minimum Lining Thickness Following Installation and Curing* ** ***			
Pipe Diameter (in)	Depth of Sewer to Top of Pipe (ft)	Fully Deteriorated Pipes Minimum Liner Thickness (mm)	Partially Deteriorated Pipes Minimum Liner Thickness (mm)
12-inch	3 to 9	6	6
12-inch	9 to 17	7.5	6
12-inch	17 to 20	9	6
15-inch	3 to 9	7.5	6
15-inch	9 to 15	9	6
15-inch	15 to 20	10.5	7.5
18-inch	3 to 8	9	6
18-inch	10 to 14	10.5	7.5
18-inch	14 to 18	12	7.5
18-inch	18 to 20	12	9
21-inch	3 to 8	9	6
21-inch	10 to 14	10.5	7.5
21-inch	14 to 18	13.5	10.5
21-inch	18 to 20	15	12

- S. The CIPP lining shall be watertight.

CURED-IN-PLACE PIPE LINING

- T. The CIPP lining shall provide a 50-year service life and shall have the following minimum initial and long-term properties:

Property	Test Method	Initial (psi)	Long-term (psi)
Flexural Strength	ASTM D790	4,500	2,250
Flexural Modulus of Elasticity	ASTM D790	300,000	150,000

2.02 END SEALS

- A. End seals shall be composed of hydrophilic rubber and molded or formed as a one-piece cylinder which when installed will form a 360 degree seal between the host pipe and the newly installed liner. Use of caulking in lieu of an end seal will not be allowed. Acceptable end seals are Insignia™ End Seals by LMK Enterprises, Hydrotite by Greenstreak, or approved equal.

PART 3 - EXECUTION

3.01 PRE-INSTALLATION

- A. The Contractor shall notify all property Owners who discharge sewage directly to the sewer being lined that their service will be temporarily discontinued during the CIPP lining installation. The Contractor shall notify individual property Owners at least 72 hours in advance, giving the date, start time, and estimated completion time for the work being conducted.
- B. The Contractor shall clean each pipe length to be lined and shall dispose of any resulting material offsite.
- C. The Contractor shall conduct a pre-rehabilitation CCTV inspection for all sewers to be rehabilitated by CIPP lining methods. The inspection shall be to identify pipe defects, to document all service lateral connection locations, and to confirm additional needed point repair locations other than those indicated on the drawings. The contractor’s project manager and/or superintendent shall review the pre-rehabilitation inspection videos to confirm the quality of the videos, locations of lateral connections, and locations of point repairs to be performed; only after the contractor has confirmed that the quality of the videos is adequate for a clear review of the pipeline, they shall be submitted to the OWNER who will review pre-rehabilitation inspection videos to confirm point repair locations to be performed by the Contractor. The Contractor may not proceed with CIPP lining installation until the OWNER has reviewed and approved the Contractor’s pre-rehabilitation CCTV inspection data. A minimum of 5 working days shall be provided to review each pre-rehabilitation CCTV inspection data submittal.
- D. The Drawings will provide the Contractor the location for known laterals; however, this list shall not be

CURED-IN-PLACE PIPE LINING

interpreted as all-inclusive. The Contractor shall be responsible for verifying active customer service connections prior to rehabilitation. If the Contractor discovers an error or addition to the list provided, the Contractor shall immediately notify the OWNER. Upon completing the rehabilitation work, a list with all service laterals abandoned or reconnected as part of the work shall be submitted to the OWNER. The compiled list shall include the following information:

1. Location for each service lateral based on the CCTV inspection logs, which shall include an accurate distance measured from the starting manhole centerline and a notation (by clock-reference) stating where on the pipe circumference the service lateral connects.
 2. Status (Active or Inactive)
- E. During the pre-rehabilitation CCTV inspection and prior to installing the CIPP lining, all protruding service lateral connections greater than or equal to ½-inch for less than 18-inch pipe and 3/4-inch for larger pipe shall be internally cut or ground down flush with the pipe wall using a robotic cutter specifically designed for this purpose. The internal cutter shall be able to cut cast iron, PVC, vitrified clay pipe, concrete pipe, ductile iron pipe, and Orangeburg pipe. All materials/cuttings shall be removed from the sewer and properly disposed.
- F. The Contractor shall provide sewage flow bypass pumping. The contractor shall provide a bypass pumping and traffic control plan prior to installation. Service connection effluent may be plugged only after proper notification to the affected residence and may not remain plugged overnight or longer than 10 hours or approved alternate measures taken. Lining installation shall not begin until the Contractor has installed the required plugs or a sewage by-pass system and until all pumping facilities have been installed and tested under full operating conditions including bypassing mainline, side sewer flows, and services addressed. Once the lining process has begun, existing sewage flows shall be maintained until the resin/felt tube composite has been fully cured, cooled down, fully televised, and the CIPP ends finished.
- G. The Contractor shall furnish and install the CIPP lining in the sewer's full length as shown on the Drawings. The CIPP lining installation shall be in complete accordance with applicable ASTM F1216 provisions and the manufacturer's recommendations.
- H. If the CIPP lining manufacturer believes the infiltration rate in the sewer segment is high enough to risk washing out the resin, the Contractor shall perform required measures to minimize infiltration prior to installation. If any infiltration runners or gushers as defined by NASSCO PACP are observed during the pre-CCTV inspection, the Contractor shall submit in writing for approval by the OWNER the methods and materials for mitigating any adverse impacts from the infiltration. Infiltration runners or gushers that are observed may be stopped by injecting a chemical hydrophilic grouting using a remote packer as an acceptable and preferred method.
- I. The Contractor shall evaluate CIPP liner installations for the potential of adverse odor issues such as

CURED-IN-PLACE PIPE LINING

from styrene and implement measures including, but not limited to, supplemental ventilation, service plugging, and monitoring in accordance with pertinent state and federal rules and regulations. The evaluations shall include issues that may occur from long duration installations, extended curing times, close proximity to buildings, and/or resident's sensitivities, impairments, or known health conditions relative to respiratory issues.

3.02 INSTALLATION

- A. The CIPP lining for 6-inch through 18-inch sewers without sags greater than 30% may be installed via inversion using hydrostatic head or air pressure or pull-in methods in accordance with ASTM F1216 and manufacturer's recommendations.
- B. The Contractor shall install a hydrophilic seal at each manhole face prior to inverting or pulling in the uncured CIPP lining.
- C. If the CIPP lining does not fit tightly against the original pipe at its termination points, at no additional cost to the Owner, the full circumference of the CIPP lining exiting the host pipe shall be filled with a resin mixture compatible with the CIPP and approved by the CIPP manufacturer. There shall be no groundwater leakage between the existing pipe and the CIPP lining at the manhole connection or service lateral connections. Any leakage found shall be eliminated by the Contractor at no additional cost to the Owner.
- D. The installed CIPP lining shall be cured using circulating heated water or steam in accordance with ASTM F1216 and manufacturer's recommendations for sewers 18-inch diameter and smaller with temperature monitoring at manholes and service openings if available. For sewers greater than 18-inch diameter, the installed CIPP lining shall only be cured using circulating heated water in accordance with ASTM F1216 and manufacturer's recommendations.
- E. The resin-impregnated flexible felt tube lining shall be processed to affect the desired cure throughout the tube's length, extending full length from manhole to manhole(s). The resin shall be cured into a hard impermeable pipe of the minimum specified thickness, providing a structurally sound, uniformly smooth interior and tight-fitting lining within the existing pipe.
- F. Cool-down procedures shall be in accordance with ASTM F1216 and manufacturer's recommendations.
- G. UV cured CIPP will not be permitted without written approval from OWNER and after reviewing the documentation to ensure the lining is compatible with all specifications and other related work including any lateral lining systems.
- H. The Contractor may install CIPP lining in multiple sewer segments at one time where possible. When installing CIPP lining in multiple sewer segments at one time, remove the top 1/2 of the CIPP lining in the intermediate manhole and fill the void between the CIPP lining and existing channel with non-

CURED-IN-PLACE PIPE LINING

shrink grout. The manhole bench shall be reconstructed as required to provide a smooth transition to the new CIPP lining.

- I. Temperature monitoring systems shall be required for all 18-inch or larger sewers, any sized sewer that crosses a stream, creek, or other body of water, or as noted on the Drawings. This system shall be installed at the pipe invert per the manufacturer's recommended procedures. The temperature sensors shall be placed at intervals as recommended by the sensor manufacturer. Additional sensors shall be placed where significant heat sinks are likely or anticipated. The sensors, if installed, shall be monitored by a computer using a tamper proof database which can record temperatures at the lining interface and the host pipe. Provide the OWNER with access to the longitudinal temperature monitoring system data during the installation via digital data, web-based or other approved methodology and printed reports. Temperature monitoring systems shall be Zia Systems or Vericure by Pipeline Renewal Technologies.
- J. If cool-down is to be accomplished by introducing cool water into an inversion standpipe to replace the water being drained from a small hole made in the downstream end, cool the hardened pipe to a temperature below 100 °F (38 °C) before relieving static head in the inversion standpipe. When releasing static head, ensure a vacuum will not be produced that could damage the newly installed CIPP lining.
- K. Vent and/or exhaust noxious fumes or odors generated during and remaining after the curing process has been completed. This process shall remain in place at all manholes, laterals, etc., until noxious odors have dissipated to an acceptable level in accordance with OSHA requirements for the materials used and there is no potential health hazard left to the general public or the construction workers.
- L. Identify and submit for approval to the OWNER the points to where curing water will be discharged if other than the downstream sanitary sewer system at acceptable discharge rates. NO discharge to storm sewers or drainage systems shall be allowed.
- M. Provide piping, pumps, valves, and other equipment to discharge curing water.
- N. All cutting and sealing of CIPP liner at manhole connections and/or walls shall provide watertight pipe and manhole seals. All cut edges of cured liner shall be thoroughly sealed with same resin as was used in liner. Catalyst or hardener used shall be compatible with resin/catalyst used in liner previously but shall not require an external heat source to begin exothermic reaction (curing). There shall be no leakage of groundwater into manhole between CIPP liner and existing sewer pipe and between existing sewer pipe and manhole wall.
- O. The installed CIPP lining shall be continuous over the sewer line section's entire length and be free from visual defects such as foreign inclusions, dry spots, pinholes, fins, major wrinkles, and delamination. The lined invert and lower third of the pipe in normal wastewater flow depth shall be of particular concern to defect avoidance. The CIPP lining shall be impervious and free from any pipe

CURED-IN-PLACE PIPE LINING

leakage to the surrounding ground or from the ground to inside the lined pipe.

3.03 REINSTATING SERVICES

- A. After the new CIPP lining has been cured and completely cooled down, the Contractor shall reconnect the existing service laterals as designated by the pre-installation CCTV report generated by the Contractor. This shall be done without excavation from the pipeline's interior using a television camera and a remote cutting device that reestablishes the service connection to not less than 90 percent of the original diameter. All connections between the CIPP lining and the service connection shall be watertight. All openings shall be clean and neatly cut, and the cut shall be buffed with a wire brush to remove rough edges and provide a smooth finish. The bottom of the openings shall be flush with the bottom of the lateral pipe with no protruding material able to hinder flow or catch debris.
- B. For service renewals by excavation methods, InsertaTees may be used for solid wall pipes having a 0.36-inch or greater wall thickness. InsertaTees shall be "Fatboy" type with hub manufactured of SDR 26 PVC material incorporating a 360 degree integral stop on the hub surface and exceeding ASTM F1336 Section 10.3 Pipe Stop Load Support Test, or approved equal. Romac type saddles shall be used for pipes having a wall thickness thinner than 0.36-inches.
- C. Inactive service laterals will be abandoned by not reopening the service connection after installing the CIPP lining.
- D. Provide a fully operational backup device for reinstating service laterals. If for any reason the remote cutting device fails during a service lateral's reinstatement, immediately deploy the standby device to complete the reinstatement. The backup device shall be fully functional without needing to remove parts from the primary device. The backup equipment shall be on site throughout the reinstatement process.

3.04 FIELD TESTING AND ACCEPTANCE

- A. The Contractor shall perform a 4 psi air test on each CIPP lining segment in the OWNER's presence after curing the CIPP and prior to internally re-instating laterals on all 18-inch and smaller diameter sewers. Larger diameter sewers will be visually inspected only by CCTV for no visible leaks. The CIPP shall be able to hold a 4 psi pressure for a 5-minute minimum duration after a 2-minute stabilization period. Any lining not able to meet this testing requirement shall be repaired and retested at no additional cost to the Owner.
- B. Field acceptance for the CIPP lining shall be based on the OWNER's evaluation of the installation including reviewing the CIPP lining curing data, the post-rehabilitation CCTV inspection data, the certified test data for the installed CIPP lining, and CIPP air testing results. All CIPP sample testing and repairs to the installed CIPP as applicable shall be completed and documented in written form before final acceptance.

CURED-IN-PLACE PIPE LINING

- C. For up to every 1,000 linear feet for pipe less than 24-inches in diameter of CIPP lining installed, the Contractor shall perform sampling and testing to determine the installed CIPP lining's flexural properties and thickness. After 10,000 feet of acceptable test results have been received, the OWNER may reduce the test sample frequency to one sample every 2,000 feet from the same wet-out batch, as long as samples continue to meet all minimum standards and sampling results are received in a timely manner. The testing frequency may be increased by OWNER and performed by the Contractor at no additional cost to the Owner when the required tests show the installed CIPP lining does not meet the specifications.
- D. Tests shall be performed by an independent testing laboratory certified by the American Association for Laboratory Accreditation (A2LA). The Contractor shall submit to the OWNER the name and location for the independent testing laboratory, a certified statement from the laboratory indicating they are independent from and not associated with the Contractor in any way, and the ASTM certification for the independent testing laboratory.
- E. All expenses for sampling and testing the installed lining shall be paid by the Contractor. The cost for all manufacturers' testing to qualify products furnished to the project site shall be the Contractor's responsibility.
- F. Sampling and testing for the installed CIPP lining shall conform to the following requirements.
1. Remove one restrained sample of the installed CIPP lining at least 18-inches in length. The sample shall be captured by installing the CIPP lining through a section of PVC or similar cylindrical tube (same diameter as the existing sewer diameter) within the installation's most downstream manhole and at all intermediate manholes if multiple sewer segments are lined at the same time. The Contractor may elect to cut the sample longitudinally and take 1/2 the sample for direct shipping to the laboratory and keep the other sample 1/2 for additional testing if necessary.
 2. For sewers 18 inches in diameter and larger, a minimum of two plate samples formulated out of the same felt blend and resin mixture as the installed liner shall be prepared and cured in the downtube of the installation column.
 3. The CIPP lining thickness shall be measured in accordance with ASTM D5813. Flexural properties shall be determined in accordance with ASTM D790. The Contractor shall label and date all samples for shipping to the independent testing laboratory. The OWNER shall be copied on all transmittals to the independent testing laboratory. Testing results shall be submitted to the OWNER within 30 days after installing the CIPP lining, or payment will be withheld.
 4. Any CIPP lining not meeting the specified installed strength and/or thickness requirements, regardless of the amount below the specified requirements, shall not be approved for payment

CURED-IN-PLACE PIPE LINING

until the deficiency has been corrected by the Contractor in a manner approved by the OWNER at no additional cost to the Owner. Options considered for correcting deficient CIPP lining installations include the following.

- a. Remove the existing CIPP lining and re-line the sewer.
 - b. Provide open-cut sewer replacement from manhole to manhole.
 - c. Re-line the sewer with the existing CIPP lining in place. Note that this will not be accepted if OWNER determines that the sewer section has capacity concerns.
 - d. Accept the following penalties depending on the structural and thickness test results.
 - 1) If the tests are within 90 percent of the specification, the payment reduction shall be 10 percent of the bid price per item.
 - 2) If the tests are between 75 percent and 89 percent of the specification, then 75 percent of the bid price shall be paid.
 - 3) If the tests are below 75 percent, the Contractor must reline or replace the segment.
- G. The Contractor shall perform a post-rehabilitation CCTV inspection for all sewers rehabilitated using CIPP lining methods. The post-rehabilitation CCTV inspection shall be performed following the CIPP lining installation and reinstating all active service laterals. The Contractor's project manager and/or superintendent shall review the post-rehabilitation inspection videos to confirm the quality of the videos and of the installed CIPP; only after the Contractor has confirmed that the video is of good quality, the videos shall be submitted to the OWNER. If it is determined that any repairs are needed at any segment, a new CCTV inspection shall be performed of the entire segment(s) after the repairs have been completed.
- H. The OWNER shall review and approve payment based on the Contractor having satisfactorily completed a lining free from significant defects. The finished lining shall be continuous between manholes and shall be free from visual defects such as foreign inclusions, reverse curvatures, splits, flats, cracks, lifts, kinks, wrinkles, flats, dry spots, pinholes, shrinkage, crazing, leaks, and delamination. The maximum allowable size for wrinkle or bulge as shown in the inspection shall not exceed 3 percent of equivalent pipe diameter or 1-inch by visual measurement, whichever is smaller. No wrinkles will be allowed in the invert of pipe between 4:00 and 8:00 o'clock positions.
- I. Contractor will be responsible to remove and repair, at Contractor's expense, all such defects in a manner that is satisfactory to the OWNER.
- J. Shrinkage of the CIPP liner's length, of more than two (2) inches for pipe diameters less than 18-inch and three (3) inches for 18-inch or larger diameter from the face of the manhole shall be repaired with

CURED-IN-PLACE PIPE LINING

a fiberglass reinforced CIPP spot repair at no cost to the Owner.

- K. The cured CIPP lining and all pipe-to-manhole connections shall be watertight and free from infiltration.
- L. Following rehabilitation or replacement of the service laterals, the Contractor shall perform an air test in the OWNER's presence for each 18-inch and smaller segment lined or may test each lateral and connection area individually in lieu of the full segment air test.

3.05 CLEANUP

- A. Upon the installation work and testing acceptance, restore the project area affected by the operations to a condition at least equal to what existed prior to the work.

END OF SECTION

SANITARY SEWERAGE MANHOLE REHABILITATION

SECTION 33 01 30.81

SANITARY SEWERAGE MANHOLE REHABILITATION

1 PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: all labor, materials, accessories, equipment, and tools necessary for the repair and rehabilitation of the sanitary sewer manholes shown on the plans.
- B. Manhole Rehabilitation as shown in the contract documents includes cleaning manhole, filling all voids, stopping all leaks by chemical grout injection, and applying a spray on liner on the bench, barrel, and cone (terminating at the frame), or providing FRP insert liners, or providing polymer concrete insert liners for the existing manholes.
- C. The intent and purpose of these specifications is to require a complete and satisfactory installation in every respect and any defect in material or workmanship shall be cause for the replacement and correction of such defect as directed by the Utility's Representative at no expense to the Utility.

1.02 UNIT PRICES

- A. Refer to Section 01 20 00 PRICE AND PAYMENT PROCEDURE

1.03 STANDARDS AND QUALITY

A. Coating System

- 1. Coating system manufacturer shall have a minimum 5 years of experience manufacturing the material provided for this project or be approved by the Utility.
- 2. Coating material must be applied by a Certified Applicator of the coating system manufacturer with at least 5 years of experience with the particular coating being used for this project.

B. FRP and Polymer Concrete Liners

- 1. Regulatory Requirements:
 - a Comply with Utility requirements.
 - b Comply with all State and Local Regulatory standards.
- 2. The installing contractor shall demonstrate applicable experience and performance history by submitting references from a minimum of 3 other rehabilitation projects or shall have a minimum of five years' experience installing standard sanitary manholes and a certification of training from the manufacturer of the manhole insert system.

2 PART 2 PRODUCTS

2.01 PATCHING MATERIAL

- A. All non-leaking holes, cracks or voids shall be patched with a quick setting (less than 30 minutes), non-shrink, fiber reinforced, corrosion resistant calcium aluminate or equivalent material that is compatible with the chosen liner system and shall be applied in accordance with the manufacturer's recommendation for basecoat materials. Patch material must meet the following minimum requirements:
 - 1. Compressive Strength per ASTM C-109: 200 psi (1 Hour)
 - 2. Ultimate Compressive Strength per ASTM C-109: 5000 psi
 - 3. Bond Strength per ASTM C-882: >1700 psi

SANITARY SEWERAGE MANHOLE REHABILITATION

4. Applied Density: 105 pcf
 5. Shrinkage per ASTM C-596: 0% at 90% R.H.
- 2.02 INFILTRATION CONTROL MATERIAL (CHEMICAL GROUT)
- A. Active leaks and infiltration shall be stopped by injecting a chemical grout through the source to the outside of the manhole. The grout used shall be an acrylamide, acrylic or hydrophobic urethane gel and might require the addition of a shrink control agent, gel reinforcing agent or accelerator. The chemical grout shall be volume stable and have a minimum 28 day compressive strength of 250 psi and minimum one day strength of 50 psi.
- 2.03 CEMENTITIOUS LINER
- A. The material shall be a 100% calcium aluminate mortar designed to stop infiltration, restore structural integrity, and provide protection against microbiologically induced corrosion. It shall be spray applied to form a structurally enhanced monolithic liner covering all interior substrate surfaces with the following minimum requirements:
1. Compressive Strength per ASTM C-109: >8000 psi (28 Days)
 2. Tensile Strength per ASTM C-900: >800 psi
 3. Flexural Strength per ASTM C-293: >1200 psi (28 Days)
 4. Shrinkage @ 90% R.H. per ASTM C-596: <0.08% (28 Days)
 5. Freeze/Thaw per ASTM C-666: No Damage After 300 Cycles
 6. Air Void Content per ASTM C-457: 2-4% (7 Days)
 7. Specific Gravity/Absorption Test per ASTM C-642: 3-5% (7 Days)
- B. Cementitious liner shall be Quadex Aluminaliner, manufactured by Quadex, Inc.; SewperCoat, manufactured by LaFarge Aluminates, CemTec Silatec CAM, manufactured by A. W. Cook Cement, Inc.; Strong-Seal MS2-C, High Performance Mix manufactured by Strong-Seal Systems, PerpetuCrete CA, manufactured by Protective Liner Systems, or approved equal.
- 2.04 EPOXY LINER
- A. The material shall be 100% solids, solvent-free two-component epoxy resin system with select fillers to minimize permeability and provide sag resistance acceptable to the following minimum requirements:
1. Hardness, Shore D per ASTM D-2240: 70
 2. Tensile Strength per ASTM D-638: >7000 psi
 3. Flexural Strength per ASTM D-790: >10000 psi
- B. Epoxy liner shall be Raven 405, manufactured by Raven Lining Systems, Cor- Cote SC, manufactured by Sherwin-Williams, PerpetuCoat PLS-613 manufactured by Protective Liner Systems, or approved equal.
- 2.05 FRP MANHOLE LINERS
- A. The resins used shall be a commercial grade unsaturated polyester resin or vinyl ester resin.
- B. The reinforcing materials shall be commercial grade "e" type glass in the form of continuous roving and chop roving, having a coupling agent that will provide a suitable bond between the glass reinforcement and the resin.
- C. Interior Surfacing Material

SANITARY SEWERAGE MANHOLE REHABILITATION

1. The inner surface exposed to the chemical environment shall be a resin- rich layer of 0.010 to 0.020 inch thick.
 2. The inner surface layer exposed to the corrosive environment shall be followed with a minimum of two passes of chopped roving of minimum length 0.5 inch (13 mm) to maximum length of 2.0 inch (50.8 mm) and shall be applied uniformly to an equivalent weight of 3 oz./ft.
 3. Each pass of chopped roving shall be well rolled prior to the application of additional reinforcement.
 4. The combined thickness of the inner surface and interior layer shall not be less than 0.10 inch (2.5 mm)
- D. Wall Construction Procedure
1. After inner layer has been applied the manhole liner wall shall be constructed with chop and continuous strand filament wound manufacturing process which insures continuous reinforcement and uniform strength and composition.
 2. The cone section, if produced separately, shall be affixed to the barrel section at the factory with resin-glass reinforced joint resulting in a one piece unit.
 3. Seams shall be fiber glassed on the inside and the outside using the same glass-resin jointing procedure.
 4. Field joints shall not be acceptable by anyone except the manufacturer.
 5. UV inhibitor shall be applied to the exterior surface of the manhole liner and shall have gray pigment and shall be a minimum thickness .125 inches.
- E. Fillers and Additives
1. Fillers, when used, shall be inert to the environment and manhole construction.
 2. Sand shall not be accepted as an approved filler.
 3. Additives, such as thixotropic agents, catalysts, promoters, etc., may be added as required by the specific manufacturing process to be used to meet the requirements of this standard. The resulting reinforced-plastic material must meet the requirements of this specification.
- F. Manhole Liner Design
1. All manholes shall have a 0.50" minimum wall thickness.
 2. All manhole liners shall be designed so that a ladder can be supported by the installed manhole liner. No manhole steps shall be installed.
 3. Manway cone sections shall be concentric with respect to the larger portion of the manhole liner diameters through 60 inches. Larger manhole liners may have concentric or eccentric manway reducer openings.
 4. The manhole liner shall provide an area for which grade rings to be installed to accept a manhole frame and cover and have the strength to support a traffic load without damage to the manhole liner.
- G. Other Requirements
1. The exterior surface of the liner shall be relatively smooth with no sharp projections. Hand-work finish is acceptable if enough resin is present to eliminate fiber show. The exterior surface shall be free of blisters larger than 0.5 inch in diameter, delamination or fiber show.

SANITARY SEWERAGE MANHOLE REHABILITATION

2. The interior surface shall be resin rich with no exposed fibers. The surface shall be free of crazing, delamination, blisters larger than 0.5 inch in diameter and wrinkles of 0.125 inch or greater in depth. Surface pits shall be permitted if they are less than 0.75 inch in diameter and less than 0.0625 inch deep. Voids that cannot be broken with finger pressure and that are entirely below the resin surface shall be permitted if they are less than 0.5 inch in diameter and less than 0.0625 inch thick.
3. Any manhole liner repairs shall meet all requirements of this specification.
4. Manhole liner lengths shall be in 6-inch increments +/- 2 inches.
5. Tolerance of inside diameter shall be +/- 1% of required manhole diameter.
6. The complete manhole liner shall have a minimum dynamic-load rating of 16,000 lbs. when tested in accordance with ASTM 3753 8.4 (note 1). To establish this rating the complete manhole shall not leak, crack, or suffer other damage when load tested to 40,000 lbs. and shall not deflect vertically downward more than 0.25 in. at the point of load application when loaded to 24,000 lbs.
7. The manhole cylinder shall have the minimum pipe-stiffness values shown in the table below when tested in accordance with ASTM 3753 8.5 (note 1).

STIFFNESS REQUIREMENTS

<u>LENGTH (ft)</u>	<u>F/AY (PSI)</u>
3 - 6.5	0.75
7 - 12.5	1.26
13 - 20.5	2.01
21 - 25.5	3.02
26 – 35	5.24

8. To determine soundness, apply an air or water pressure test to the manhole test sample. Test pressure shall not be less than 3 psig or greater than 5 psig. While holding at the established pressure, inspect the entire manhole for leaks. Any leakage through the laminate is cause for failure of the test. Refer to ASTM 3753 8.6.
 9. The FRP manhole and all related components shall be fabricated from corrosion proof material suitable for atmospheres containing hydrogen sulfide and dilute sulfuric acid as well as other gases associated with the wastewater collection systems.
- H. The required physical properties shall be as follows:

	<u>Hoop Direction</u>	<u>Axial Direction</u>
Tensile Strength (psi)	18,000	5,000
Tensile Modules (psi)	0.6 x 10 ⁶	0.7 x 10 ⁶
Flexural Strength (psi)	26,000	4,500
Flexural Modules (psi)	1.4 x 10 ⁶	0.7 x 10 ⁶
Compressive (psi)	18,000	10,000

- I. All tests shall be performed as specified in ASTM 3753 latest edition, section 8. Test method D-790 (see note 5) and test method D-695.

2.06 POLYMER CONCRETE MANHOLE LINERS

- A. Polymer Concrete liners shall be designed manufactured to meet the design

SANITARY SEWERAGE MANHOLE REHABILITATION

requirements of AASHTO HL-93 design live loading applied to manhole cover and riser sections and shall be designed based upon live and dead load criteria in ASTM C 857.

- B. Polymer mixture shall consist solely of thermosetting resin, sand and aggregate. No cementitious or calcium carbonate materials shall be allowed.
- C. Thermosetting Resin
 - 1. Resin used shall be unsaturated, certified, isophthalic polyester resins or vinyl ester resins.
 - 2. The resin shall have a minimum of deflection temperature of 158° F when tested at 264 psi (1.820 mPa) following Test Method D 648.
 - 3. The resin content shall not be less than 7% of the weight of the sample as determined by test method D 2584.
 - 4. Resin selection shall be suitable for applications in the corrosive conditions to which the structures will be exposed.
 - 5. Mixing lots of resin from different manufacturers shall not be allowed.
- D. The polymer manhole sleeve will have a minimum wall thickness of 2-inches and an outside diameter clearance of 1.5-inches. The wall thickness of risers and conical tops shall be not less than that prescribed by the manufacturer's design by more than 5%.
- E. Steel reinforcement shall not be required for circumferential reinforcement, joint reinforcement, or hoop reinforcement. Manufacture will determine the need for and type of reinforcement as it pertains to safety and lifting requirements.
- F. Variations in height of two opposite sides of risers and conical tops shall not be more the 5/8 inch. The under run-in height of a riser or conical top shall not be more than ¼-inch /foot of height with a maximum of ½-inch in any one section.
- G. Riser and cone section joints shall be of a flush flat edge design that on assembly with gaskets and/or butyl mastic will make a continuous and uniform manhole. Joint sealing surfaces shall be free of dents, gouges and other surface irregularities that would affect joint integrity.
- H. Polymer manhole riser and cone sections are to be provided in various lengths in combination to provide correct height with the fewest joints.
- I. Each manhole component shall be free of all defects that will detrimentally affect the strength and serviceability of the component part.
- J. Epoxy coatings for bench area shall meet the requirements of Section 2.04 above.

2.07 MANHOLE FRAME AND COVER

- A. Manhole Frames and Covers shall be ferrous; 24-inch ID by 7- to 9-inch riser, with 4-inch- minimum-width flange and 26-inch diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "SANITARY SEWER." Outside ring on sewer manholes shall be painted APWA Green (PMS 3415).
- B. Material shall be ASTM A 48-43, Class 35 gray iron unless otherwise indicated.
- C. Cast Iron covers and frames design shall be based on a wheel load of 15,000 pounds plus 25% allowance for impact and the use of class 20 cast iron (federal spec RR-F 621C). Other designs differing only in non-essential details and as approved by the Owner may be used. Total weight shall be at least 400 pounds.
- D. Manhole frame and cover shall be manufactured by the same manufacturer.

SANITARY SEWERAGE MANHOLE REHABILITATION

- E. All castings shall conform to the shape and dimensions shown on the plans, and shall be clean and perfect without blow, sand holes, or defects of any kind which tend to impair their strength. No plugging or other stopping of defect holes will be allowed.
- F. The manhole ring and cover shall be set into a bed of clean, fresh mortar and/or a concrete collar as indicated on Utility's Standard Details, to place the ring and cover at the required grade.
- G. Camlock ring and covers shall have wiper gasket and two stainless steel roll pins ½-inch diameter by 1-3/4 inches 180° apart on the manhole cover. Camlock bolt head shall be compatible with Owner standard tool for turning camlock mechanism. Camlock ring and covers shall be installed as indicated on the drawings, in accordance with Owner standard details.

2.08 FRAME/CONE SEAL

- A. Applied seals shall be achieved by applying an aromatic urethane resin compound to the internal surface between the manhole frame and the cone section to stop inflow under the manhole frame. Sufficient material shall be applied to achieve a minimum thickness of 120 mils. The material shall comply with the following requirements:
 - 1. Hardness per ASTM D-2240: 75
 - 2. Tensile Strength per ASTM D-412: 1150 psi
 - 3. Elongation per ASTM D-442: 800%
 - 4. Adhesive Strength per ASTM D-903: 175 lb/l. inch
 - 5. Tear Resistance per ASTM D-1004: 155 lb/l. inch
- B. The material shall be Flex-Seal Utility Sealant as manufactured by Sealing Systems, Inc. or approved equal.

2.09 CONCRETE

- A. General: Cast-in-place concrete complying with ACI 318, ACI 350/350R, and the following:
 - 1. Cement: ASTM C 150, Type II.
 - 2. Fine Aggregate: ASTM C 33, sand.
 - 3. Coarse Aggregate: ASTM C 33, crushed gravel.
 - 4. Water: Potable.
- B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.

2.10 WATER

- A. All water used on this project shall be clean and potable water.

3 PART 3 – EXECUTION

3.01 FLOW CONTROL AND BYPASS PUMPING:

- A. It is anticipated that minimal bypass pumping will be required for manhole rehabilitation. It is expected that most of the flow control can be accomplished using flow through plugs.
- B. When force main discharges are encountered, the Contractor may fabricate an apparatus to divert flow toward the bottom of the manhole thus reducing splash. Accepted materials for the temporary apparatus include PVC pipe, bends, fittings, fernco couplings, and lay flat discharge hose (and other acceptable materials/methods presented by the

SANITARY SEWERAGE MANHOLE REHABILITATION

Contractor). The Utility shall assist by hand operating the lift stations while the Contractor installs the flow control apparatus.

- C. If the Contractor proposes bypass pumping for this project, a detailed Bypass Pumping Plan shall be submitted by the Contractor, prior to installing any bypass pumping.

3.02 PATCHING HOLES OR VOIDS

- A. All loose or disintegrated material shall be removed from the area to be patched.
- B. Holes or voids around steps, joints or pipes, spalled areas, and cavities caused by missing or broken brick or mortar shall be repaired using patching material conforming to the requirements of Section 2.01 of these specifications.
- C. The patching material shall be mixed and applied in accordance with the manufacturer's requirements.

3.03 STOPPING ACTIVE LEAKS AND INFILTRATION:

- A. All active leaks and infiltration shall be repaired using chemical grout conforming to the requirements of Section 2.02. Any areas that show evidence of leakage either active or non-active during inspection shall be injected.
- B. At each point of leakage within the manhole structure a hole shall be carefully drilled through the wall to the exterior of the manhole. Grout ports or sealant injection devices shall be placed in these holes in a way as to provide a watertight seal between the holes and the injection device.
- C. Chemical grout shall be pumped through the hole until material refusal is recorded on a pressure gauge mounted on the pumping unit. Care shall be taken during the pumping operation to insure that excessive pressures do not develop and cause damage to the manhole structure.
- D. Upon completion of the injection, the ports shall be removed and the remaining holes filled with mortar and troweled flush with the surface of the manhole wall.
- E. The injected section joints, pipe connection, holes, or seams shall be sealed with patching material conforming to the requirements of Section 2.01 and smoothed flush with the surface of the manhole wall.
- F. To prevent the migration of infiltration leaks the Contractor shall comply with the following requirements for points of injection:
 1. For Pre-cast Section Joint Leaks, provide a minimum of 4 injection points shall be evenly spaced around the circumference of the manhole joint.
 2. For Pipe Connection Leaks, provide a minimum of 2 injection points shall be evenly spaced around pipe connection. Large diameter pipe may require more than 2 injection points.
 3. For Pipe Invert Leaks, provide a minimum of 2 injection points, one on each side of trough.
 4. For Lift Holes/Voids provided a minimum of 1 injection point below the center of the lift hole/void.

3.04 REFORM/REPAIR EXISTING BENCH AND INVERT

- A. Manhole inverts and benches shall be reformed as identified in the plans using the patching material identified in Section 2.01. Fast setting hydraulic cement may be used to repair the invert.
- B. The patch material shall be applied to the invert and bench at a minimum thickness of ½", extending sufficiently to the wall to tie into the cementitious liner to be applied later.

SANITARY SEWERAGE MANHOLE REHABILITATION

- C. The finished invert and bench shall be troweled to a smooth finish free of any ridges.
- D. The bench shall be sloped a minimum of 2 inches from the manhole wall toward the invert to prevent debris build-up on the bench.
- E. Repairs on the invert shall not compromise grade.
- F. The invert and bench shall be allowed to cure for a minimum of 30 minutes before being subject to active flow. Flow shall be bypassed by the requirements of Section 2: Wastewater Flow Control

3.05 BUILDING BENCH AND INVERT

- A. Inverts and benches shall be constructed in manholes with no hard bottom and no defined invert (channel of flow) using the patching material identified in Section 2.01. Fast setting hydraulic cement may be used to repair the invert.
- B. The bench shall be constructed of brick or block and finished by troweling smooth with patching material.
- C. The patching material shall have a minimum thickness of 1".
- D. The finished invert and bench shall be troweled to a smooth finish free of any ridges.
- E. The bench shall be sloped from the manhole wall toward the invert to prevent debris build-up on the bench. The invert and bench shall be allowed to cure for a minimum of 30 minutes before being subject to active flow.
- F. Flow shall be bypassed by the requirements of Section 3.01.

3.06 CEMENTITIOUS LINER APPLICATION

- A. Surface Preparation:
 - 1. All foreign material shall be removed from the manhole wall and bench using a high-pressure water spray (minimum 5,000 psi).
 - 2. Loose or protruding brick, mortar and concrete shall be removed using a mason's hammer and chisel or scraper. All concrete or mortar that is not sound or has been damaged by chemical exposure shall be removed to a sound concrete surface.
 - 3. All loose cementitious liner (previously installed) shall be removed by water blasting. Deteriorated epoxy or protective coatings shall be completely removed by sandblasting.
 - 4. Any holes or voids shall be filled in accordance with Section 3.02. The surface to be repaired must be clean and free of any loose materials.
 - 5. Active leaks and infiltration shall be stopped in accordance with Section 3.03.
- B. Step Removal:
 - 1. Prior to application of the cementitious liner, all steps shall be cut off and ground flush with the manhole wall. The contractor shall be responsible for the removal and disposal of old steps.
- C. Liner Application:
 - 1. No application shall be made to frozen surfaces or if freezing is expected to occur inside the manhole within 24 hours after application. If ambient temperatures are in excess of 95 degrees, precautions shall be taken to keep the mix temperature below 90 degrees.
 - 2. For each bag of product, use the amount of water specified by the manufacturer and mix for 30 seconds to 1 minute using equipment per manufacturer's recommendation.
 - 3. Manhole channels are not required to be lined.

SANITARY SEWERAGE MANHOLE REHABILITATION

4. First Application:
 - a The surface prior to spraying shall be damp without noticeable free water, but totally saturated.
 - b Materials shall be applied using low-pressure spray equipment from the bottom of the wall (including the bench but not invert) to the top (terminating at the frame / cone connection), to a minimum uniform thickness to insure that all cracks, crevices, and voids are filled and a relatively smooth surface remains after light troweling.
 - c Light troweling shall be performed to compact the material into voids and to set the bond.
5. Second Application:
 - a A second application is applied after the first application has begun to take an initial set (disappearance of surface sheen which could be 15 minutes to 1 hour depending upon ambient conditions) to assure a minimum total finished thickness of 1 inch.
 - b Application again shall be from the bottom up using low-pressure spray equipment.
 - c The surface shall then troweled to a smooth finish being careful not to over trowel so as to bring additional water to the surface and weaken it.
6. Curing:
 - a Caution should be taken to minimize exposure of applied product to sunlight and air movement.
 - b If application of second coat is to be longer than 15 minutes after completion of first coat, the manhole cover shall be set back in place.
 - c At no time should the finished product be exposed to sunlight or air movement for longer than 15 minutes before replacing the manhole cover.
 - d The final application shall have a minimum of 4 hours cure time before being subjected to active flow.
 - e Flow shall be bypassed per the requirements of Section 3.01.
 - f Traffic shall not be allowed over manholes for 12 hours after application is complete.

3.07 EPOXY LINER APPLICATION

A. Surface Preparation:

1. All concrete or mortar that is not sound or has been damaged by chemical exposure shall be removed to a sound concrete surface. At a minimum, this shall be achieved with a low pressure water cleaning equipment using a 0 degree rotating nozzle at 5,000 psi and 4 gpm.
2. Other methods such as high pressure water jetting (refer to NACE Standard No. 5/SSPC-SP12), abrasive blasting, shot-blasting, grinding, scarifying, and/or acid etching may also be used.
3. The method(s) used shall be performed in a manner that provides a uniform, sound, clean, neutralized surface that is not excessively damaged.
4. Any holes or voids shall be filled in accordance with Section 3.02. The surface to be repaired must be clean and free of any loose materials.
5. Active leaks and infiltration shall be stopped in accordance with Section 3.03.

SANITARY SEWERAGE MANHOLE REHABILITATION

6. When required on the plans, the epoxy liner shall be applied over a back-build of cementitious surface.
 - a. Exact minimum thicknesses of cementitious back-build will be determined after deteriorated concrete has been removed.
 - b. The cementitious liner shall be applied accordance to Section 3.06 of this specification.
 - c. The epoxy lining shall take place only after the cementitious liner has cured the appropriate length of time as recommended by the manufacturer.
 - d. Micro-silica based cementitious material may be substituted for back-build material upon Manufacturer's recommendations.
 - B. Liner Application:
 1. Spray application equipment approved by the coating manufacturer shall be used.
 2. Manhole channels are not required to be lined.
 3. Surfaces shall be coated by spray application to a minimum dry film finished thickness of 100 mils including bench (not including invert) and walls (terminating at cone/frame joint). Thickness shall be achieved using a minimum of two coats.
 4. Subsequent top coating or additional coats should occur no later than the recoat window for the specified products. Additional surface preparation will be required if this recoat window is exceeded.
 - C. Spark Test:
 1. The cured epoxy lining shall be spark tested for pinholes with a spark tester set at 10,000 volts minimum (100 V per mil).
 2. All pinholes identified by the spark test shall be repaired.
 3. All pinholes shall be marked off on surface areas containing pinholes to a point 6 inches beyond all pinholes and patch with epoxy to a minimum additional thickness of 30 mils.
 4. Blisters and uncured lining shall be completely removed and the areas recoated with epoxy to a point 6 inches beyond the repair areas at a minimum thickness of 100 mils.
- 3.08 FRP MANHOLE LINERS
- A. The existing manhole shall be excavated to below the bottom of concrete cone section on the existing manhole. The existing concrete cone section shall be removed and disposed of properly.
 - B. All cuts through existing asphalt and or concrete pavement shall be saw cut with straight cuts.
 - C. All existing manhole steps shall be removed flush with the existing manhole wall.
 - D. FRP manhole liners shall be installed in strict conformance to the manufacturer's recommendations and specifications. General procedure is as follows:
 1. Lift the manhole liner by inserting timber into the opening at the top of the liner. Attach a rope or chain to the timber and lift with a backhoe or other lifting device.
 2. Set the manhole liner into existing manhole. Mark the contour of the existing bench area onto the FRP liner. Remove the liner and cut along the contour mark.

SANITARY SEWERAGE MANHOLE REHABILITATION

3. Set the liner into the existing manhole in a concentric manner. Use a non- shrinking grout to seal the area between the bottom of the liner and the existing bench area.
4. The area between the old manhole and the new FRP manhole liner shall be filled using a concrete grout or flowable fill. The concrete grout shall be poured in layers of not more than 12 inches in even lifts. Backfill around the excavated reducer section with stabilized sand or crushed stone. The material chosen shall be free of large lumps or clods which will not readily break down under compaction. Backfill material and compaction requirements shall be in accordance with Section 31 20 00 Earth Moving.
- E. Any required manhole wall penetrations shall be sealed with a water proof gasket assembly approved by Owner.
- F. The manhole frame and cover shall be set on concrete grade rings and into a bed of clean, fresh mortar as indicated on the standard details, in order to place the ring and cover at the required grade. Set tops of frames and covers level with finished surface of manholes that are in pavements. Set tops of frames and covers 3-inches above finished surface in non-pavement areas unless otherwise indicated. Grade rings shall be no more than 6-inches in height.
- G. All exposed concrete/grout surfaces within manholes including manhole inverts shall be sealed with a 60 mil coating with Sauereisen Sewer Guard Epoxy spray coating or approved equal.
- H. Pavement shall be replaced in kind to match existing pavement depth and material type. Non paved areas shall be replaced in kind to match existing conditions.

3.09 POLYMER CONCRETE MANHOLE LINERS

- A. The area around the manhole shall be excavated as necessary to provide for removal of existing cone and castings while preventing soil and debris from falling into the manhole.
- B. Contractor shall provide equipment to maintain sewage flows without backup, overflow or spill.
- C. Necessary repairs shall be made to the existing manhole in order to receive the polymer inserts.
- D. Any loose debris shall be power washed or cleaned from wall areas. All dirt, grease, and debris shall be removed from the bench area to prepare bench surfaces for resurfacing. Debris shall not be allowed to enter the sewage system.
- E. All active leaks shall be repaired, and the bench shall be leveled and repaired to prepare for the polymer insert installation.
- F. The risers will be offloaded and lifted into place with approved manufacturer's lifting device. No other handling apparatus shall be acceptable.
- G. Installation of First Polymer Riser Section
 1. The first polymer riser section shall be saw cut if necessary to accommodate pipe entry and bench slopes.
 2. Depending on invert configuration, the bench area shall be prepared by building up the bench section with a Portland cement and sand mixture to provide a clean level surface to receive the riser. This build up should allow for a level surface above the existing top of the highest pipe.
 3. If pipe inverts are severely staggered the initial polymer sleeve can be modified in the field to accommodate the difference in bench slopes.
 4. After grout has set, lower the first riser section, clean and wipe down the polymer riser

SANITARY SEWERAGE MANHOLE REHABILITATION

wall above the bench to allow for application of the epoxy coating. This shall be done with a wet cloth.

5. When the new bench configuration is sufficiently dry and clean, a thin shell coating of the epoxy shall be built over the bench. The epoxy shall continue 6-inches up the polymer riser face to allow for interlink between the coating and polymer riser section.
 6. All non-booted or flexible coupler pipe entry areas shall be grouted by an epoxy patch kit provided by the manufacturer.
- H. Completion of Installation
1. After the initial bottom seal has cured the additional remaining riser sections and cone shall be installed using the appropriate wall alignment guides, gaskets and/or mastic.
 2. Fill the annular space between old and new structure with 3 parts sand to 1 part cement Portland cement grout or a backfill material approved by the Utility.
- 3.10 FRAME/CHIMNEY (CONE) SEAL INSTALLATION
- A. Applied Seal:
1. All foreign material, bituminous coating, rust or scale build-up, etc. shall be removed from the area to be coated by sandblasting in accordance with the manufacturers requirements. Wire brushing will not be allowed.
 2. After the area is cleaned, it must be completely dried prior to application of the seal material.
 3. The urethane resin compound shall then be applied from the bottom 3 inches of the frame to the top three inches of the cone, including the grade adjustment area, to a minimum thickness of 120 mils.
 4. Application shall be in accordance with the manufacturer's instructions.
- 3.11 CLEANING MANHOLE
- A. Any rocks, pieces of broken pipe or any other debris not desired in the manhole or invert shall be removed and disposed of by methods deemed appropriate by the engineer.
- B. The bench and invert shall be pressure washed to remove organic material and return undisturbed wastewater flow to the invert.
- 3.12 PLUGGING ABANDONED LINE
- A. Abandoned lines shall be filled with non-shrink grout conforming to the requirements of Section 2.02.
- B. Grout plug shall extend at least 1.5 times the thickness of the manhole wall.
- C. Plugging abandoned lines shall be performed prior to cementitious lining.
- 3.13 RAISING MANHOLES
- A. The frame shall be removed from the cone.
- B. The top of the cone and bottom of the frame shall receive a SSPC-SP3 Power Tool Cleaning to remove all rust and loose material.
- C. Precast Concrete Grade Adjustment Ring:
1. A pre-cast grade ring shall be inserted to raise the manhole with ample butyl rubber mastic applied between the cone and grade ring and the grade ring and the frame.
 2. If adjustment is made between the barrel and the cone section, butyl rubber shall be inserted

SANITARY SEWERAGE MANHOLE REHABILITATION

between each joint

D. Steel Grade Adjustment Ring:

1. Silicone shall be used to seat the steel grade adjustment ring on the frame.
2. The grade ring shall be secured to the existing frame by four spot welds spaced equal distance around the circumference of the frame.
3. This method shall only be used to raise manholes prior to asphalt overlay of the road.

3.14 INSTALL FLAT TOP SLAB ON EXISTING SQUARE TOP MANHOLE

- A. Existing square top slab, frame, and cover shall be removed.
- B. Brick or block courses shall be removed to allow for the installation of new flat top slab to grade.
- C. Standard approved precast concrete flat top slabs shall be used when applicable. Where standard size top slabs will not suffice, a custom precast concrete approved flat top slab shall be installed.
- D. Frames shall be bolted to the flat top using SS expansion bolts and butyl rubber mastic.
- E. The finished elevation shall be level with the existing or proposed finished grade.

3.15 REALIGN AND RESET FRAME

- A. Manhole frames shall be bolted to the cone section using SS Expansion Bolts. Frame shall have a minimum of 2 bolts (5/8" diameter, 4" in length).
- B. Frames shall be sealed to the top of manhole with butyl rubber mastic.
- C. Grout shall then be placed, on the inside and outside to the height of the adjustment.
- D. Manholes installed in streets or roadways shall be constructed with a concrete ring (3,000 psi) 6 inches thick and 5 foot minimum o.d. securing the frame. The concrete ring shall lie embedded in the gravel base course and below the surface course of pavement.

3.16 MANHOLE BENCH AND CHANNEL

- A. Manhole channels and benches shall be removed and rebuilt.
- B. Manhole channels and benches shall be field formed from concrete.
 1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
 2. Benches: Concrete, sloped to drain into channel.
- C. Modify the inverts to provide a smooth flow line through the manhole.
- D. Raise the bench to the top of the pipe, forming a "U" channel through the manhole and provide sufficient slope to make benches self-cleaning when benches must be modified.

3.17 GROUTING SECTION JOINTS

- A. Section joints shall be repaired with cementitious material conforming to the requirements of Section 2.03.
- B. Material shall be applied to fill any holes, voids, or cracks at the section joint.
- C. The material shall be applied at an even thickness around the entire circumference of the joint and smoothed flush to the surface of the manhole wall.

SANITARY SEWERAGE MANHOLE REHABILITATION

3.18 GROUTING CHIMNEY

- A. Manhole chimneys shall be repaired with calcium aluminate cementitious material conforming to the requirements of Section 2.03 at a minimum thickness of 1 inch.
- B. The cementitious material shall be applied and smoothed to an even thickness around the entire circumference of the chimney.

3.19 ACCEPTANCE

A. Photographs

- 1. Upon completion of repair / rehabilitation work, the Contractor shall capture a digital photograph of the finished manhole.
- 2. The photograph shall be taken looking down into the manhole, oriented so that the effluent pipe is at the bottom of the photograph.
- 3. Photographs shall be named by the corresponding manhole number. When duplicate numbers occur, the photograph name shall also contain an approximate address or street location. These photographs shall be submitted to the Utility digitally on a USB flash drive, periodically to accompany pay applications.
- 4. Final project acceptance is contingent upon receiving all manhole photographs.

B. GPS

- 1. The Contractor shall capture Easting and Northing coordinates of all repaired / rehabilitated manholes.
- 2. The Contractor may use GPS receivers capable of supplying mapping grade (sub-meter) locations.
- 3. A list of manholes with corresponding coordinates shall be provided to the Engineer, in digital format, upon completion of the project.
- 4. Final project acceptance is contingent upon receiving all manhole GPS locations.

C. Performance Testing

- 1. After the manhole rehabilitation and repair has been completed, the work shall be visually inspected by the Contractor in the presence of the Utility for compliance with these specifications and the manufacturer’s recommendations.
- 2. The Utility shall also inspect the work during the 1-year warranty period. Any leakage or defects in the work shall be corrected by the Contractor at no additional cost to the Owner.
- 3. If required, a qualified independent testing and inspecting agency shall be contracted by the Contractor or by the Utility as designated in the Contract Documents

D. Vacuum Testing

- 1. Manholes that are completely rehabilitated using the cementitious liner shall be vacuum tested prior to final acceptance.
- 2. Vacuum testing shall not be performed earlier than 72 hours after application of the liner.
- 3. A vacuum of 10 inches of mercury shall be drawn and vacuum pump shut off. With the valves closed, the time shall be measured for which it takes the vacuum to drop to 9 inches of mercury. The manhole shall be approved as passing the test if the time is greater than the values shown below:

<u>Manhole Depth</u>	<u>Manhole Diameter</u>		
	<u>48”</u>	<u>60”</u>	<u>72”</u>

SANITARY SEWERAGE MANHOLE REHABILITATION

Less than 10'	60 sec	75 sec	90 sec
10'-15'	75 sec	90 sec	105 sec
15'-20'	90 sec	105 sec	120 sec

4. If the manhole fails the initial test, necessary repairs shall be made with an approved non-shrink grout. Retesting shall continue until the manhole satisfactorily passes the test.
5. All tests shall be performed in the presence of the Utility.
6. The Contractor will furnish all personnel, facilities, and equipment necessary to conduct the testing.

E. Spark Testing

1. Manholes that are completely rehabilitated using epoxy liner shall be spark tested in accordance to Section 3.07 for epoxy lining.
2. If the manhole fails the initial test, necessary repairs shall be made in accordance to Section 3.07 for epoxy lining. Retesting shall continue until the manhole satisfactorily passes the test.
3. All tests shall be performed in the presence of the Utility.
4. The Contractor will furnish all personnel, facilities, and equipment necessary to conduct the testing

F. Material Testing:

1. Cementitious Liner

- a Cementitious liner shall be tested for 7 and 28-day compressive strength in accordance with ASTM C-109.
- b Three samples shall be taken for every 50 bags of material used.
- c Samples shall be sprayed from the nozzle. Use three 3 by 6-inch diameter cylinders for testing.
- d Cylinders shall be labeled with date, project, manhole number, and product batch number.
- e Samples shall be sent to an independent testing agency for laboratory verification, results shall be provided to the Utility.
- f A written log shall be maintained referencing the specific bags of cement (product batch numbers) used per manhole, for all manholes.

G. Epoxy Liner

- a The Contractor shall produce samples of epoxy liner. These samples shall be sprayed on concrete substrate (block), approx. 6 X 6-inch, approx. 60 mils thick, just prior to spraying the manholes.
- b Samples shall be labeled with the date, project, manhole number, and product batch number.
- c Samples shall be sent to an independent testing agency for laboratory verification, results shall be provided to the Utility.

3.20 CLEANUP

- A. After the work has been completed and accepted by the Utility, the Contractor shall clean up the entire project area and return the ground cover to its original condition.

SANITARY SEWERAGE MANHOLE REHABILITATION

- B. The Contractor shall dispose of all excess material and debris not incorporated into the permanent installation.

END OF SECTION

SECTION 33 05 17.13
UTILITY DIRECTIONAL DRILLING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: all labor, materials, tools, and equipment necessary for directional drilling of piping.
- B. This section specifies fusible pipe and installation methods by horizontal directional drilling (HDD).
- C. Contractor shall be responsible for all installation processes including drilling, back-reaming, management and disposal of all drilling fluid, dewatering flow around his work, and leak testing the fusible pipe and fittings in accordance with these specifications.
- D. All pipe installation shall be in compliance with EGLE *Suggested Practice for Water Works Design, Construction, and Operation for Type I Public Water Supplies*.

1.02 RELATED SECTIONS

- 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES
- 31 23 19 DEWATERING
- 33 14 13 PUBLIC WATER UTILITY DISTRIBUTION PIPING
- 33 31 23 SANITARY SEWERAGE FORCE MAIN PIPING

1.03 REFERENCED STANDARDS

The work shall conform to the applicable portions of the following standard specifications:

- ANSI - American National Standards Institute
- ASTM - American Society for Testing and Materials
- AWWA - American Water Works Association
- EGLE - Michigan Department of Environment Great Lakes and Energy (Previously the MDEQ - Michigan Department of Environmental Quality)
- NSF - National Sanitation Foundation
- MDOT - Michigan Department of Transportation

1.04 QUALITY ASSURANCE

- A. Contractor Qualifications
 - 1. The contractor and field supervisory personnel shall have at least 3 years' experience in directional drilling and familiarity in drilling subsurface and site conditions.
- B. Fusion Technician Requirements
 - Fusion Technician shall have a current qualification by the pipe supplier to install fusible pipe of the type(s) and size(s) being used.
- C. Warranty
 - 1. In addition to the standard pipe warranty, the fusing contractor shall provide a written one-year warranty for all the fusion joints
 - 2. Warranty periods shall begin on the date of the project's substantial completion.

1.05 SUBMITTALS

- A. Product data for pipe.
- B. Fusion joint data fusion joint warranty information, and recommended project specific fusion parameters, including criteria logged and recorded by data logger.
- C. The following product data and information is required from the Contractor:
 - 1. Directional drilling equipment information indicating the applicability of equipment to the size and scope of the project.
 - 2. Bentonite drilling mud products information (MSDS); special precautions necessary; method of mixing and application; and method of removing soils.
 - 3. Directional drilling operator certification and references.
 - 4. Project safety and contingency plan including drilling fluid containment and cleanup procedures, equipment and plan for compromised utility installations including electrical and power lines, water, wastewater and any other subsurface utility.
 - a. Submit the HDD schedule identifying daily work hours and working dates two weeks prior to the start of work.
 - b. Submit drilling fluid information, including handling procedures, material safety data sheets methods of mixing and application, and disposal plan.
- D. Submit as-built information including:
 - 1. Pipe and fusing information:
 - a. Pipe Size and Dimensions
 - b. Machine Size
 - c. Fusion Technician Identification
 - d. Job Identification Number
 - e. Fusion Number
 - f. Fusion, Heating, and Drag Pressure Settings
 - g. Heat Plate Temperature
 - h. Time Stamp
 - i. Heating and Cool Down Time of Fusion
 - j. Ambient Temperature
 - 2. Pipeline installation information:
 - a. Pipeline horizontal offset from the baseline and depth of cover, a maximum of every 25 feet and at all changes in direction, whichever is less.
 - b. All fittings, valves, or other appurtenances and their location.
 - c. Other deviations from the original plans.

PART 2 PRODUCTS

2.01 HDPE (HIGH DENSITY POLYETHYLENE) PIPING AND FITTINGS

- A. HDPE pipe will be produced from resins meeting the requirements of ASTM D1248, designation PE3408, ASTM D3350 cell classification, PE34543C, and will meet the requirements of AWWA C901 and C906. Pipe will be legibly marked at intervals of no more than five feet with the manufacturer's name, trademark, pipe size, HDPE cell classification, NSF-pw, appropriate legend such as SDR 11, ASTM D3035, AWWA C901, or C906, dates of manufacture and point of origin. Pipe not marked as indicated above will be rejected.
- B. Water Pipe to be used for this project will conform to the AWWA C906 specification. The pipe will be black with blue stripes on the exterior and black on the inside. The water pipe shall be DIPS DR 11 HDPE PE3408 C901/C906, at a minimum.
- C. All HDPE materials used for water mains must be listed and approved for use with potable water under ANSI/NSF Standard 14. The exterior wall print line of all HDPE pipe proposed for installation and potable use must bear the NSF-pw identification.
- D. Provide HDPE adapter at each end of the directional drill.

- E. Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.

2.02 TRACER WIRE

- A. All piping shall be installed with a continuous, insulated TW, THW, THWN, or HMWPE insulated copper, 10 gauge or thicker wire for pipeline location purposes by means of an electronic line tracer.
 - 1. The wires must be installed along the entire length of the pipe.
 - 2. Sections of wire shall be spliced together using approved splice caps and waterproof seals. Twisting the wires together is not acceptable.
 - 3. Wire shall be colored according to utility type. Blue for water, green for sewer and drain lines. Other Village owned utilities shall meet standard color code.

2.04 WATER SERVICES

- A. Water services shall be the same material specified in Section 02660 WATER DISTRIBUTION.
- B. Services connected to HDPE mains:
 - 1. Use fusion connector approved to be used with HDPE Philmac connection or equal, capable of being joined with K-copper pipe.
 - 2. Provide flexible connector from HDPE main to copper service pipe.

2.03 DRILLING SYSTEM EQUIPMENT

- A. General
 - 1. The directional drilling equipment shall consist of a directional drilling rig of sufficient capacity to perform the bore(s) and pullback of the pipe(s), a drilling fluid mixing & delivery system of sufficient capacity to successfully complete the crossing, a guidance system to accurately guide boring operations, and trained and competent personnel to operate the system. All equipment shall be in good, safe operating condition with sufficient supplies, materials and spare parts on hand to maintain the system in good working order for the duration of this project. All required equipment shall be included per the emergency and contingency plan as submitted per these specifications.
- B. Drilling Rig
 - 1. The directional drilling machine shall consist of a hydraulically powered system to rotate, push and pull drill pipe while delivering a pressurized fluid mixture to a steer-able drill head. The machine shall be anchored to withstand the pulling, pushing and rotating forces required to complete the project.
 - 2. The drilling rig hydraulic system shall be self-contained with sufficient pressure and volume to power drilling operations. Hydraulic system shall be free of leaks.
 - 3. The drilling rig shall have a system to monitor and record maximum pull-back hydraulic pressure during pull-back operations.
- C. Drill Head
 - 1. The horizontal directional drilling equipment shall produce a stable fluid lined tunnel with the use of a steer-able drill head.
 - 2. The system must be able to control the depth and direction of the pipe.
 - 3. Drill head shall contain all necessary cutters and fluid jets for the operation and shall be of the appropriate design for the medium being drilled.
- D. Drilling Fluid System
 - 1. Drilling Fluid (Mud)
 - a. Drilling fluid shall be composed of clean water and the appropriate additive(s) for the fluid to be used. Water shall be from a clean source and shall meet the mixing requirements of the manufacturer.

- b. The water and additives shall be mixed thoroughly to assure the absence of any clumps or clods. No hazardous additives may be used.
 - c. Drilling fluid shall be maintained at a viscosity sufficient to suspend cuttings and maintain the integrity of bore wall(s).
 - d. Drilling fluid shall be disposed of off-site in accordance with local, state and federal requirements and/or permit conditions.
 - e. No additional chemicals or polymer surfactants shall be allowed to be added to the drilling fluid as submitted for this project without written consent of the Owner and/or Engineer.
2. **Mixing System**
 - a. A self-contained, closed, drilling fluid mixing system shall be of sufficient size to mix and deliver drilling fluid for the project.
 - b. The mixing system shall be able to ensure thorough mixing of the drilling fluid. The drilling fluid reservoir tank shall be sized for adequate storage of the fluid.
 - c. The mixing system shall continually agitate the drilling fluid during drilling operations.
 3. **Drilling Fluid Delivery and Recovery System**
 - a. The drilling fluid pumping system shall have a minimum capacity to supply drilling fluid in accordance with the drilling equipment pull-back rating at a constant required pressure.
 - b. The delivery system shall have filters or other appropriate in-line equipment to prevent solids from being pumped into the drill pipe.
 - c. Used drilling fluid and drilling fluid spilled during drilling operations shall be contained and properly disposed of. The use of spill containment measures shall be maintained around drill rigs, drilling fluid mixing system, entry and exit pits and drilling fluid recycling system (if used) to prevent spills into the surrounding environment. Pumps, vacuum truck(s), and/or storage of sufficient size shall be in place to contain excess drilling fluid.
 - d. A closed-loop drilling fluid system and a drilling fluid cleaning system should be used to whatever extent practical, depending upon project size and conditions. Under no circumstances shall drilling fluid that has escaped containment be reused in the drilling system.
- E. **Pipe Pull Heads**
1. Pipe pulls heads shall be utilized that employ a positive through-bolt design assuring a smooth wall against the pipe cross-section at all times.
 2. Pipe pull heads shall be specifically designed for use with fusible pipe, and shall be as recommended by the pipe supplier.
- F. **Drilling Control System**
1. Calibration of the electronic detection and control system shall be verified prior to the start of the bore.
 2. The drilling head shall be remotely steer-able by means of an electronic or magnetic detection system. The drilling head location shall be monitored in three dimensions:
 - a. Offset from the baseline
 - b. Distance along the baseline
 - c. Depth of cover.
 3. Point of rotation of the head shall also be monitored.
 4. For gravity application and on-grade drilling, sonde/beacon or approved equipment applicable for grade increments of 1/10th of one percent shall be used.
 5. The control system shall be capable of generating a plot of the borehole survey for the purpose of a record drawing.

PART 3 EXECUTION

3.01 GROUND WATER CONTROL

- A. Provide a dewatering method, as necessary, in accordance with Section 31 23 19 - DEWATERING.

3.02 FUSION PROCESS

- A. General
 - 1. Fusible pipe shall be handled in a safe and non-destructive manner before, during, and after the fusion process and in accordance with this specification and pipe supplier's recommendations.
 - 2. Each joint fusion shall be recorded and logged by an electronic monitoring device (data logger) affixed to the fusion machine. Joint data shall be submitted as part of the As-Recorded information, in accordance with this specification.
 - 3. The fusible pipe shall be installed in a manner so as not to exceed the recommended bending radius.
 - 4. Where fusible pipe is installed by pulling in tension, the recommended Safe Pulling Force, according to the pipe supplier, shall not be exceeded.
 - 5. Other equipment specifically required for the fusion process shall include the following:
 - a. Pipe rollers shall be used for support of pipe to either side of the machine.
 - b. A weather protection canopy that allows full machine motion of the heat plate, fusion assembly and carriage shall be provided for fusion in inclement and /or windy weather.
 - c. Fusion machine operations and maintenance manual shall be kept with the fusion machine at all times.
 - d. Facing blades specifically designed for cutting fusible pipe.
- B. Joint Recording
Use an electronic monitoring device (data logger) connected to the fusion machine to log each joint.

3.03 DRILLING OPERATIONS

- A. General
 - 1. Grades, radii, and alignment of the proposed HDD installation are presented in the drawings for reference and intended bore path. Entry and exit locations and control-point elevations shall be maintained as shown on the drawings and specified, unless approved by the Owner or Engineer.
 - 2. Bend radii shown on the drawings are minimum allowable radii and shall not be reduced. Control-point elevations shown on the drawings are minimum allowable cover and/or separation and shall not be reduced.
- B. Location and Protection of Underground Utilities
 - 1. Correct location of all underground utilities that may impact the HDD installation is the responsibility of the Contractor, regardless of any locations shown on the drawings
 - 2. Utility location and notification services shall be contacted by the Contractor prior to the start of construction.
 - 3. Identify all existing lines and underground utilities, including exposing those facilities that are located within an envelope of possible impact of HDD installation as determined for the project specific site conditions. The Contractor shall determine the safe offset from existing utilities. This will include, but is not limited to, soil conditions and layering, utility proximity and material, HDD system and equipment, and foreign subsurface material.
- C. Drilling Layout and Tolerances

1. Instrumentation shall be provided and maintained at all times that accurately locates the pilot hole, measures drill-string axial and torsional loads and measures drilling fluid discharge rate and pressure.
 2. Do not exceed the pipe manufacturer's recommended bending limitations at the entry and exit areas
- D. Pilot Hole Bore
1. In the event that the pilot bore does deviate from the bore path, Contractor shall notify the Engineer. The Engineer may require contractor to pull-back and re-drill from the location along bore path before the deviation.
 2. In the event that a drilling fluid fracture, inadvertent returns or returns loss occurs during pilot hole drilling operations, Contractor shall cease drilling and contact the Owner and Engineer.
 3. Owner and/or Engineer shall approve the pilot hole bore alignment prior to back reaming phase and pipe installation.
- F. Reaming
1. After successfully completing the pilot hole, the bore hole shall be reamed to a diameter which meets all local jurisdictional standards and the following table as a minimum:

Nominal Pipe Diameter	Bore Hole Diameter
< 8 inches	Pipe Dia. + 4 inches
8 inches to 24 inches	Pipe Dia. x 1.5
> 24 inches	Pipe Dia. + 12 inches

2. Multiple reaming passes shall be used at the discretion of the Contractor and shall conform to these specifications.
3. A swivel shall be used between the reaming head and the fusible pipe to minimize torsion stress on the assembly.
4. In the event of a drilling fluid fracture, returns loss or other loss of drilling fluid, the Contractor shall be responsible for restoring any damaged property to original condition and cleaning up the area in the vicinity of the damage or loss. Contractor shall immediately inform the Owner and Engineer.

3.04 PIPE PULL-BACK AND INSERTION

- A. Pipe shall be fused prior to insertion, if the site and conditions allow, into one continuous length.
- B. Contractor shall handle the pipe in a manner that will not over-stress the pipe prior to insertion. Vertical and horizontal curves shall be limited so that the pipe does not over-deflect, buckle, or otherwise become damaged. Damaged portions of the pipe shall be removed and replaced.
- C. The pipe entry area shall be graded as needed to provide support for the pipe and to allow free movement into the bore hole.
 1. The pipe shall be guided into the bore hole to avoid deformation of, or damage to, the pipe.
 2. The fusible pipe may be continuously or partially supported on rollers or other Owner and Engineer approved friction decreasing implement during joining and insertion, as long as the pipe is not over-stressed or critically abraded prior to, or during installation.
- D. Buoyancy modification shall be at the sole discretion of the Contractor, and shall not exceed the pipe supplier's recommendations. Damage caused by buoyancy modifications shall be the responsibility of the Contractor.
- E. Pullback operations shall continue without interruption until the pipe is completely pulled through

the bore hole. Except for drill rod removal, pull-back operation shall not cease until the pipe has been completely installed to final position. During the pull-back operations, excessive pullback force shall be reported to Owner and Engineer.

- F. The pipe shall be installed in a manner that does not cause upheaval, settlement, cracking, or movement and distortion of surface features. Any damages caused by the Contractor's operations shall be corrected by the Contractor at no cost to the Owner.

3.05 INSTALLATION ACCEPTANCE AND CLEANUP

- A. If the final grade of the finished installation is not satisfactory to the Owner, Engineer or other jurisdictional entity, the pipe shall be abandoned, full pressure grouted in place in accordance with the jurisdictional authority, and an alternate installation shall be made. The abandoned pipe shall be shown on as-built drawings. If the pipe is abandoned, the Contractor shall re-drill another line at no additional cost to the Owner.
- B. The Contractor shall inspect the installed pipe ends for roundness and/or damage. Evidence of significant surface scratching shall be brought to the attention of the Engineer. Gouges or excessive surface damage of more than 10 percent of the wall thickness may be grounds to abandon the bore and have the Contractor re-drill another line at no additional cost to the Owner.
- C. Following the installation, the project site shall be returned to a condition equal to or better than the pre-construction condition of the site. All excavations will be backfilled and compacted to 95% maximum density. All pavements and hard surfaces shall be repaired, and excess materials shall be removed from the site, all drilling fluid shall be properly disposed.

3.06 PRESSURE TESTING

- A. General:
 - 1. All water main shall be tested.
 - 2. Conduct all testing only while the engineer is present.
 - 3. Notify Engineer at least 24 hours prior to testing.
 - 4. If any section of pipe fails to pass a test, the Contractor shall determine the source of the failure, repair it, and retest the section at no additional cost to the Owner.
 - 5. If for any reason a test is not completed, the test section shall be depressurized and allowed to relax for at least 8 hours before starting the next testing sequence.
 - 6. The tests shall be repeated until satisfactory results are obtained.
- B. Test preparation:
 - 1. Maximum test section: 2000 feet or as approved by the Engineer.
 - 2. Install temporary caps or pugs where necessary to test sections.
 - 3. Brace and sufficiently backfill all parts of the pipeline to prevent movement of the pipe.
 - 4. Water for testing shall be from a source approved by the engineer.
 - 5. If water is available from any existing system, the contractor shall comply with any requirements from the agency that controls the existing water system.
 - 6. Expel all air from the pipe prior to testing. If necessary to accomplish this, taps shall be made at the high points using corporation stops as specified in Section 33 14 13 2.07 B. No additional compensation will be made for taps of this type.
 - 7. When hydrants are in the test section, test against the main valve in the hydrant.
- C. Testing water main:
 - 1. Testing equipment:
 - a. Low flow high pressure pump capable of producing 200 psi.
 - b. 0 to 200 psi gage with minimum gradations of 10 psi.
 - c. Measuring device approved by the Engineer.
 - 2. Test method: ASTM F2164 (AWWA M55)
 - 3. Test pressure: Up to 1.5 times the working pressure (150 psi) and is taken at the lowest

point in elevation along the pipe's test section.

4. Fill slowly to remove air.
5. Maintain test pressure for 4 hours; add makeup water as needed to keep the pressure constant; water amount is not monitored.
6. Under no circumstances shall test pressure of 1.5 times the working pressure exceed 8 hours.
7. Reduce pressure by 10 psi and monitor pressure for 1 hour
8. Pass if pressure stays within 5% of the reduced pressure.
9. Test pressure: 150 psi, with not less than 125 psi at the highest point.

D. Testing valves:

1. Test all valves in the closed position.
2. Apply a net test pressure of 125 psi for a period of 10 minutes.
3. A valve will be considered to have passed if after 10 minutes the pressure is within ± 2 psi of the net test pressure, and in the opinion of the Engineer, no appreciable amount of leakage takes place during the test period.

3.07 DISINFECTION

Refer to Section 33 14 13 - PUBLIC WATER UTILITY DISTRIBUTION PIPING

3.08 PIPE SYSTEM CONNECTIONS

- A. Pipe connections shall be installed according to applicable standards and regulations, and the connection manufacturer's recommendations and as indicated on the drawings. Pipe connections to structures shall be installed per applicable standards and regulations, as well as per the connection manufacturer's recommendations.

3.09 TRACER WIRE TESTING

- A. Upon completion of the directional bore, the Contractor shall demonstrate that the wire is continuous and unbroken through the entire run of the pipe.
1. Demonstration shall include full signal conductivity (including splices) when energizing for the entire run in the presence of the Owner or Engineer.
 2. If the wire is broken, the Contractor shall repair or replace it. Pipeline installation will not be accepted until the wire passes a continuity test.

END OF SECTION

SECTION 33 09 10
INSTRUMENTATION AND CONTROLS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes the installation of a control system with appurtenances provided by others for the pumphouse. The installation shall include mounting and wiring the panels and appurtenances at the pump station, and all miscellaneous wiring and conduit necessary to make the control system operate in accordance with the specifications.

B. The control equipment supplied by others is described by the Windemuller Inc. **proposal dated ???**. Questions concerning the control system and appurtenances to be supplied can be directed to Mark Shiefla, at Windemuller Inc. 231.935.4800.

1.02 RELATED WORK

A. 33 32 13 - PACKAGED WASTEWATER PUMPING STATIONS

1.03 REFERENCES

A. National Electric Code

B. NFPA 79 Electrical Standard for Industrial Machinery

PART 2 – PRODUCTS

2.01 Not Used.

PART 3 – EXECUTION

3.01 GENERAL

A. Install in accordance with manufacturer's specifications and Control System supplier (Windemuller) recommendations.

END OF SECTION

ABANDONMENT OF WATER MAINS

SECTION 33 11 00.19

ABANDONMENT OF WATER MAINS

PART 1: GENERAL

1.01 SUMMARY

- A. This work consists of abandonment in place, by cutting and capping, of existing water mains, hydrants, service lines, and valves.
- B. This work also consists of abandonment in place of water mains using flowable fill. Flowable fill will be utilized when abandoning water mains underneath roadways and paved areas, and at the direction of the Engineer as field conditions dictate, or as specified on the Drawings.

1.02 SUBMITTALS

- A. Related sections:
 - 1. Section 01 20 00 PRICE AND PAYMENT PROCEDURE
 - 2. Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES
 - 3. Section 31 00 00 EARTHWORK
- B. Submit product data for proposed plugs and clamps for approval.
- C. Submit technical information for equipment and operational procedures including projected slurry injection rate, grout pressure, method of controlling grout pressure, bulkhead and vent design, and number of stages of grout application.
- D. At least fifteen (15) days prior to commencing flowable fill abandonment activities, submit plan for abandonment describing proposed grouting sequence and other information pertinent to completion of the Work.

PART 2: PRODUCTS

2.01 GENERAL MATERIALS

- A. Concrete thrust blocks shall be minimum 3,000 psi concrete conforming to requirements of SECTION 03 30 53 MISCELLANEOUS CAST IN PLACE CONCRETE.
- B. Plugs and clamps shall be applicable for the type of pipe to be plugged.

2.02 FLOWABLE FILL REQUIREMENTS

- A. Unconfined compressive strength shall be a minimum of 75 psi and a maximum of 150 psi at 56 days as determined based on an average of three tests for the same placement. Present at least three acceptable strength tests for the proposed mix design in the mix design report.
- B. Placement characteristics shall be self-leveling.
- C. Shrinkage characteristics shall be non-shrink.

ABANDONMENT OF WATER MAINS

- D. Water bleeding for fill to be placed by grouting method in sewers shall not exceed 2 percent according to ASTM C940.
- E. Minimum wet density shall be 90 pounds per cubic foot.

2.03 BALLAST

- A. Ballast material shall be natural rock or concrete pieces with minimum size equal to at least ten (10) times the maximum aggregate size of flowable fill and maximum size of twenty-four (24) inches. Maximum dimension shall not be more than twenty (20) percent of minimum dimension of space to be filled.
- B. Ballast composition shall be free of regulated waste material.

PART 3 EXECUTION

3.01 DEMOLITION OF FIRE HYDRANTS, VALVES, AND PIPELINE STRUCTURES PRIOR TO ABANDONMENT

- A. Remove all water main appurtenances such as hydrants, valves, and valve boxes. Appurtenances shall be returned to the DPW for future use.
- B. Demolish and remove precast concrete adjustment rings, concrete vaults and covers, or other pipeline structures to a minimum depth of four (4) feet below finished grade. Structures may be removed to greater depth, but not deeper than eighteen (18) inches above the crown of the abandoned water main. Poke holes in floor prior to filling.
- C. Until a fire hydrant is physically removed, any hydrant that becomes non-usable during abandonment procedures shall have a heavy-duty cover placed over it, secured, and marked "Abandoned" so that fire department personnel know its status.

3.02 CUTTING AND CAPPING OF MAINS

- A. Do not begin cut, plug, and abandonment operations until replacement water main has been constructed and tested, all service connections have been installed, and replacement main is approved for use.
- B. Install plug, clamp, and concrete reaction block and make cut at the water main and/or at the location shown on the Drawings.
- C. Main to be abandoned shall not be valved off and shall not be cut or plugged other than as shown on the Drawings.
- D. After the main to be abandoned has been cut and capped, check for other sources feeding the abandoned water main. When sources are found, notify the Engineer immediately. Cut and cap abandoned main at the point of other feed as directed by the Engineer.
- E. Plug or cap ends or openings in abandoned main in a manner approved by the Engineer. Install concrete around cap and over pipe to ensure it is not penetrable by groundwater.
- F. Backfill excavations in accordance with Section – 31 00 00 - EARTHWORK.

ABANDONMENT OF WATER MAINS

- G. Repair street surfaces in accordance with the specifications.
- H. Mark location of abandoned water service laterals on Drawings and provide to the Engineer.

3.03 CUTTING AND CAPPING OF WATER SERVICES

- A. Do not begin cut, plug, and abandonment operations until replacement service, if necessary, has been constructed and tested and all service connections have been installed.
- B. Service lines shall be cut and capped at the water main and/or as directed by the Engineer.
- C. Before backfilling of a capped service line is started, the capping must be observed by a representative of the OWNER.
- D. After service to be abandoned has been cut and capped, check for any other sources feeding the abandoned water service. When sources are found, notify the Engineer immediately. Cut and cap abandoned service at point of other feed as directed by the Engineer.
- E. Plug or cap ends or openings in abandoned service in a manner approved by the Engineer. Install concrete around cap and over pipe to ensure it is not penetrable by groundwater.
- F. Remove all water service surface identifications and appurtenances such as valves and valve boxes, meters, and backflow devices. Return appurtenances to the DPW.
- G. Backfill excavations in accordance with Section 31 00 00 - EARTHWORK.
- H. Repair paved surfaces in accordance with the specifications.
- I. Mark location of abandoned water services on Drawings and provide to the Engineer.

3.04 PREPARATION FOR ABANDONMENT VIA FLOWABLE FILL

- A. Have fill mix design reports and other required submittals accepted by the Engineer prior to start of placement. Notify the Engineer at least twenty-four (24) hours in advance of grouting with flowable fill.
- B. Select fill placement equipment and follow procedures with sufficient safety and care to avoid damage to existing underground utilities and structures. Operate equipment at pressure that will not distort or imperil portions of work, new or existing.
- C. Clean water lines and video with closed circuit television to identify connections, locate obstructions, and assess condition of pipe. Locate previously unidentified connections which have not been redirected and reconnected as part of the Work and report them to the Engineer. During placement of fill, compensate for irregularities in water pipe such as obstructions, open joints, or broken pipe to ensure no voids remain unfilled.
- D. Perform demolition work prior to starting fill placement. Clean placement areas of water mains of debris that may hinder fill placement. Remove excessive amounts of

ABANDONMENT OF WATER MAINS

tuberculations and other substances that may degrade performance of fill. Do not leave debris in place if filling more than two (2) percent of placement volume.

- E. Remove free water prior to starting fill placement.

3.05 EQUIPMENT FOR ABANDONMENT VIA FLOWABLE FILL

- A. Mix flowable fill in automated batch plant and deliver to site in ready-mix trucks. Performance additives may be added at placement site if required by mix design.
- B. Use concrete or grout pumps capable of continuous delivery at planned placement rate.

3.06 INSTALLATION OF FLOWABLE FILL

- A. Abandon existing water lines underneath roadways, paved areas, and other required locations by completely filling water mains with flowable fill.
- B. Place flowable fill to fill volume between abandonment points. Continuously place flowable fill with no intermediate pour points, but not exceeding five hundred (500) feet in length.
- C. Have filling operation performed by experienced crews with equipment to monitor density of flowable fill and to control pressure.
- D. Pump flowable fill through bulkheads constructed for placement of two (2) two-inch PVC pipes or use other suitable construction methods to contain flowable fill in lines to be abandoned. These pipes will act as injection points or vents.
- E. Place flowable fill under pressure flow conditions into properly vented open system until flowable fill emerges from vent pipes. Pump flowable fill with sufficient pressure to overcome friction and to fill water main from downstream end to discharge at upstream end.
- F. Inject flowable fill through replaced ballast using grouting equipment and a series of grout pipes discharging at bottom of placement allowing fill to rise through ballast effectively filling all voids. Alternatively, sequentially place individual pieces of ballast at same time as flowable fill is placed. Do not fill with ballast more than fifty (50) percent of volume at any level.
- G. Remediate placement of flowable fill where voids develop due to excessive shrinkage or bleeding by pressure grouting either from inside water main or from surface.
- H. Plug each end of the water main being abandoned.
- I. Backfill to surface above pipe left in place and compact in compliance with Section – Excavation and Backfill for Utilities.
- J. Collect and dispose of excess flowable fill material and debris as directed by the Engineer.

3.07 PROTECTION OF PERSONS AND PROPERTY

ABANDONMENT OF WATER MAINS

- A. Provide safe working conditions as required by OSHA and applicable State and local laws. Observe safety requirements for work below grade.
- B. Maintain safe access to adjacent property and buildings. Do not obstruct roadways, sidewalks, or passageways.

3.08 ASBESTOS CONCRETE PIPE

- A. Any work involving or impacting asbestos concrete pipe must be in accordance with the EPA document titled "Demolition Practices Under the Asbestos NESHAP."

END OF SECTION

SECTION 33 14 13
PUBLIC WATER UTILITY DISTRIBUTION PIPING WATER DISTRIBUTION

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: all labor, tools, equipment, and testing necessary for the installation of all water main and appurtenances and related sections.
- B. Related sections:
 - 1. Section 01 20 00 PRICE AND PAYMENT PROCEDURE
 - 2. Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES
 - 3. Section 31 00 00 EARTHWORK

1.02 UNIT PRICES

Refer to Section 01 20 00, PRICE AND PAYMENT PROCEDURE

1.03 REFERENCED STANDARDS

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

- ANSI - American National Standards Institute
- ASTM - American Society for Testing and Materials
- AWWA - American Water Works Association
- NSF - National Sanitation Foundation

1.04 SUBMITTALS

Submit complete sets of shop drawings and product data to the ENGINEER for review and approval, prior to ordering any material.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Piping shall not be stacked higher than four feet. Suitable racks, chairs and other supports shall be provided to protect pipe mating surfaces from damage. Store bottom tiers off the ground, alternate tiers and chock tier ends.
- B. All pipe and other materials subject to ultraviolet or ozone attack shall be protected from the sunlight, atmosphere and weather and stored in suitable enclosures until ready for installation.
- C. Store all hydrants, valves and other materials off the ground, drained and kept free of water to protect against damage from freezing.

PART 2 PRODUCTS

2.01 DUCTILE IRON WATER MAIN

- A. Design standard: AWWA C151
- B. Thickness: AWWA C150, Class 52

- C. Exterior coating: AWWA C151
- D. Interior coating: AWWA C104
- E. Joints: AWWA C111
- F. Pipe marking:
 - 1. All pipe shall be marked as required by AWWA C151.
 - 2. All pipe shall be stamped NSF- pw to indicate compliance with NSF Standard 61 for potable water.
 - 3. All pipe shall have 6.0 feet of minimum cover.

2.02 PVC WATER MAIN

- A. Design standard: AWWA C900
- B. Pressure rating: 150 psi
- C. Thickness: DR18
- D. Joints: ASTM D3139
- E. Pipe marking:
 - 1. All pipe shall be marked as required by AWWA C900.
 - 2. All pipe shall be stamped to indicate compliance with NSF Standard 61.

2.03 HDPE WATER MAIN

- A. Design standard: AWWA C901, C906
- B. Pressure rating: 200 psi
- C. Thickness: DR-11
- D. Joints: Butt-fused, restrained-mechanical or electro-fused per industry standards
- E. Pipe marking:
 - 1. All pipe shall be marked as required by AWWA C900 latest edition.
 - 2. All pipe shall be stamped to indicate compliance with NSF Standard pw.
 - 3. All pipe shall have 6.0 feet of minimum cover.

2.04 FITTINGS

- A. Material: Ductile Iron, Class 350
- B. Design standards: AWWA C110, C153
- C. Exterior coating: Bituminous, AWWA C151, 518.1
- D. Interior coating: AWWA C104
- E. Joints: AWWA C111, Mechanical Joint

2.05 RESTRAINED JOINTS

- A. Ductile iron pipe:
 - 1. Push-on joint:
 - a. Design standard: AWWA C111
 - b. Thickness: AWWA C151, Class 52
 - c. Manufacturers:
 - i. Clow: SuperLock
 - ii. U.S. Pipe: TR FLEX
 - iii. Or Engineer approved equal
 - 2. Mechanical joint:
 - a. Retainer gland safety factor: 2:1
 - b. Design requirement: Twist-off nuts to assure actuating restraint
 - c. Manufacturers:
 - i. EBAA Iron: MEGALUG, Series 1100
 - ii. Standard International
 - iii. Or Engineer approved equal
 - 3. Ball joint:
 - a. Design standard: AWWA C151
 - b. Thickness: AWWA C150, Class 54
 - c. Exterior coating: Bituminous, AWWA C151, 518.1
 - d. Interior coating: AWWA C104
 - e. Joints: AWWA C110
 - f. Manufacturers:
 - i. U.S. Pipe: USIFLEX Pipe
 - ii. Clow: Ball and Socket Pipe
 - iii. Or Engineer approved equal

2.06 GATE VALVE AND BOX

- A. Gate valves:
 - 1. Design standard: AWWA C515, Resilient Wedge
 - 2. Opening: Counterclockwise
 - 3. Nonrising stem with 2" square operating nut
 - 4. Joint: AWWA C111, mechanical joint
 - 5. Interior coating: AWWA C550
 - 6. Exterior coating: AWWA C151, 518.1
 - 7. Manufacturer: EJ Flowmaster or Engineer approved equal
- B. Box:
 - 1. Cast iron three-piece screw type, adjustable box
 - 2. Cover marked "WATER"
 - 3. Shaft: 5¼" internal diameter
- C. Gate Valve Adaptor
 - 1. Manufacturer: Adaptor Inc. or Engineer approved equal
 - 2. ¼" steel with UV Polyurethane Protective Coating
 - 3. ¾" rubber gasket attached to the Gate Valve Adaptor

2.07 HYDRANTS

- A. Design standard: AWWA C502
- B. Manufacturer: East Jordan or Engineer approved equal
- C. Model: 5-BR250, Traffic Model
- D. Features:

1. Nozzles;
 - a. 2 - 2½ inch hose, N.S. Threads
 - b. 1 - 4½ inch pumper, N.S. Threads
2. 24" Snow Barrel
3. Operating nut: pentagon, 1 ½" inch point to flat
4. Opening: Clockwise
5. Inlet: 6" Mechanical Joint
6. Automatic drain: ¼" tapped and plugged
7. Depth of bury: 6.0 feet, U.L. Approved
8. Paint: Red

2.08 SERVICES

- A. Tapping saddles:
 1. Materials: ASTM B62 Brass
 2. Type: Double Strap
 - a. Only use Ductile Iron when services are $\geq 1 \frac{1}{2}$ "
 3. Manufactured and tested: AWWA C800
 4. Threads: AWWA taper thread
 5. Manufacturer: Mueller BR2S series or Engineer approved equal
 6. Inline tees: ≥ 3 " services
- B. Corporation stops:
 1. Design standard: AWWA C800
 2. Manufacturer: Mueller H-15000 or Engineer approved equal
 3. Joints: Taper thread inlet and flared copper outlet
- C. Service lines:
 1. Material: ASTM B88, Type K Copper
 2. Joints: Flared or Compression
- D. Curb stops:
 1. Design standard: AWWA C800
 2. Manufacturer: Mueller H-15204 or Engineer approved equal
 3. Joints: Flared copper or compression joints
- E. Curb box:
 1. 1" to 2" "K" Services
 - a. Cast iron
 - b. Tyler series 6500
 - c. Screw type, 2 ¼" ID
 - d. Use enlarged base w/ 2" curb stop
 - e. Use with or without stationary rod
 - f. Cover marked "Water"
 2. >3 " Ductile Iron Services
- F. Water meter:
 1. All Meters installed inside unless approved by Village
 2. Meter to match all existing Village meters
- G. Meter pit:
 1. High density corrugated polyethylene smooth interior pipe
 2. Manufacturer: Advantage Drainage Systems or Hancor Hi-Q
 3. ¾" – 1" service, use 18" diameter pipe for pit
 4. 1 ½" – 2" service, use 30" diameter pipe for pit

- H. Meter box lids:
 - 1. Manufacturer: Ford Meter Box Company drilled for touch read
 - 2. Ford Wabash Double Lid Model W32 for 18" diameter meter pits
 - 3. Ford Wabash Double Lid Model MC-30 for 30" diameter meter pits
 - 4. Feature locking lids w/ double covers
- I. Water Services:
 - 1. 1" – 2" "K" Copper
 - 2. > 3" Ductile Iron, HDPE or PVC

2.09 TAPPING SLEEVES & VALVES

- A. Tapping valve:
 - 1. Design standard: AWWA C509, C515
 - 2. Opening: Counter Clockwise.
 - 3. Non-Rising stem with a 2" square operating nut.
 - 4. Joint: AWWA C111, Mechanical Joint.
 - 5. Interior coating: AWWA C550
 - 6. Exterior coating: AWWA C151, 5181
- B. Tapping sleeve:
 - 1. Joint:
 - a. AWWA C111, Mechanical Joint.
 - b. MSS-SP60 Machined Face Joint to Tapping Valve.
 - 2. Cast or ductile iron
 - 3. Threaded and plugged port for pressure testing
 - 4. Coatings: As specified in paragraph 2.03.

2.10 DETECTABLE UNDERGROUND MARKING TAPE

- A. Minimum width of 3 inches.
- B. Blue colored detectable metallic tape bearing a legend similar to "Caution Buried Waterline Below."

2.11 TRACER WIRE

- A. All PVC or HDPE piping shall be installed with a continuous, insulated TW, THW, THWN, or HMWPE insulated copper, 10 gage or thicker wire for pipeline location purposes by means of an electronic line tracer.
 - 1. The wires must be installed along the entire length of the pipe.
 - 2. Sections of wire shall be spliced together using approved splice caps and waterproof seals. Twisting the wires together is not acceptable.

2.12 TRACER WIRE BOX

- A. Tracer wire box shall have a cast iron cover conforming to ASTM-48 Class 25 or higher.
- B. Plastic standpipe of acrylonitrile butadiene styrene (ABS) ASTM D-1788.
- C. Manufacturer shall be SnakePit Two-terminal Switchable CD14*2T-SW, SnakePit Single-terminal CD14*TP, VALCO Inc Mini test station, or equal. Lid shall be blue.

PART 3 EXECUTION

3.01 WATER MAIN INSTALLATION

- A. Install pipe in accordance with the pipe manufacturer's recommendations including:
 - 1. Unibell PVC Pipe Association.
 - 2. Ductile Iron Pipe Research Association.
 - 3. AWWA C600, AWWA C605 and AWWA 906.

- B. Alignment and Grade:
 - 1. Lay pipe to the lines and grades established on the plans or as indicated by Engineer's stakes.
 - 2. Laying depth for water main is 6.0' of cover from top of pipe to proposed finish grade, unless shown or directed otherwise.
 - 3. Maintain a 10' horizontal separation from sewer main.
 - 4. Maintain an 18 inch minimum vertical separation from all utility crossings.
 - 5. When crossing storm or sanitary sewer, locate the water main above the sewer crossing. If the minimum cover depth cannot be met, locate the water main below the sewer crossing and position the water main section centered on the sewer.

- C. Earthwork:

Perform all trench excavation, bedding, and backfilling in accordance with Section 31 00 00 EARTHWORK.

- D. Pipe laying:
 - 1. Center the pipe within the trench with adequate clearance between the pipe and the trench sidewalls.
 - 2. Each section of pipe shall rest upon the pipe bed for the full length of its barrel, with recesses excavated to accommodate the joints.
 - 3. Thoroughly clean all foreign matter from the pipe and keep the pipe clean during the pipe laying operations by using temporary plugs.
 - 4. Pipe shall not be installed in trenches containing water or mud without the approval of the Engineer.
 - 5. All pipe ends shall be plugged with a watertight plug when construction stops for an extended period of time or overnight.
 - 6. Prevent plugged pipe from floating.
 - 7. Damage to linings and coatings shall be cause for rejection of the complete section of pipe.
 - 8. Place a detectable tape 24" above the top of the pipe.

- E. Jointing pipe:
 - 1. Thoroughly clean & lubricate bell, spigot, and gaskets.
 - 2. Only joint lubricates approved by the pipe manufacture will be permitted.
 - 3. Align the pipe & force it "Home" without damaging the joint.
 - 4. Conform to AWWA C600, AWWA C605 and AWWA C906.

- F. Joint restraint:

Install all manufactured restrained joints in conformance with the manufacturer's recommendations.

 - 1. Provide adequate joint restraint at all tees, plugs, caps, hydrants, and bends deflecting 22½ degrees or more.
 - 2. Manufactured restrained joints:
 - a. Install only where indicated on the plans, in the specifications or where directed by the Engineer.
 - 3. Tie rods:
 - a. Install only where indicated on the plans, in the specifications or where directed by the Engineer.
 - b. Install where adequate earth backing is not available.

4. Concrete thrust blocks:
 - a. Size and shape: As shown on the plans.
 - b. Placing pour concrete only after all connections have been made.
 - c. Location: Thrust block shall extend from the fitting to the undisturbed earth of the trench wall. Keep block behind the bell of fitting and below the hydrant drain.
 - d. Bracing: Support fittings and valves independently of the piping until the concrete has set.

- G. Connecting to existing mains:
 1. Provide special adapters, fittings, and pipe as required to mate the new water main with the existing water main.
 2. Do not connect the existing water supply system until the new water main has been pressure tested, disinfected, and approved by the engineer.
 3. When making the connection, swab all pipe fittings with a 4% chlorine solution.
 4. Provide adequate notice to owner about connections or excavations near water mains.

- H. Future connections:
 1. Provide thrust blocking that can be easily removed in the future.

- I. Electrical conductivity:
 1. Provide electrical conductivity between all ductile iron pipe, fittings and joints with the following connectors.
 - a. Brass wedges (three (3) minimum per joint)
 - b. "ElectroBond" strip connectors
 2. Connectors shall be capable of carrying 400 amperes for an extended period.
 3. Provide sufficient connectors to insure conductivity through all pipe, fittings, valves, and appurtenances.

- J. Tracer Wire and Tracer Box
 1. All watermain shall be laid with a 10 gage tracer wire.
 2. Tracer wire shall be placed 6" above watermain.
 3. Tracer wire shall be terminated in a tracer wire box.
 4. Tracer wire box shall be placed at each hydrant and intersection of two or more pipes or approximately every 400 feet.

3.02 SETTING VALVES

- A. Set and join valves as specified for pipe sections in paragraph 3.01.
- B. Set and firmly support valve boxes over the valve. Set the box centered and plumb over the valve operating nut. Set the box lid flush with the proposed finish grade.

3.03 SETTING THE HYDRANTS

- A. Location:
 1. Locate as shown on the plans.
 2. Set hydrant plumb to the finish grade.
 3. Set pumper nozzle pointing towards the curb or road edge.
 4. Set the hydrant height to elevations shown on plans. Use hydrant extensions as shown on plans.

- B. Shut-off valve box:
 1. Install shut off valve, piping, and fittings as specified in paragraph 3.02.

- C. Restraints:
 - 1. Anchor shut off valve to hydrant tee with tie rods.
 - 2. Provide thrust block at hydrant base.
 - 3. Prevent thrust block concrete from covering hydrant drain.

3.04 SERVICE CONNECTIONS

- A. Tapping saddles:
 - 1. PVC main: use on all service connections
 - 2. Ductile iron main:
 - a. Services 1 inch to 1 inch: Not required.
 - b. Services 1½ inch to 2 inch: Use double strap tapping saddles.
 - c. 3 inch and larger: Use inline tees for service connections.
- B. Corporation stops:

Use a corporation stop for services 2 inches and smaller as specified on the plans.
- C. Service line:
 - 1. Services 1 inch to 2 inch: Install type "K" copper tubing from corporation to curb stop.
 - 2. Services 3 inch and larger: Install ductile iron pipe.
- D. Curb stops:
 - 1. Services ¾ inch to 2 inch: Set curb stop and box as shown on the plans.
 - a. Set curb box plumb over valve operating stem.
 - b. Adjust box lid to proposed finish grade.
 - 2. Services 3 inch and Larger: Install standard gate valve with box.
 - 3. Flare or compression joints
- E. Earthwork:

Perform all trench excavation, pipe bedding, and backfilling in accordance with Section 31 00 00, EARTHWORK 01300.
- F. Cleaning:

Flush all service connections until clean.
- G. Lead Service Lines:

Report all galvanized lines or lead gooseneck piping encountered to the Engineer. Lead or galvanized services suspected of being connect to lead goosenecks will be replaced from the main to 18-inches or the first valve within the customers occupancy in accordance with PA 399.

3.05 FLUSHING

- A. General:
 - 1. All water main shall be flushed to remove dirt and foreign matter prior to connection to the existing water supply system.
 - 2. Water for flushing will be the sole responsibility of the Contractor.
 - 3. Water for flushing shall be from a potable source approved by the Engineer and the Michigan Department of Environment Great Lakes and Energy Drinking Water Division.
 - 4. If water is available from any existing system, the Contractor shall comply with any requirements from the agency that controls the existing water system.
 - 5. All connections to existing water supplies shall be made with a backflow prevention device in accordance with State of Michigan Act 399 and all other applicable laws of the State of Michigan.

- B. Method:
1. Flush water mains using a "poly pig" supplied by the Contractor.
 2. Insert the "poly pig" into the main at a location and using a method approved by the Engineer.
 3. Retrieve the "poly pig" at a temporary blowoff assembly constructed by the Contractor, at a location approved by the engineer.
 4. Repeat the "poly pigging" until all foreign matter is removed.

3.06 PRESSURE TESTING

- A. General:
1. All water main shall be tested.
 2. Conduct all testing only while the engineer is present.
 3. Notify Engineer at least 24 hours prior to testing.
 4. If any section of pipe fails to pass a test, the Contractor shall determine the source of the failure, repair it, and retest the section at no additional cost to the Owner.
 5. The tests shall be repeated until satisfactory results are obtained.
- B. Test preparation:
1. Maximum test section: 2000 feet or as approved by the Engineer.
 2. Install temporary caps or pugs where necessary to test sections.
 3. Brace and sufficiently backfill all parts of the pipeline to prevent movement of the pipe.
 4. Water for testing shall be from a source approved by the engineer.
 5. If water is available from any existing system, the contractor shall comply with any requirements from the agency that controls the existing water system.
 6. Expel all air from the pipe prior to testing. If necessary to accomplish this, taps shall be made at the high points using corporation stops as specified in 2.07 B. No additional compensation will be made for taps of this type.
 7. When hydrants are in the test section, test against the main valve in the hydrant.
- C. Testing water main:
1. Testing equipment:
 - a. Low flow high pressure pump capable of producing 200 psi.
 - b. 0 to 200 psi gage with minimum gradations of 10 psi.
 - c. Measuring device approved by the Engineer.
 2. Test method: AWWA C600 for Ductile Iron Pipe or AWWA C605 for PVC Pipe.
 3. Test pressure: 150 psi, with not less than 125 psi at the highest point.
 4. Test period: 2 Hours
 5. Allowable leakage: Defined as the amount of water that must be supplied into the pipe to maintain the test pressure of 150 psi to within ± 5 psi during the test period. Leakage shall not exceed the rates shown below are for Ductile Iron as indicated in AWWA C600 or AWWA C605 for PVC Pipe:
 - a. 4 inch pipe: 0.66 gallons per 2 hour per 1000 feet of pipe.
 - b. 6 inch pipe: 0.99 gallons per 2 hour per 1000 feet of pipe.
 - c. 8 inch pipe: 1.32 gallons per 2 hour per 1000 feet of pipe.
 - d. 10 inch pipe: 1.66 gallons per 2 hour per 1000 feet of pipe.
 - e. 12 inch pipe: 1.99 gallons per 2 hour per 1000 feet of pipe.
 6. Repair all visible leakage regardless of the amount.
- D. Testing valves:
1. Test all valves in the closed position.
 2. Apply a net test pressure of 125 psi for a period of 10 minutes.
 3. A valve will be considered to have passed if after 10 minutes the pressure is within ± 2 psi of the net test pressure, and in the opinion of the Engineer, no appreciable amount

of leakage takes place during the test period.

3.07 DISINFECTION

A. General:

1. All water main shall be disinfected.
2. All sampling must be done while the Engineer is present.
3. Notify Engineer at least 24 hours prior to testing.
4. Unless authorized by the Engineer, disinfect water main after pressure testing.
5. Conduct disinfection in accordance with AWWA C651, unless specified otherwise.

B. Disinfection procedure:

1. PolyPig and flush all water mains prior to disinfection.
2. Utilize the AWWA continuous feed method.
3. Inject the chlorine solution into the water main through a corporation stop installed at the opposite end of the discharge end of the main.
4. Fill the water main with the water and chlorine solution to produce a minimum concentration of 25 parts per million at the discharge end.
5. Valve off the water main and allow it to sit for a period of 24 hours. After 24 hours the chlorine residual must be at least 10 mg/l.
6. Dispose of heavily chlorinated water in accordance with applicable regulations.
7. If there is any possibility that the chlorinated discharge will cause damage to the environment, the contractor shall neutralize the discharge water in accordance with AWWA C651 Appendix B.

C. Bacteriological testing:

1. Collect samples from the water main at locations designated by the Engineer. As a minimum, collect samples at the inlet, mid section and discharge end of the water main.
2. Collect samples from corporation stops. Samples from fire hydrants will not be allowed.
3. Submit samples to a laboratory approved by the Michigan Department of Environment Great Lakes and Energy Drinking Water Division and the Engineer for bacteriological analysis.
4. The pipe section will have passed after two consecutive samples, taken at 24 hour intervals, shows an absence of coliform, atypical, or overgrowth organisms. Acceptable sample results are negative as otherwise defined by AWWA C651 and MDEQ requirements.
5. The Engineer may, at his discretion, collect samples for bacteriological testing.
6. Submit all test and laboratory results to the Engineer.
7. If sample fails, repeat disinfection and sample as required at no cost to the owner.
8. Acceptable results must be obtained and connection approved by Owner prior to any new watermain to the existing distribution system.

3.08 ELECTRICAL CONDUCTIVITY TESTING

A. Ductile iron pipe:

1. General:

- a. All water main shall be tested.
- b. Conduct all testing only while a representative of the Village is present.
- c. Notify Village at least 24 hours prior to testing.
- d. If any section of pipe fails to pass a test, the Contractor shall determine the source of the failure, repair it, and retest the section.
- e. The tests shall be repeated until satisfactory results are obtained.
- f. Test labs need to be approved by Village.

2. Method:

- a. Test all water main and hydrants for electrical continuity.

- b. Conduct test after pressure testing and while the pipe is at normal operating pressure.
 - c. Test the water main in section lengths approved by the Village.
 - d. Apply a direct current of 400 amps \pm 10% through the test section for a period of 5 minutes.
 - e. Measure current flow through the pipe continuously on a suitable ammeter. The current shall remain steady without interruption or excessive fluctuation.
 - f. The pipe section will have failed if it shows signs of insufficient current, intermediate current, or arcing, indicated by large fluctuations of the ammeter.
- B. PVC and HDPE pipe:
- 1. Contractor shall demonstrate that the wire is continuous and unbroken through the entire run of the pipe.
 - a. Demonstration shall include full signal conductivity (including splices) when energizing for the entire run in the presence of the Owner or Engineer.
 - b. If the wire is broken, the Contractor shall repair or replace it. Pipeline installation will not be accepted until the wire passes a continuity test.

END OF SECTION

ABANDONMENT OF SEWER MAINS

SECTION 33 31 00.13

ABANDONMENT OF SEWER MAINS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Abandonment in place, by cutting and capping, of existing sewers, junction structures, manholes, service lines, and force mains.
- B. Abandonment in place of existing sewers and force mains using flowable fill. Flowable fill will be utilized when abandoning existing sewers and force mains underneath roadways and paved areas and at the direction of the Engineer as field conditions dictate, or as specified on the Drawings.

1.02 SUBMITTALS

- A. Related sections:
 - 1. Section 01 20 00 PRICE AND PAYMENT PROCEDURE
 - 2. Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES
 - 3. Section 31 00 00 EARTHWORK
- B. Submit product data for proposed plugs for approval.
- C. Technical information for equipment and operational procedures including projected slurry injection rate, grout pressure, method of controlling grout pressure, bulkhead and vent design, and number of stages of grout application.
- D. At least 15 days prior to commencing abandonment activities, submit plan for abandonment, describing proposed grouting sequence, bypass pumping requirements and plugging, if any, and other information pertinent to completion of work.

PART 2 PRODUCTS

2.01 PLUGS

- A. Grout Plugs: Cement-based dry-pack grout conforming to ASTM C1107, Grade B or C.
- B. Manufactured Plug: Commercially available plug or cap specifically designed and manufactured to be used with pipe being abandoned.

2.02 FLOWABLE FILL REQUIREMENTS

- A. Unconfined compressive strength: minimum 75 psi and maximum 150 psi at 56 days as determined based on an average of three tests for same placement. Present at least three acceptable strength tests for proposed mix design in mix design report.
- B. Placement characteristics: self-leveling.
- C. Shrinkage characteristics: non-shrink.

ABANDONMENT OF SEWER MAINS

- D. Water bleeding for fill to be placed by grouting method in sewers: not to exceed 2 percent according to ASTM C940.
- E. Minimum wet density: 90 pounds per cubic foot.

2.03 BALLAST

- A. Ballast Material: Natural rock or concrete pieces with minimum size equal to at least 10 times maximum aggregate size of flowable fill and maximum size of 24 inches. Maximum dimension shall not be more than 20 percent of minimum dimension of space to be filled.
- B. Ballast Composition: Free of regulated waste material.

PART 3 EXECUTION

3.01 DEMOLITION OF SEWER MANHOLES, PIPELINE STRUCTURES, AND FORCE MAINS PRIOR TO ABANDONMENT

- A. Remove manhole frames and covers and castings from other existing pipeline structures. Deliver castings to nearest DPW maintenance facility for future use. Alternatively, salvaged castings may be used upon approval by the Engineer, for constructing new manholes on this project.
- B. Demolish and remove precast concrete adjustment rings and corbel section, or brick and mortar corbel and chimney, or other pipeline structures, to minimum depth of 4 feet below finished grade. Structure may be removed to greater depth, but not deeper than 18 inches above crown of abandoned sewer.
- C. Drain manholes and poke holes in manhole floors and walls prior to filling.
- D. When adjacent sewer lines are not to be filled, place temporary plugs in each line connecting to manhole, in preparation for filling manhole.
- E. Excavate overburden from force mains to be abandoned at locations indicated on Drawings, conforming to the specification section for Excavation and Backfill for Utilities. Cut existing force main, when necessary, to provide an end surface perpendicular to axis of pipe and suitable for plug to be installed. Remove force main piping material remaining outside of segment to be abandoned.

3.02 CUTTING AND CAPPING OF MAINS

- A. Do not begin cut, plug, and abandonment operations until replacement sewer or force main has been constructed and tested, all service connections have been installed, and main has been approved for use.
- B. Install plug, clamp, and concrete thrust block and make cut at location shown on Drawings and/or as directed by Engineer.
- C. Main to be abandoned shall not be valved off and shall not be cut or plugged other than as shown on Drawings.

ABANDONMENT OF SEWER MAINS

- D. After main to be abandoned has been cut and capped, check for other sources feeding abandoned sewer main. When sources are found, notify Engineer immediately. Cut and cap abandoned main at point of other feed as directed by Engineer.
- E. Plug or cap ends or opening in abandoned main in manner approved by Engineer. Install concrete around cap and over pipe to ensure it is not penetrable by groundwater.
- F. Remove and dispose of surface identifications such as cleanouts. Clean-outs in improved streets shall be filled with concrete.
- G. Backfill excavations in accordance with Section 31 00 00 EARTHWORK.
- H. Repair street surfaces in accordance with specifications.
- I. Mark location of abandoned sewer laterals on Drawings and provide to the Engineer.

3.03 CUTTING AND CAPPING OF SERVICES

- A. Do not begin cut, plug, and abandonment operations until replacement service, if necessary, has been constructed and tested, and all service connections have been installed.
- B. Service lines shall be cut and capped at the sewer main and/or as directed by Engineer.
- C. Before backfilling of a capped service line is started, the capping must be observed by a representative of the DPW.
- D. After service to be abandoned has been cut and capped, check for any other sources feeding abandoned sewer service. When sources are found, notify Engineer immediately. Cut and cap abandoned main at point of other feed as directed by Engineer.
- E. Plug or cap ends or opening in abandoned service in manner approved by Engineer. Install concrete around cap and over pipe to ensure it is not penetrable by groundwater.
- F. Remove and dispose of surface identifications such as cleanouts. Cleanouts in improved streets shall be filled with concrete.
- G. Backfill excavations in accordance with Section 31 00 00 EARTHWORK.
- H. Repair paved surfaces in accordance with specifications.
- I. Mark location of abandoned sewer laterals on Drawings and provide to DPW.

3.04 ABANDONMENT OF FORCE MAINS

- A. Do not begin cut, plug, and abandonment operations until replacement force main has been constructed and tested, and all service connections have been installed.
- B. Install plug, clamp, and concrete thrust block and make cut at location shown on Drawings.
- C. Main to be abandoned shall not be valved off and shall not be cut or plugged other than as shown on Drawings.

ABANDONMENT OF SEWER MAINS

- D. After force main to be abandoned has been cut and plugged, check for other sources feeding abandoned force main. When sources are found, notify the Engineer immediately. Cut and plug abandoned force main at point of other feed as directed by Engineer.
- E. Plug or cap ends or openings in abandoned force main in manner approved by the Engineer.
- F. Remove surface identifications and appurtenances such as valve boxes.
- G. Backfill excavations in accordance with Section 31 00 00 EARTHWORK.
- H. Repair street surfaces in accordance with the specifications.

3.05 PREPARATION FOR ABANDONMENT VIA FLOWABLE FILL

- A. Have fill mix design reports and other submittals required by Paragraph 2.02 accepted by the Engineer prior to start of placement. Notify the Engineer at least 24 hours in advance of grouting with flowable fill.
- B. Select fill placement equipment and follow procedures with sufficient safety and care to avoid damage to existing underground utilities and structures. Operate equipment at pressure that will not distort or imperil portion of work, new or existing.
- C. Clean sewer lines and video with closed circuit television to identify connections, locate obstructions, and assess condition of pipe. Locate previously unidentified connections, which have not been redirected and reconnected as part of this project, and report them to the Engineer. During placement of fill, compensate for irregularities in sewer pipe, such as obstructions, open joints, or broken pipe to ensure no voids remain unfilled.
- D. Perform demolition work prior to starting fill placement. Clean placement areas of sewers and manholes of debris that may hinder fill placement. Remove excessive amounts of sludge and other substances that may degrade performance of fill. Do not leave sludge or other debris in place if filling more than 2 percent of placement volume.
- E. Remove free water prior to starting fill placement.

3.06 EQUIPMENT FOR FLOWABLE FILL

- A. Mix flowable fill in automated batch plant and deliver it to site in ready-mix trucks. Performance additives may be added at placement site if required by mix design.
- B. Use concrete or grout pumps capable of continuous delivery at planned placement rate.

3.07 INSTALLATION OF FLOWABLE FILL

- A. Abandon existing sewer lines and force mains underneath roadways and paved areas by completely filling sewer line with flowable fill. Abandon manholes and other structures by filling with flowable fill, together with ballast as applicable, within depth of structures left in place.
- B. Manholes located in non-paved areas may be filled with soil or acceptable fill and compacted as directed by Engineer.

ABANDONMENT OF SEWER MAINS

- C. Place flowable fill to fill volume between manholes. Continuously place flowable fill from manhole to manhole with no intermediate pour points, but not exceeding 500 feet in length.
- D. Have filling operation performed by experienced crews with equipment to monitor density of flowable fill and to control pressure.
- E. Temporarily plug sewer lines which are to remain in operation during pouring/pumping to keep lines free of flowable fill.
- F. Pump flowable fill through bulkheads constructed for placement of two 2-inch PVC pipes or use other suitable construction methods to contain flowable fill in lines to be abandoned. These pipes will act as injection points or vents for placement of flowable fill.
- G. Place flowable fill under pressure flow conditions into properly vented open system until flowable fill emerges from vent pipes. Pump flowable fill with sufficient pressure to overcome friction and to fill sewer from downstream end, to discharge at upstream end.
- H. Inject flowable fill through replaced ballast using grouting equipment and series of grout pipes discharging at bottom of placement, allowing fill to rise through ballast effectively filling all voids. Alternatively, sequentially place individual pieces of ballast at same time as flowable fill is placed. Do not fill with ballast more than 50 percent of volume at any level, to prevent nesting and void formation.
- I. Remediate placement of flowable fill which does not fill voids in sewer, in force main, and in manhole or other structures, or where voids develop due to excessive shrinkage or bleeding of fill, by using pressure grouting either from inside sewer or from surface.
- J. Plug each end of force main being abandoned, if not filled with flowable fill.
- K. Clean inside surface of force main at least 12 inches from ends to achieve firm bond and seal grout plug or manufactured plug to pipe surface. Similarly, clean and prepare exterior pipe surface if manufactured cap is to be used.
- L. When using manufactured plug or cap, install fitting as recommended by manufacture's instructions, to form water tight seal.
- M. Backfill to surface, above pipe or structures left in place, with flowable fill in restricted areas, compacted bank run sand in unrestricted areas to be paved or select fill in unrestricted areas outside of pavement. Place and compact backfill, other than flowable fill, in compliance with Section 31 00 00 EARTHWORK.
- N. Collect and dispose of excess flowable fill material and other debris in accordance with local requirements or as directed by the Engineer.

3.08 PROTECTION OF PERSONS AND PROPERTY

- A. Provide safe working conditions as required by OSHA and applicable State and local laws for employees throughout demolition and removal operations. Observe safety requirements for work below grade.

ABANDONMENT OF SEWER MAINS

- B. Maintain safe access to adjacent property and buildings. Do not obstruct roadways, sidewalks or passageways adjacent to Work.

END OF SECTION

PUBLIC SANITARY SEWERAGE GRAVITY PIPING SANITARY SEWERS

SECTION 33 31 11

PUBLIC SANITARY SEWERAGE GRAVITY PIPING SANITARY SEWERS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: all labor, materials, tools, and equipment necessary for the installation of all sanitary sewer piping, manholes, services, and appurtenances.
- B. Related sections:
- | | |
|---------------------|--|
| 1. Section 01 20 00 | PRICE AND PAYMENT PROCEDURE |
| 2. Section 01 33 23 | SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES |
| 3. Section 31 00 00 | EARTHWORK |

1.02 UNIT PRICES

Refer to Section 01 20 00, PRICE AND PAYMENT PROCEDURE

1.03 REFERENCED STANDARDS

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

ASTM American Society for Testing and Materials

1.04 SUBMITTALS

Submit complete sets of shop drawings and product data to the Engineer for review and approval, prior to ordering any material in accordance with Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Piping shall not be stacked higher than four feet. Suitable racks, chairs and other supports shall be provided to protect pipe mating surfaces from damage. Store bottom tiers off the ground, alternate tiers and chock tier ends.
- B. All pipe and other materials subject to ultraviolet or ozone attack shall be protected from the sunlight, atmosphere and weather and stored in suitable enclosures until ready for installation.

PART 2 PRODUCTS

2.01 SANITARY GRAVITY SEWER MAIN

- A. PVC sewer main and fittings:
1. Design standard: ASTM - D 3034.
 2. Wall thickness: SDR-35.
 3. Joints: Push on joint with elastomeric gasket meeting ASTM - D 3212.
 4. Depth: 14' feet of cover or less
- A. Composite Sewer Pipe (Truss Pipe):
1. Design standard: ASTM - D 2680.

PUBLIC SANITARY SEWERAGE GRAVITY PIPING SANITARY SEWERS

2. Joints: Push on joint with elastomeric gasket meeting ASTM - D 3212.

2.02 SANITARY SERVICE PIPE

- A. PVC sewer service pipe and fittings:
 1. Design standard: ASTM - D 3034.
 2. Wall thickness: SDR-35.
 3. Joints: Push on joint with elastomeric gasket meeting ASTM - D 3212.
 4. Depth: Greater than 14' feet of cover

2.03 4 FOOT DIAMETER MANHOLES

- A. Sections:
 1. 4 foot diameter, precast section conforming to ASTM C-478.
 2. Rubber gasket joints conforming to ASTM C-443.
 3. Bottom slab and walls shall be cast integrally.
 4. Top section:
 - a. Manholes less than 4 feet deep: flat top.
 - b. Manholes greater than 4 feet deep: eccentric cone.
 5. Manhole to pipe connections: Kor-N-Seal neoprene boot with stainless steel bands.
 6. Exterior shall be coated w/ coal tar waterproofing.
 7. Interior shall be coated w/ "Thoroseal" waterproofing.
 8. Depth:
 - a. < 4 feet: flat top
 - b. > 4 feet: eccentric cone top
- B. Castings: Manhole: EJ # 1040 AGS with type "A" cover
- C. Steps: ASTM D-2146, TYPE II, GRADE 49108 M.A. INDUSTRIES P.S. I, POLYPROPYLENE, or Equal

PART 3 EXECUTION

3.01 GRAVITY PIPE INSTALLATION

- A. Earthwork: Perform all trench excavation, pipe bedding, and backfilling in accordance with Section 31 00 00, EARTHWORK.
- B. Line and grade controls:
 1. Install PVC pipe according to ASTM D2321.
 2. Lay all pipe in a straight line between manholes and structures.
 3. Maintain grade by the use of laser beam.
 4. Establish line and grade control from benchmarks and site coordinate lines.
 5. Promptly report any alignment conflicts to the Engineer.
- C. Pipe laying:
 1. Each section of pipe shall rest upon the pipe bed for the full length of the pipe barrel.
 2. Recess bedding to accommodate joints.
 3. Maintain pipe and joints in a clean condition.
 4. Provide concrete pipe anchors at all joints of pipe laid at slopes greater than 15 percent.
 5. Lay pipe from downstream end to upstream end.

3.02 SEWER SERVICE LEADS

- A. General:

PUBLIC SANITARY SEWERAGE GRAVITY PIPING SANITARY SEWERS

1. Place 6 inch service leads from service wyes to property line or as indicated on the plans.
 2. Provide minimum depth of cover of 6 feet within roadway.
 3. Install a watertight plug in the end of each lead.
 4. Install cleanouts at bends and maximum spacing of 100'.
- B. Earthwork: Perform all trench excavation, pipe bedding, and backfilling in accordance with Section 02200 - Earthwork.
- C. Pipe laying:
1. Lay all pipe in a straight line between bends and structures.
 2. Maintain grade using a method approved by the Engineer.
 3. Install service leads where indicated on the plans.
 4. Maintain pipe and joints in a clean condition.
- D. Marker post:
1. Install a pressure treated 4" x 4" x 8' marker post at the end of each service lead.
 2. Set bottom of marker post plumb and level with the service lead invert.
 3. Cut the post to 24 inches above finished grade after the Engineer has recorded the elevation of the marker post top.
 4. Paint the exposed marker post:
 - a. Color: brown.

3.03 MANHOLES

- A. Installation:
1. Construct base, sections, top cone, and castings in accordance with the detail shown on the Plans.
 2. Place manhole base on 4 inches sand or aggregate leveling base.
 3. Compact sand base to 95% Modified Proctor density by mechanical means.
 4. Set manhole base and sections plumb.
 5. Install rubber gasket between each manhole section and lubricate according to the manufacturers specifications.
 6. Coat exterior walls with coal tar waterproofing.
 7. Place approved backfill material around manhole in layers not exceeding 12 inches.
 8. Compact each backfill layer by mechanical means to 95% Modified Proctor density.
 9. Seal all joints and lift holes with non-shrink grout.
- B. Flow Channel
1. Construct concrete flow channel as shown on the plans for each manhole.

3.04 TESTING

- A. General:
1. All gravity main piping shall be subject to air (leakage) testing, deflection testing, and television inspection prior to acceptance by the Owner.
 2. Conduct all testing only while the Engineer is present.
 3. Notify the Engineer at least 24 hours prior to testing.
 4. If any section of pipe fails to pass a test, the Contractor shall repair and retest the section at no additional cost to the Owner.
 5. The tests shall be repeated until satisfactory results are obtained.
 6. No connections shall be made on new pipe until all tests have passed.
- B. Air testing:
1. Perform low pressure air test according to Uni-Bell Plastic Pipe Association Recommended Practice UNI-B-6.

PUBLIC SANITARY SEWERAGE GRAVITY PIPING SANITARY SEWERS

2. Test each section of pipe from manhole to manhole or structure to structure.
 3. A pipe section shall be considered as failed if the leakage exceeds the amount allowed by ASTM F 1417. (See table 1).
 4. Initial pressure of 4 psi greater than the average back pressure of the groundwater above the pipe shall be maintained for 2 minutes to equalize air temperature.
- C. Deflection testing:
1. Perform deflection testing no earlier than 30 days after final backfill has been placed.
 2. Maximum allowable deflection is 5% as determined by ASTM D3034-89.
 3. Perform testing by pulling a properly sized "go, no-go" mandrel between manholes.
 4. Failure to pass the mandrel will indicate an unacceptable deflection, requiring re-excavation and replacement of the failed section at no additional cost to the Owner.
 5. Repeat the test until satisfactory results are obtained.
- D. Television inspection:
1. Conduct test with closed circuit television.
 2. Record inspection digitally and provide to Engineer via flash drive.
 3. Provide the Engineer with one copy of the inspection video recording within 15 days of televising.
 4. The recorded inspection shall include audio or visual aids which indicate the exact location of the video camera.
 5. All defects in the sewer shall be noted during the inspection.
 6. Provide written log of all defects.
 7. Repair all defects at no cost to the Owner and re-televising until satisfactory results are obtained.

3.06 CLEANING

- A. Clean the sewer and manholes to the satisfaction of the Village, before testing.
- B. Cleaning shall be done with high pressure water jetting equipment. Equipment shall be approved by the Owner.
- C. Remove any debris from the sewer or manholes that was dislodged by cleaning.
- D. Clean all manhole flow channels and steps to the satisfaction of the Engineer.

3.07 CONNECT TO EXISTING MANHOLE

- A. General:
1. Use a coring machine to cut hole in existing manhole.
 2. Install a flexible boot and adjust flow channel as needed.

END OF SECTION

SECTION 33 40 00
STORMWATER UTILITIES

PART 1 GENERAL

1.01 SUMMARY

- A Section includes: all labor, materials, tools, and equipment necessary for the installation of storm sewers, drainage structures, culverts, and appurtenances as shown on the plans.
- B. Related sections:
 - 1. Section 01 20 00 PRICE AND PAYMENT PROCEDURE
 - 2. Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES
 - 3. Section 31 00 00 EARTHWORK
 - 4. Section 31 25 00 EROSION CONTROL

1.02 UNIT PRICES

Refer to Section 01 20 00, PRICE AND PAYMENT PROCEDURE

1.03 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
- AASHTO - American Association of State Highway and Transportation Officials
- MDOT - Michigan Department of Transportation

1.04 SUBMITTALS

Submit complete sets of shop drawings and product data to the ENGINEER for review and approval, prior to ordering any material.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Stack piping within manufacturer's recommended limits. Suitable racks, chairs and other supports shall be provided to protect pipe mating surfaces from damage. Store bottom tiers off the ground, alternate tiers and chock tier ends.
- B. All pipe and other materials subject to ultraviolet or ozone attack shall be protected from the sunlight, atmosphere and weather and stored in suitable enclosures until ready for installation.

PART 2 PRODUCTS

2.01 PVC PIPE

- A. Design standard: ASTM D3034
- B. Thickness: SDR 35
- C. Joints: Bell & Spigot with premium elastomeric gasket joints conforming to ASTM 3212.

2.02 HIGH DENSITY POLYETHYLENE PIPE

- A. Material: Smooth interior corrugated polyethylene pipe.
- B. Design standard:
 - 1. 3"-10" diameter: AASHTO M252
 - 2. 12"-36" diameter: AASHTO M294
 - 3. 42" and larger diameter: Meeting the performance requirements of AASHTO M294.
- C. Joints and fittings:
Conform to the corresponding pipe specification and be constructed of the same material classification as the pipe.

2.03 END SECTIONS

- A. Metal: In conformance with MDOT specification 8.08.18.
- B. Concrete: In conformance with MDOT specification 8.08.19.
- C. Protective bars, grating, etc.: As noted on plans.
- D. Rip rap: See Section 31 25 00, EROSION CONTROL.

2.04 STORM MANHOLE AND CATCH BASINS

- A. Barrel: Precast manhole riser, four-foot diameter or as noted on plans, ASTM C-478 with integral base.
- B. Pipe connections:
 - 1. 8" - 48" pipe: Kor-N-Seal gasket, or equal.
 - 2. 48" - 60" pipe: A-Lock Connector, or equal.
- C. Cone: Precast eccentric cone or flat top section.
- D. Joints: ASTM C-443, rubber gasketed joints.
- E. Manhole steps: Manufacturer - MA Industries, Inc.
 - 1. PS1-PF-Precast Manhole.
 - 2. PS1-B-Block Manhole.
- F. Grade adjustment bricks: Concrete masonry units in accordance with MDOT specification 8.14.03.
- G. Casting: As noted on plans.

PART 3 EXECUTION

3.01 STORM SEWER PIPE INSTALLATION

- A. Install pipe in accordance with pipe manufacturers recommendations.
- B. Earthwork: Perform all trench excavation, pipe bedding, and backfilling in accordance with Section 31 00 00, EARTHWORK.
- C. Line and grade controls:
 - 1. Lay all pipe in a straight line between manholes and structures.
 - 2. Maintain grade by the use of laser beam.

- D. Pipe laying:
 - 1. Center the pipe within the trench with adequate clearance between the pipe and the trench sidewalls.
 - 2. Each section of pipe shall rest upon the pipe bed for the full length of its barrel, with recesses excavated to accommodate the joints.
 - 3. Thoroughly clean all foreign matter from the pipe and keep the pipe clean during the pipe laying operations by using temporary plugs.
 - 4. Pipe shall not be installed in trenches containing water or mud without the approval of the Engineer.
 - 5. All pipe ends shall be plugged with a watertight plug when construction stops for an extended period of time or overnight.
 - 6. Prevent plugged pipe from floating.

- F. Jointing pipe:
 - 1. Thoroughly clean & lubricate bell, spigot, and gaskets.
 - 2. Only joint lubricates approved by the pipe manufacture will be permitted.
 - 3. Align the pipe & force it "Home" without damaging the joint.

3.02 STORM MANHOLE AND CATCH BASIN

- A. Installation:
 - 1. Construct base sections, top cone, and castings in accordance with the details shown on the plans.
 - 2. Place base on 4 inches sand leveling base.
 - 3. Compact sand base to 95% Modified Proctor density by mechanical means.
 - 4. Manhole sections shall be set plumb.
 - 5. Seal all joints and lift holes with an approved waterproofing agent.
 - 6. Place approved backfill material around manhole in layers not exceeding 12 inches.
 - 7. Compact each backfill layer by mechanical means to 90% Modified Proctor density in non-critical areas and 95% density in critical areas, as per Section 31 00 00, EARTHWORK.
 - 8. Adjust casting to be flush with finish grade.

3.03 CONNECTING TO EXISTING DRAINAGE STRUCTURE

- A. Construct neat opening in structure wall using coring machine or hammer drill. Jackhammering or chiseling of openings will not be permitted.

- B. Seal opening around pipe with masonry and mortar to provide a leakproof seal.

3.04 ADJUSTING DRAINAGE STRUCTURE COVERS

- A. Remove existing casting, adjustment rings, bricks, etc. as required.

- B. Place bricks and/or adjustment rings as required to set casting at proper elevation.

3.05 CLEANING

- A. Clean the pipe and structures of all debris and foreign material.

- B. Remove all sediment from catch basin sumps.

END OF SECTION

APPENDIX A

SANITARY SEWER SERVICE SCHEDULE
WATER SERVICE SCHEDULE

Village of Elk Rapids - Sanitary Sewer Service Schedule

Number	Address Number	Street	Description
1	125	IROQUOIS ST	6" PVC
2	95	LAKE (CIP)	6" PVC
3	97	LAKE (CIP)	6" PVC
4	99	LAKE (CIP)	6" PVC
5	115	LAKE ST	6" PVC
6	403	LAKE ST	6" PVC
7	409	LAKE ST	6" PVC
8	411	LAKE ST	6" PVC
9	507	LAKE ST	6" PVC
10	606	LAKE ST	6" PVC
11	201	LOOMIS DR	6" PVC
12	209	LOOMIS DR	6" PVC
13	211	LOOMIS DR	6" PVC
14	222	LOOMIS DR	6" PVC
15	211A	LOOMIS DR	6" PVC
16	201 (1)	LOOMIS DR	6" PVC
17	210 (1)	LOOMIS DR	6" PVC
18	201 (2)	LOOMIS DR	6" PVC
19	210 (2)	LOOMIS DR	6" PVC
20	302	OTTAWA ST	6" PVC
21	203	SPRUCE ST	6" PVC
22	209	SPRUCE ST	6" PVC
23	301	TRAVERSE ST	6" PVC
24	311	TRAVERSE ST	6" PVC

Village of Elk Rapids - Water Service Schedule

Number	Address Number	Street	Description
1	121	AMES ST	1"
2	115A	AMES ST	1"
3	115B	AMES ST	1"
4	110	BASS ST	1"
5	105	HENRY ST	1"
6	05-43-100-032-00	HENRY ST	1"
7	117	LAKE ST	1"
8	123	LAKE ST	1"
9	124	LAKE ST	1"
10	125	LAKE ST	1"
11	127	LAKE ST	1"
12	128	LAKE ST	1"
13	130	LAKE ST	1"
14	131	LAKE ST	1"
15	132	LAKE ST	1"
16	133	LAKE ST	1"
17	135	LAKE ST	1"
18	136	LAKE ST	1"
19	137	LAKE ST	1"
20	138	LAKE ST	1"
21	142	LAKE ST	1"
22	145	LAKE ST	1"
23	203	LAKE ST	1"
24	205	LAKE ST	1"
25	206	LAKE ST	1"
26	209	LAKE ST	1"
27	210	LAKE ST	1"
28	212	LAKE ST	1"
29	214	LAKE ST	1"
30	220	LAKE ST	1"
31	301	LAKE ST	1"
32	303	LAKE ST	1"
33	305	LAKE ST	1"
34	400	LAKE ST	1"
35	403	LAKE ST	1"
36	405	LAKE ST	1"
37	409	LAKE ST	1"
38	501	LAKE ST	1"
39	503	LAKE ST	1"
40	504	LAKE ST	1"
41	505	LAKE ST	1"
42	509	LAKE ST	1"
43	606	LAKE ST	1"
44	201	LOOMIS DR	1"
45	203	LOOMIS DR	1.5"

Village of Elk Rapids - Water Service Schedule

Number	Address Number	Street	Description
46	209	LOOMIS DR	1"
47	210	LOOMIS DR	1"
48	211	LOOMIS DR	1"
49	222	LOOMIS DR	1"
50	105	OLDS ST	1"

APPENDIX B

SOIL BORING LOGS

SOIL CLASSIFICATION INFORMATION

SOIL DESCRIPTIONS

Example: Silty fine SAND (SM) - trace clay - occasional clay seams - dense - brown/gray below 40 feet - wet
(1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10)

- 1a FOR COARSE GRAINED PRIMARY MATERIAL: Secondary Material of 15 to 50%, if applicable. (eg. Silty, Clayey)
- 1b FOR FINE GRAINED PRIMARY MATERIAL: Secondary Material of 30 to 50%, if applicable (eg. Gravelly, Sandy)
- 2 PRIMARY MATERIAL (in CAPs)- SILT, SAND, GRAVEL, or CLAY
Note: fine, medium and/or coarse grained SAND
fine and/or coarse grained GRAVEL
- 3 (USCS) Unified Soil Classification System (USCS) symbol(s) is presented at the end of the soil description (in parentheses) based on ASTM gradation and plasticity testing. See attached USCS chart.
- 4 Additional Materials (with percentage descriptors as below)

Fine Grained Material	Coarse-Grained Material
15 to 30% - "some" or "with"	5 to 15% - "little"
5 to 15% - "little"	< 5% - "trace" or "few"
< 5% - "trace" or "few"	
- 5 Description of sorting or grading. For example, "well-sorted, or "poorly graded."
- 6 Occurrences (with frequency descriptors as below) - cobbles, boulders, bricks, layers, seams, etc.
Greater than one per 12-inches = "frequent"
One per 12-inches = "occasional"

Note: Seams = < 1-inch in thickness
Layers = > 1-inch in thickness
- 7 Angularity and mineral composition, if warranted
- 8 Odor or Sheen, if applicable
- 9 Soil Strength Description (Relative Density for gravel, sand and silt, or Consistency for clay)
- 10 Color
- 11 Moisture - "dry" or "wet" or "moist"
"dry" = absence of apparent moisture
"moist" = damp but not saturated
"wet" = saturated

Particle Sizes	Relative Density	SPT N-Value	Consistency	SPT N-Value	Ppen, tsf
Boulders - > 12-in					
Cobbles - 12 to 3 in	"very loose"	W.O.H. to 4	"very soft"	WOH to 2	0 - 0.125
Course gravel - 3 to 3/4 in	"loose"	5 to 10	"soft"	2 to 4	0.125 - 0.25
Fine gravel - 3/4 to 0.187-in	"medium dense"	11 to 30	"medium stiff"	4 to 8	0.25 - 0.5
Coarse sand - 4.75 to 2.0-mm	"dense"	31 to 50	"stiff"	8 to 15	0.5 - 1.0
Medium sand - 2.0 to 0.425-mm	"very dense"	over 50	"very stiff"	15 to 30	1.0 - 2.0
Fine sand - 0.425 to 0.075-mm			"hard"	over 30	2.0 - 4.0
Clay/Silt - < 0.075-mm					

NOTES AND GENERAL INFORMATION

1. Drilling and sampling activities are indicative of subsurface conditions only at locations where data are taken, and when data are taken. Conditions at locations not evaluated may differ from professional interpretation.
2. Environmental boring logs present soil and groundwater data collected for resource development, depositional environment, groundwater flow and/or contaminant transport analyses and may not for be suited for geotechnical or structural engineering use unless otherwise arranged.
3. Stratigraphic Contacts: Solid line denotes a sudden, observed soil transition.
Dashed line denotes a gradual or gradational soil transition.
Dotted line denotes an inferred transition, therefore the type and specific location of the transition is unknown / approximated.
3. Common abbreviations: WOH = Weight of (SPT) Hammer DHH = Down Hole Hammer HA = Hand Auger
DR = Drove Rock (During SPT) NR = No Recovery
Ppen = Pocket Penetrometer (unconfined compressive strength in tons per square foot)



Gosling Czubak

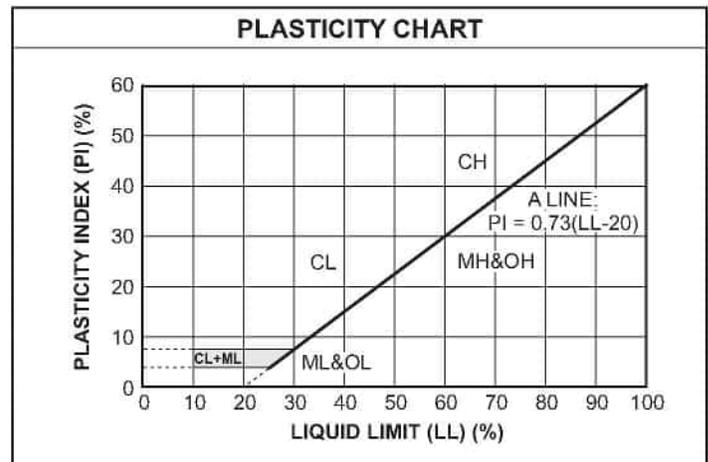
engineering sciences, inc.

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART		
COARSE-GRAINED SOILS (more than 50% of material is larger than No. 200 sieve size.)		
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size	Clean Gravels (Less than 5% fines)	
	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
	GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
	Gravels with fines (More than 12% fines)	
	GM	Silty gravels, gravel-sand-silt mixtures
	GC	Clayey gravels, gravel-sand-clay mixtures
SANDS 50% or more of coarse fraction smaller than No. 4 sieve size	Clean Sands (Less than 5% fines)	
	SW	Well-graded sands, gravelly sands, little or no fines
	SP	Poorly graded sands, gravelly sands, little or no fines
	Sands with fines (More than 12% fines)	
	SM	Silty sands, sand-silt mixtures
	SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS (50% or more of material is smaller than No. 200 sieve size.)		
SILTS AND CLAYS Liquid limit less than 50%	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
	OL	Organic silts and organic silty clays of low plasticity
SILTS AND CLAYS Liquid limit 50% or greater	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
	CH	Inorganic clays of high plasticity, fat clays
	OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS	PT	Peat and other highly organic soils

LABORATORY CLASSIFICATION CRITERIA		
GW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
GP	Not meeting all gradation requirements for GW	
GM	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
GC	Atterberg limits above "A" line with P.I. greater than 7	
SW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
SP	Not meeting all gradation requirements for GW	
SM	Atterberg limits below "A" line or P.I. less than 4	Limits plotting in shaded zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols.
SC	Atterberg limits above "A" line with P.I. greater than 7	

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 percent GW, GP, SW, SP
 More than 12 percent GM, GC, SM, SC
 5 to 12 percent Borderline cases requiring dual symbols





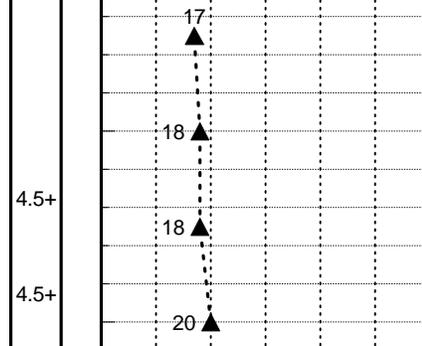
PROJECT: Ph.2-Water & Sewer Improvements
PROJECT NO.: 240424
PROJECT LOCATION: Elk Rapids, MI
CLIENT: Village of Elk Rapids
DRILLING COMPANY: Gosling Czubak **RIG:** CME-75
DRILLER: R. Farve **LOGGED BY:** P. Hermstein

LOG OF BORING: SB-1

GROUND ELEVATION: N.A. **DATE:** 10/8/24
DRILLING LOCATION: Refer to Site Plan
DRILLING METHOD: 4.25-Inch (I.D.) Hollow-Stem
BOREHOLE DIAMETER (IN): 10 **TOTAL DEPTH (FT):** 10
STATIC WATER LEVEL: Dry **CAVING DEPTH:** C N.A.

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Elevation (feet)	Graphic	Soil Description (See Boring Log Key)	Depth (feet)	Sample Type	Sample No.	Recovery (in)	Blow Counts	Notes	Pocket Penetrometer (tsf)	TEST RESULTS											
										% < #200		Plastic Limit	Liquid Limit	Water Content - %	SPT RESULT - N Value						
		Sandy TOPSOIL - with gravel - brown	0																		
		Silty SAND (SM/GM) - little gravel - medium dense - brown	0.4	▲	1	18	8 8 9	Drove Rock													
				▲	2	6	12 10 8														
		Silty CLAY (CL) - HARD - gray	5.5	▲	3	18	3 8 10		4.5+												
				▲	4	18	6 10 10		4.5+												
		Boring terminated at 10 ft.	10																		



Boring backfilled with augered cuttings.



PROJECT: Ph.2-Water & Sewer Improvements
PROJECT NO.: 240424
PROJECT LOCATION: Elk Rapids, MI
CLIENT: Village of Elk Rapids
DRILLING COMPANY: Gosling Czubak **RIG:** CME-75
DRILLER: R. Farve **LOGGED BY:** P. Hermstein

LOG OF BORING: SB-2

GROUND ELEVATION: N.A. **DATE:** 10/8/24
DRILLING LOCATION: Refer to Site Plan
DRILLING METHOD: 4.25-Inch (I.D.) Hollow-Stem
BOREHOLE DIAMETER (IN): 10 **TOTAL DEPTH (FT):** 10
STATIC WATER LEVEL: \neq Dry **CAVING DEPTH:** C N.A.

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Elevation (feet)	Graphic	Soil Description (See Boring Log Key)	Depth (feet)	Sample Type	Sample No.	Recovery (in)	Blow Counts	Notes	Pocket Penetrometer (tsf)	% < #200	TEST RESULTS									
											Plastic Limit	— —	Liquid Limit	Water Content -	×	%	SPT RESULT -	▲	N Value	
		Sandy GRAVEL (SP/GP) - brown	0																	
		Silty CLAY (CL) - hard - gray	1.5	▲	1	18	2 3 4					7								
			5	▲	2	18	2 3 5					8								
				▲	3	18	2 3 5					8								
			10	▲	4	18	3 5 9					14								
		Boring terminated at 10 ft.																		

Boring backfilled with augered cuttings.



PROJECT: Ph.2-Water & Sewer Improvements
PROJECT NO.: 240424
PROJECT LOCATION: Elk Rapids, MI
CLIENT: Village of Elk Rapids
DRILLING COMPANY: Gosling Czubak **RIG:** CME-75
DRILLER: R. Farve **LOGGED BY:** P. Hermstein

LOG OF BORING: SB-7

GROUND ELEVATION: N.A. **DATE:** 10/8/24
DRILLING LOCATION: Refer to Site Plan
DRILLING METHOD: 4.25-Inch (I.D.) Hollow-Stem
BOREHOLE DIAMETER (IN): 10 **TOTAL DEPTH (FT):** 10
STATIC WATER LEVEL: \approx Dry **CAVING DEPTH:** C N.A.

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Elevation (feet)	Graphic	Soil Description (See Boring Log Key)	Depth (feet)	Sample Type	Sample No.	Recovery (in)	Blow Counts	Notes	Pocket Penetrometer (tsf)	% < #200	TEST RESULTS									
											Plastic Limit	— —	Liquid Limit	Water Content -	×	%	SPT RESULT -	▲	N Value	
		Sandy TOPSOIL - brown	0																	
		Fine to medium SAND (SP) - loose - brown	0.5	▲	1	18	2 3 3					6								
		Fine to medium SAND (SP) - trace gravel - very loose - brown	3.5	▲	2	18	2 2 2					4								
		Fine to medium SAND (SP) - very loose - brown	6	▲	3	18	1 2 3					5								
		Boring terminated at 10 ft.	10	▲	4	18	1 2 2					4								

Boring backfilled with augered cuttings.



PROJECT: Ph.2-Water & Sewer Improvements
PROJECT NO.: 240424
PROJECT LOCATION: Elk Rapids, MI
CLIENT: Village of Elk Rapids
DRILLING COMPANY: Gosling Czubak **RIG:** CME-75
DRILLER: R. Farve **LOGGED BY:** P. Hermstein

LOG OF BORING: SB-8

GROUND ELEVATION: N.A. **DATE:** 10/4/24
DRILLING LOCATION: Refer to Site Plan
DRILLING METHOD: 4.25-Inch (I.D.) Hollow-Stem
BOREHOLE DIAMETER (IN): 10 **TOTAL DEPTH (FT):** 10
STATIC WATER LEVEL: 6ft **CAVING DEPTH:** C 6

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Elevation (feet)	Graphic	Soil Description (See Boring Log Key)	Depth (feet)	Sample Type	Sample No.	Recovery (in)	Blow Counts	Notes	Pocket Penetrometer (tsf)	% < #200	TEST RESULTS										
											Plastic Limit	— —	Liquid Limit	Water Content -	×	%	SPT RESULT -	▲	N Value		
		Sandy TOPSOIL - brown	0																		
		Fine to medium SAND (SP) - very loose to loose - brown - wet below 6 ft	0.5		1	18	2 2 3														
					2	18	1 1 1														
			5		3	18	1 2 3														
					4	18	1 2 5														
		Boring terminated at 10 ft.	10																		

Boring backfilled with augered cuttings.



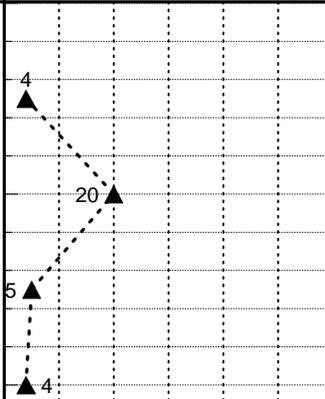
PROJECT: Ph.2-Water & Sewer Improvements
PROJECT NO.: 240424
PROJECT LOCATION: Elk Rapids, MI
CLIENT: Village of Elk Rapids
DRILLING COMPANY: Gosling Czubak **RIG:** CME-75
DRILLER: R. Farve **LOGGED BY:** P. Hermstein

LOG OF BORING: SB-9

GROUND ELEVATION: N.A. **DATE:** 10/4/24
DRILLING LOCATION: Refer to Site Plan
DRILLING METHOD: 4.25-Inch (I.D.) Hollow-Stem
BOREHOLE DIAMETER (IN): 10 **TOTAL DEPTH (FT):** 10
STATIC WATER LEVEL: 5.5ft **CAVING DEPTH:** C N.A.

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Elevation (feet)	Graphic	Soil Description (See Boring Log Key)	Depth (feet)	Sample Type	Sample No.	Recovery (in)	Blow Counts	Notes	Pocket Penetrometer (tsf)	TEST RESULTS								
										Plastic Limit — Liquid Limit Water Content - × % SPT RESULT - ▲ N Value 10 20 30 40 50								
		ASPHALT	0															
		Gravel base	0.2		1	18	1 2											
		Fine to medium SAND (SP/GP) - little gravel - frequent slag - very loose - black and brown [FILL]	1		2	0	7 10 10	Drove Rock										
		Fine to medium SAND (SP/GP) - little gravel - loose - dark brown - wet	5		3	18	2 1 4											
		Silty clayey SAND (SC/GC) - little gravel - very loose - brown - wet	8.5		4	18	2 2 2											
		Boring terminated at 10 ft.	10															



Boring backfilled with augered cuttings.



PROJECT: Ph.2-Water & Sewer Improvements
PROJECT NO.: 240424
PROJECT LOCATION: Elk Rapids, MI
CLIENT: Village of Elk Rapids
DRILLING COMPANY: Gosling Czubak **RIG:** CME-75
DRILLER: R. Farve **LOGGED BY:** P. Hermstein

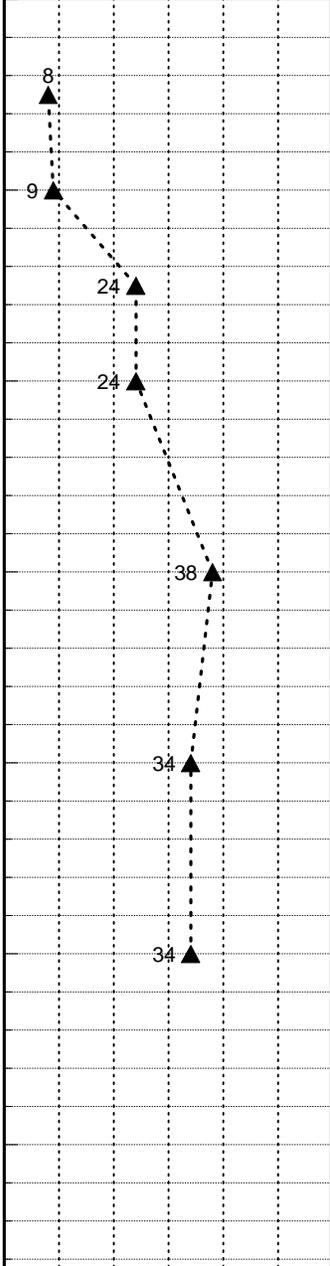
LOG OF BORING: SB-10

GROUND ELEVATION: N.A. **DATE:** 10/4/24
DRILLING LOCATION: Refer to Site Plan
DRILLING METHOD: 4.25-Inch (I.D.) Hollow-Stem
BOREHOLE DIAMETER (IN): 10 **TOTAL DEPTH (FT):** 25
STATIC WATER LEVEL: 8 **CAVING DEPTH:** C 9

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Elevation (feet)	Graphic	Soil Description (See Boring Log Key)	Depth (feet)	Sample Type	Sample No.	Recovery (in)	Blow Counts	Notes	Pocket Penetrometer (tsf)	% < #200	TEST RESULTS	
											Plastic Limit Water Content - SPT RESULT -	Liquid Limit % N Value
0		ASPHALT	0									
0.3		GRAVEL BASE	0.3		1	18	3 3 5					
1		Fine to medium SAND (SP) - trace gravel - brown	1									
2		Silty clayey SAND (SC/GC) - little gravel - loose to medium dense - brown - wet below 8 feet	2		2	18	2 4 5					
5			5									
					3	18	4 10 14					
					4	18	5 11 13					
10			10									
					5	18	23 14 24					
13		Silty fine to medium SAND (SM) - little gravel - dense - brown - wet	13									
					6	18	10 13 21					
					7	18	12 14 20					
25		Boring terminated at 25 ft.	25									

Plastic Limit — Liquid Limit
Water Content - × %
SPT RESULT - ▲ N Value
10 20 30 40 50



Boring backfilled with augered cuttings.



PROJECT: Ph.2-Water & Sewer Improvements
PROJECT NO.: 240424
PROJECT LOCATION: Elk Rapids, MI
CLIENT: Village of Elk Rapids
DRILLING COMPANY: Gosling Czubak **RIG:** CME-75
DRILLER: R. Farve **LOGGED BY:** P. Hermstein

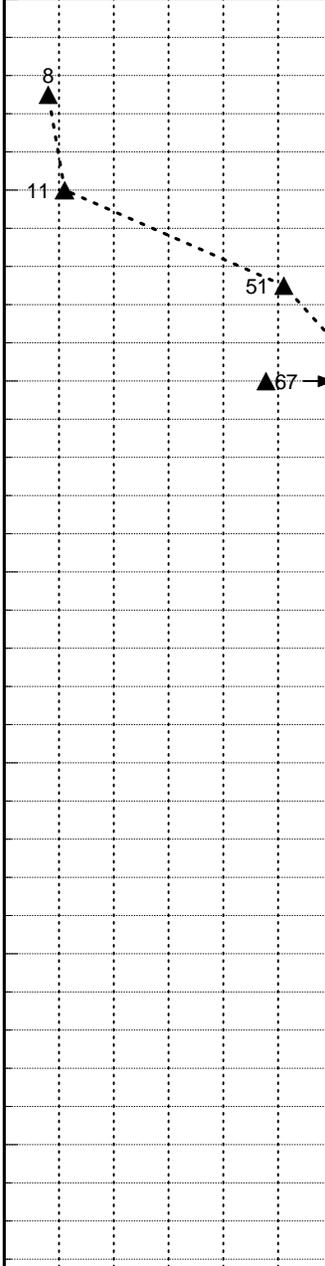
LOG OF BORING: SB-11

GROUND ELEVATION: N.A. **DATE:** 10/8/24
DRILLING LOCATION: Refer to Site Plan
DRILLING METHOD: 4.25-Inch (I.D.) Hollow-Stem
BOREHOLE DIAMETER (IN): 10 **TOTAL DEPTH (FT):** 10
STATIC WATER LEVEL: \approx Dry **CAVING DEPTH:** C N.A.

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Elevation (feet)	Graphic	Soil Description (See Boring Log Key)	Depth (feet)	Sample Type	Sample No.	Recovery (in)	Blow Counts	Notes	Pocket Penetrometer (tsf)	% < #200	TEST RESULTS				
											Plastic Limit	Liquid Limit			
											Water Content - %	SPT RESULT - N Value			
											10	20	30	40	50
		ASPHALT	0												
		GRAVEL BASE	0.4		1	18	3 4 4								
		Silty SAND (SM/GM) - little gravel - loose - brown	1												
		Silty CLAY (CL) - some gravel - hard - brown	3		2	18	3 5 6		4.00						
		Fine to medium SAND (SP/GP) - little gravel - trace clay - very dense - brown	5.5		3	18	17 21 30								
		Boring terminated at 10 ft.	10		4	18	15 27 40								

Plastic Limit |—| Liquid Limit
Water Content - × %
SPT RESULT - ▲ N Value



Boring backfilled with augered cuttings.



PROJECT: Ph.2-Water & Sewer Improvements
PROJECT NO.: 240424
PROJECT LOCATION: Elk Rapids, MI
CLIENT: Village of Elk Rapids
DRILLING COMPANY: Gosling Czubak **RIG:** CME-75
DRILLER: R. Farve **LOGGED BY:** P. Hermstein

LOG OF BORING: SB-12

GROUND ELEVATION: N.A. **DATE:** 10/4/24
DRILLING LOCATION: Refer to Site Plan
DRILLING METHOD: 4.25-Inch (I.D.) Hollow-Stem
BOREHOLE DIAMETER (IN): 10 **TOTAL DEPTH (FT):** 12.5
STATIC WATER LEVEL: 9.5 **CAVING DEPTH:** C 9

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Elevation (feet)	Graphic	Soil Description (See Boring Log Key)	Depth (feet)	Sample Type	Sample No.	Recovery (in)	Blow Counts	Notes	Pocket Penetrometer (tsf)	% < #200	TEST RESULTS	
											Plastic Limit	Liquid Limit
		Sandy TOPSOIL - brown	0									
		Fine to medium SAND (SP/GP) - little gravel - medium dense - brown	0.4	▲	1	18	4 10 8					18
		Fine to medium SAND (SP) - trace gravel - medium dense - brown	3	▲	2	18	4 10 14					24
		Fine to medium SAND (SP) - medium dense - brown - wet below 9.5 ft	5.5	▲	3	18	4 10 14					24
			10	▲	4	18	3 7 11					18
				▲	5	18	7 11 14					25
		Boring terminated at 12.5 ft.										

Boring backfilled with augered cuttings..



PROJECT: Ph.2-Water & Sewer Improvements
PROJECT NO.: 240424
PROJECT LOCATION: Elk Rapids, MI
CLIENT: Village of Elk Rapids
DRILLING COMPANY: Gosling Czubak **RIG:** CME-75
DRILLER: R. Farve **LOGGED BY:** P. Hermstein

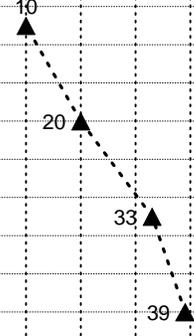
LOG OF BORING: SB-13

GROUND ELEVATION: N.A. **DATE:** 10/4/24
DRILLING LOCATION: Refer to Site Plan
DRILLING METHOD: 4.25-Inch (I.D.) Hollow-Stem
BOREHOLE DIAMETER (IN): 10 **TOTAL DEPTH (FT):** 10
STATIC WATER LEVEL: \approx 10 **CAVING DEPTH:** C N.A.

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Elevation (feet)	Graphic	Soil Description (See Boring Log Key)	Depth (feet)	Sample Type	Sample No.	Recovery (in)	Blow Counts	Notes	Pocket Penetrometer (tsf)	% < #200	TEST RESULTS	
											Plastic Limit	Liquid Limit
		ASPHALT	0									
		GRAVEL BASE	0.4		1	18	3 5 5		3.00			
		Sandy CLAY (CL) - hard - brown	1.5									
		Fine to medium SAND (SP) - medium dense - brown	2		2	18	4 9 11					
		Fine to medium SAND (SP) - trace silt - dense - brown	3.0									
			5		3	18	4 11 22					
		Fine to medium SAND (SP) - trace silt and gravel - dense - brown - wet below 10 ft	8.0		4	18	5 17 22					
		Boring terminated at 10 ft.	10									

Plastic Limit — Liquid Limit
Water Content - X %
SPT RESULT - ▲ N Value
10 20 30 40 50



Boring backfilled with augered cuttings.



PROJECT: Ph.2-Water & Sewer Improvements
PROJECT NO.: 240424
PROJECT LOCATION: Elk Rapids, MI
CLIENT: Village of Elk Rapids
DRILLING COMPANY: Gosling Czubak **RIG:** CME-75
DRILLER: R. Farve **LOGGED BY:** P. Hermstein

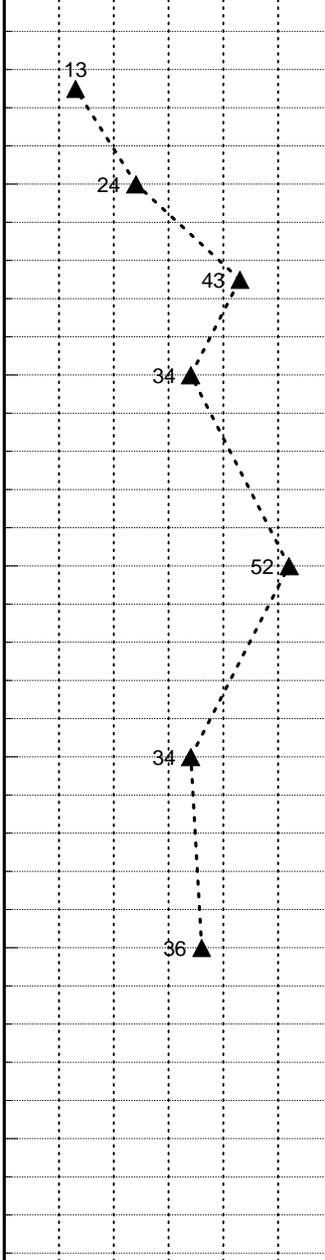
LOG OF BORING: SB-14

GROUND ELEVATION: N.A. **DATE:** 10/4/24
DRILLING LOCATION: Refer to Site Plan
DRILLING METHOD: 4.25-Inch (I.D.) Hollow-Stem
BOREHOLE DIAMETER (IN): 10 **TOTAL DEPTH (FT):** 25
STATIC WATER LEVEL: 8.5 ft **CAVING DEPTH:** C 10

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Elevation (feet)	Graphic	Soil Description (See Boring Log Key)	Depth (feet)	Sample Type	Sample No.	Recovery (in)	Blow Counts	Notes	Pocket Penetrometer (tsf)	% < #200	TEST RESULTS	
											Plastic Limit	Liquid Limit
0.4		ASPHALT	0									
1.5		GRAVEL BASE	0.4		1	18	10 5 8					
4.5		Silty clayey SAND (SC-SM) - little gravel - medium dense - brown	1.5		2	18	15 12 12					
5.5		Sandy CLAY (CL) - trace gravel - hard - brown	4.5		3	18	28 22 21					
10		Silty fine to medium SAND (SM) - little gravel - dense to very dense - brown - wet below 8.5	5.5		4	18	12 14 20					
15			10		5	18	12 22 30					
17		Fine to medium SAND (SP) - trace silt - dense - brown - wet	15		6	18	5 12 22					
25			20		7	18	4 13 23					
		Boring terminated at 25 ft.	25									

Plastic Limit — Liquid Limit
Water Content - X %
SPT RESULT - ▲ N Value
10 20 30 40 50



Boring backfilled with augered cuttings.



PROJECT: Ph.2-Water & Sewer Improvements
PROJECT NO.: 240424
PROJECT LOCATION: Elk Rapids, MI
CLIENT: Village of Elk Rapids
DRILLING COMPANY: Gosling Czubak **RIG:** CME-75
DRILLER: R. Farve **LOGGED BY:** P. Hermstein

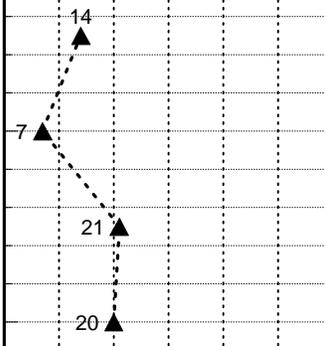
LOG OF BORING: SB-15

GROUND ELEVATION: N.A. **DATE:** 10/4/24
DRILLING LOCATION: Refer to Site Plan
DRILLING METHOD: 4.25-Inch (I.D.) Hollow-Stem
BOREHOLE DIAMETER (IN): 10 **TOTAL DEPTH (FT):** 10
STATIC WATER LEVEL: \neq Dry **CAVING DEPTH:** C N.A.

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Elevation (feet)	Graphic	Soil Description (See Boring Log Key)	Depth (feet)	Sample Type	Sample No.	Recovery (in)	Blow Counts	Notes	Pocket Penetrometer (tsf)	% < #200	TEST RESULTS	
											Plastic Limit	Liquid Limit
		Water Content -										
		SPT RESULT -										
		10	20	30	40	50						
0.4		ASPHALT	0									
1.5		GRAVEL BASE	0.4		1	18	5 7 7					
3		Silty fine to medium SAND (SM) - medium dense - brown	1.5									
5		Clayey SAND (SC/GC) - little gravel - loose to medium dense - brown	3		2	18	2 3 4		2.50			
8		Silty fine to medium SAND (SM/GM) - little gravel - medium dense - brown	5		3	18	4 9 12					
10		Boring terminated at 10 ft.	8		4	18	4 9 11					

Plastic Limit |—| Liquid Limit
Water Content - × %
SPT RESULT - ▲ N Value



Boring backfilled with augered cuttings.



PROJECT: Ph.2-Water & Sewer Improvements
PROJECT NO.: 240424
PROJECT LOCATION: Elk Rapids, MI
CLIENT: Village of Elk Rapids
DRILLING COMPANY: Gosling Czubak **RIG:** CME-75
DRILLER: R. Farve **LOGGED BY:** P. Hermstein

LOG OF BORING: SB-400

GROUND ELEVATION: 614.8 **DATE:** 12/30/24
DRILLING LOCATION: Refer to Site Plan
DRILLING METHOD: 4.25-Inch (I.D.) Hollow-Stem
BOREHOLE DIAMETER (IN): 10 **TOTAL DEPTH (FT):** 25
STATIC WATER LEVEL: \approx N.A. **CAVING DEPTH:** C N.A.

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Elevation (feet)	Graphic	Soil Description (See Boring Log Key)	Depth (feet)	Sample Type	Sample No.	Recovery (in)	Blow Counts	Notes	Pocket Penetrometer (tsf)	% < #200	TEST RESULTS	
											Plastic Limit	Liquid Limit
		Sandy TOPSOIL - brown	0									
610		Silty fine to medium SAND (SM) - trace gravel - loose - brown - wet	1		1	18	3 3 3				6	
			5		2	10	2 1 2				3	
					3	18	2 3 3				6	
605			10		4	12	2 2 3				5	
		Silty fine to medium SAND (SM) - loose - brown - wet	11		5	18	2 3 5				8	
			13.5		6	12	2 4 4				8	
600		Sandy SILT (ML) - loose - brown - wet	15		7	18	7 8 10				18	
		Silty fine to medium SAND - medium dense - brown - wet	16		8	18	7 11 16				27	
595		Fine to medium SAND (SP/GP) - little gravel - medium dense - brown - wet	19		9	12	6 10 15				25	
			20		10	14	7 8 17				25	
590		Boring terminated at 25 ft.	25									
585												

Soil descriptions from drillers log.

Backfilled with grout from 25ft to 4ft. Epco plug was set at 4ft. Backfilled from 4ft to surface with cuttings.



PROJECT: Ph.2-Water & Sewer Improvements
PROJECT NO.: 240424
PROJECT LOCATION: Elk Rapids, MI
CLIENT: Village of Elk Rapids
DRILLING COMPANY: Gosling Czubak **RIG:** CME-75
DRILLER: R. Farve **LOGGED BY:** P. Hermstein

LOG OF BORING: SB-401

GROUND ELEVATION: 614.8 **DATE:** 12/30/24
DRILLING LOCATION: Refer to Site Plan
DRILLING METHOD: 4.25-Inch (I.D.) Hollow-Stem
BOREHOLE DIAMETER (IN): 10 **TOTAL DEPTH (FT):** 25
STATIC WATER LEVEL: \approx N.A. **CAVING DEPTH:** C N.A.

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Elevation (feet)	Graphic	Soil Description (See Boring Log Key)	Depth (feet)	Sample Type	Sample No.	Recovery (in)	Blow Counts	Notes	Pocket Penetrometer (tsf)	% < #200	TEST RESULTS	
											Plastic Limit Water Content -	Liquid Limit %
		Sandy TOPSOIL - dark brown	0									
		Silty fine to medium SAND (SM) - loose to medium dense - brown	0.5		1	10	4 4 4				8	
610			5		2	12	3 3 4				7	
					3	18	4 6 8				14	
605		Silty fine to medium SAND (SM) - trace gravel - loose - brown	9		4	18	4 5 5				10	
		Silty fine to medium SAND (SM) - loose - brown	11		5	18	3 3 5				8	
600		Silty fine to medium SAND(SM) - trace gravel - loose - brown	13.5		4	12	3 3 4				7	
			15		5	18	3 3 4				7	
595		Silty fine SAND (SM) - loose - brown	19		6	18	3 4 5				9	
		Silty fine to medium SAND (SM) - medium dense - brown - wet	21		7	18	5 6 8				14	
590		Boring terminated at 25 ft.	25		8	10	5 7 15				22	

Soil descriptions from drillers log.
Backfilled with grout from 25ft to 4ft. Epco plug set at 4ft. Backfilled with cuttings from 4ft to surface.

APPENDIX C

EPA A GUIDE TO NORMAL DEMOLITION
PRACTICES UNDER THE ASBESTOS NESHAP

2/c-3B

United States
Environmental Protection
Agency

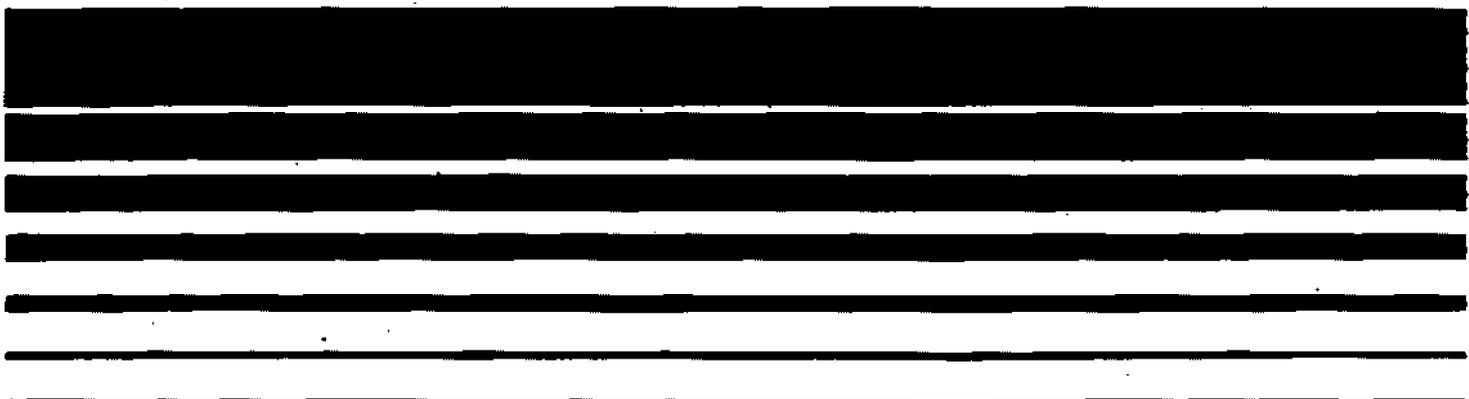
Office of Air Quality
Planning and Standards
Washington, DC 20480

EPA - 340/1-92-013
September 1992

Stationary Source Compliance Series



A Guide to Normal Demolition Practices Under the Asbestos NESHAP



NESHAP

U.S. EPA LIBRARY REGION 10 MATERIALS

RX00002503L

EPA - 340/1-92-013

**A Guide to Normal
Demolition Practices Under
the Asbestos NESHAP**

(TRC Ref. No. 1-456-019)

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Stationary Source Compliance Division
Washington, DC 20460

September 1992

DISCLAIMER

This manual was prepared by TRC Environmental Corporation for the Stationary Source Compliance Division of the U.S. Environmental Protection Agency. It has been completed in accordance with EPA Contract No. 68D20059, Work Assignment No. IA2-19. This document is intended for information purposes ONLY, and may not in any way be interpreted to alter or replace the coverage or requirements of the asbestos National Emission Standards for Hazardous Air Pollutants (NESHAP), 40 CFR Part 61, Subpart M. Any mention of product names does not constitute endorsement by the U.S. Environmental Protection Agency.

TABLE OF CONTENTS

Section		Page
1	DEMOLITION PRACTICES AND NONFRIABLE MATERIALS	1-1
	Introduction	1-1
	Purpose	1-1
	Definitions	1-2
2	PRE-DEMOLITION BUILDING STATUS	2-1
	State and Local Regulations	2-1
	Unsafe Building Declarations	2-1
	Abatement Prior to Demolition	2-1
	Intentional Burning	2-2
3	DEMOLITION PRACTICES BY TYPE OF ACM	3-1
	Introduction	3-1
	Resilient Floor Covering (Tiles)	3-1
	Asphalt Roofing Products	3-3
	Asbestos-Cement Products	3-3
4	DEMOLITION PRACTICES BY METHOD	4-1
	Heavy Machinery Razing Operations	4-1
	Explosions/Implosions	4-3
	Hand Methods of Demolition	4-4
5	ONSITE WASTE HANDLING PROCEDURES	5-1
	Introduction	5-1
	Waste Consolidation	5-1
6	OFFSITE WASTE HANDLING PROCEDURES	6-1
	Appendix I	I-1

SECTION 1

DEMOLITION PRACTICES AND NONFRIABLE MATERIALS

INTRODUCTION

EPA revised the asbestos NESHAP regulations on November 20, 1990 (see 40 CFR Part 61 Subpart M). Although the NESHAP has not been revised to alter its applicability to friable and nonfriable asbestos-containing materials (ACM), nonfriable asbestos materials are now classified as either Category I or Category II material.

Category I material is defined as asbestos-containing resilient floor covering, asphalt roofing products, packings and gaskets. Asbestos-containing mastic is also considered a Category I material (EPA determination - April 9, 1991). Category II material is defined as all remaining types of non-friable ACM not included in Category I that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure. Nonfriable asbestos-cement products such as transite are an example of Category II material.

The asbestos NESHAP specifies that Category I materials which are not in poor condition and not friable prior to demolition do not have to be removed, except where demolition will be by intentional burning. However, regulated asbestos-containing materials (RACM) and Category II materials that have a high probability of being crumbled, pulverized, or reduced to powder as part of demolition must be removed before demolition begins.

PURPOSE

EPA has identified a need to address how specific demolition practices affect Category I and II nonfriable ACM. The purpose of this manual is to provide asbestos NESHAP inspectors with such information.

This manual is intended to apply primarily to demolition and cleanup activities for buildings that contain Category I nonfriable ACM. Although references will be made to Category II nonfriable ACM, for the purposes of this document, it and all other RACM will be assumed to have been removed prior to the start of actual demolition activities. Work practices associated solely with building renovations will not be addressed.

This manual is designed to assist the asbestos NESHAP inspector in identifying practices that normally do or do not make Category I nonfriable ACM become regulated asbestos-containing material (RACM). Applicability determinations (both formal and informal) provided by the Regional NESHAP Coordinators have been incorporated into the appropriate sections of this document in an effort to promote nationwide consistency in applying the asbestos NESHAP to these demolition practices.

Activities associated with site cleanup such as segregation, reduction, and on and offsite disposal of ACM are discussed because they may take place during or after the major demolition activities at a site and consequently may influence a demolition contractor's choice of methods.

DEFINITIONS

The following definitions taken from the November 20, 1990 revision of the asbestos NESHAP regulation are provided for ease of reference.

Adequately wet means sufficiently mix or penetrate with liquid to prevent the release of particulates. If visible emissions are observed coming from asbestos-containing material, then that material has not been adequately wetted. However, the absence of visible emissions is not sufficient evidence of being adequately wet.

Asbestos-containing waste materials means mill tailings or any waste that contains commercial asbestos and is generated by a source subject to the provisions of this subpart. This term includes filters from control devices, friable asbestos waste material, and bags or other similar packaging contaminated with commercial asbestos. As applied to demolition and renovations operations, this term also includes regulated asbestos-containing material waste and materials contaminated with asbestos including disposable equipment and clothing.

Category I nonfriable asbestos-containing material (ACM) means asbestos-containing packings, gaskets, resilient floor covering, and asphalt roofing products containing more than one percent asbestos as determined using the method specified in appendix A, subpart F, 40 CFR part 763, section 1, Polarized Light Microscopy.

Category II nonfriable ACM means any material, excluding Category I nonfriable ACM, containing more than one percent asbestos as determined using the methods specified in appendix A, subpart F, 40 CFR part 763, section 1, Polarized Light Microscopy that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

Cutting means to penetrate with a sharp-edged instrument and includes sawing, but does not include shearing, slicing, or punching.

Demolition means the wrecking or taking out of any load-supporting structural member of a facility together with any related handling operations or the intentional burning of any facility.

Facility means any institutional, commercial, public, industrial, or residential structure, installation, or building (including any structure, installation, or building containing condominiums or individual dwelling units operated as a residential cooperative, but excluding residential buildings having four or fewer dwelling units); any ship; and any active or inactive waste disposal site. For purposes of this definition, any building, structure, or installation that contains a loft used as a dwelling is not considered a residential structure, installation, or building. Any structure, installation or building that was previously subject to this subpart is not excluded, regardless of its current use or function.

Facility component means any part of a facility including equipment.

Friable asbestos material means any material containing more than one percent asbestos as determined using the method specified in appendix A, subpart F, 40 CFR part 763 section 1, Polarized Light Microscopy, that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure. If the asbestos content is less than 10 percent as determined by a method other than point counting by polarized light microscopy (PLM), verify the asbestos content by point counting using PLM.

Grinding means to reduce to powder or small fragments and includes mechanical chipping or drilling.

In poor condition means the binding of the material is losing its integrity as indicated by peeling, cracking, or crumbling of the material.

Inactive waste disposal site means any disposal site or portion of it where additional asbestos-containing waste material has not been deposited within the past year.

Installation means any building or structure or any group of buildings or structures at a single demolition or renovation site that are under the control of the same owner or operator (or owner or operator under common control).

Nonfriable asbestos-containing material means any material containing more than one percent asbestos as determined using the method specified in appendix A, subpart F, 40 CFR part 763, section 1, Polarized Light Microscopy, that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

Owner or operator of a demolition or renovation activity means any person who owns, leases, operates, controls, or supervises the facility being demolished or renovated or any person who owns, leases, operates, controls, or supervises the demolition or renovation operation, or both.

Planned renovation operations means a renovation operation, or a number of such operations, in which some RACM will be removed or stripped within a given period of time and that can be predicted. Individual nonscheduled operations are included if a number of such operations can be predicted to occur during a given period of time based on operating experience.

Regulated asbestos-containing material (RACM) means (a) Friable asbestos material, (b) Category I nonfriable ACM that has become friable, (c) Category I nonfriable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading, or (d) Category II nonfriable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations regulated by this subpart.

Remove means to take out RACM or facility components that contain or are covered with RACM from any facility.

Renovation means altering a facility or one or more facility components in any way, including the stripping or removal of RACM from a facility component. Operations in which load-supporting structural members are wrecked or taken out are demolitions.

Resilient floor covering means asbestos-containing floor tile, including asphalt and vinyl floor tile, and sheet vinyl floor covering containing more than one percent asbestos as determined using polarized light microscopy according to the method specified in appendix A, subpart F, 40 CFR part 763, Section 1, Polarized Light Microscopy.

Strip means to take off RACM from any part of a facility or facility components.

Visible emissions means any emissions, which are visually detectable without the aid of instruments, coming from RACM or asbestos-containing waste material, or from any asbestos milling, manufacturing, or fabricating operation. This does not include condensed, uncombined water vapor.

Waste generator means any owner or operator of a source covered by this subpart whose act or process produces asbestos-containing waste material.

Waste shipment record means the shipping document, required to be originated and signed by the waste generator, used to track and substantiate the disposition of asbestos-containing waste material.

SECTION 2

PRE-DEMOLITION BUILDING STATUS

This section discusses several factors that can affect the approach to demolition taken by a demolition contractor. It is being included because events that have taken place prior to the start of actual demolition work can influence the methodology(ies) chosen by demolition contractors. These events can be evaluated by an inspector, allowing for prediction of "hidden" potential problem areas. Reinforcement and clarification of applicable components of the asbestos NESHAP regulations are also included in this section.

STATE AND LOCAL REGULATIONS

State and local asbestos regulations are sometimes more stringent than the asbestos NESHAP regulations. This does not imply, however, that Category I nonfriable ACM is necessarily removed from a building prior to demolition. Contractors surveyed during research conducted in the preparation of this manual indicated that they typically treated Category I nonfriable ACM as RACM only when the owner or operator of the building being demolished was a state or local government agency or when project specifications explicitly specified that one or more of the Category I nonfriable ACM materials be removed prior to the start of demolition.

UNSAFE BUILDING DECLARATIONS

Several contractors surveyed utilized state or local mechanisms to have buildings declared unsafe as a means to avoid NESHAP requirements during and after demolition activities. However, a State or local agency should not issue a demolition order unless the facility is structurally unsound and in danger of imminent collapse. These conditions should be confirmed independently, and a demolition order should not be based solely on the representation of the contractor or the contractor's agent. Although issuance of a demolition order may have an effect on notification requirements under the asbestos NESHAP (see §61.145(a)(3)), it has no effect on requirements for disposal procedures for RACM after demolition activities. Also, waste segregation/reduction activities, addressed in Section 5 of this manual, are subject to the asbestos NESHAP provisions whether or not a building has been declared unsafe.

ABATEMENT PRIOR TO DEMOLITION

Demolition contractors typically require that a building owner/operator accept responsibility for the removal of all asbestos-containing materials found during the building inspection prior to the start of demolition activities. Several contractors indicated that if suspect ACM became exposed during demolition activities, and there was no prior knowledge of its existence at the start of demolition activities, that potential asbestos NESHAP requirements would be disregarded unless a change order was immediately processed by the owner/operator

requesting the time and materials necessary to achieve compliance with the asbestos NESHAP. Such practices are in direct violation of the asbestos NESHAP.

INTENTIONAL BURNING

As stated in the November 1990 asbestos NESHAP revision (see §61.145(c)(10)):

"If a facility is demolished by intentional burning, all RACM, including Category I and Category II nonfriable ACM, must be removed in accordance with the NESHAP before burning."

Abandoned buildings utilized by fire departments for practice exercises involving partial burning are subject to this requirement.

For buildings which are still structurally sound but which have previously been subjected to partial or total, intentional or unintentional burning, an inspection for the condition of all ACM should be conducted. Category I ACM should be examined for friability and condition. Friable materials or Category I materials that are friable and in poor condition must be removed prior to any further demolition activity.

SECTION 3

DEMOLITION PRACTICES BY TYPE OF ACM

INTRODUCTION

For many years now the applicability of the asbestos NESHAP to demolitions involving Category I nonfriable ACMs (packings, gaskets, resilient floor coverings and mastic, and asphaltic roofing materials) has been the topic of much debate. Since significant amounts of airborne asbestos fibers are not believed to be produced from such materials during normal demolition activities, however, the asbestos NESHAP, in most cases, does not require their removal prior to demolition.

Category I materials are considered RACM only when they "will be or have been subjected to sanding, grinding, cutting, or abrading", they are in "poor condition" and "friable", or the structure in which they are located will be demolished by burning. (Definitions for these terms and additional information concerning Category I nonfriable ACM can be found in the preamble to the November 1990 revised asbestos NESHAP (SUPPLEMENTARY INFORMATION, Section IV - Significant Comments..., *Demolition and Renovation*, Nonfriable ACM and Broken ACM).

The following information details specific pre-demolition and demolition practices and their impact on Category I nonfriable ACM. The information has been compiled from telephone surveys of demolition contractors, the viewing of activities at a number of demolition sites, and formal and informal EPA applicability determinations. The effects of various demolition practices on asbestos-cement products are also discussed. Since the applicability of the asbestos NESHAP to Category II nonfriable materials is determined on a case-by-case basis, it is hoped that this additional information will help foster nationwide consistency in the application of the regulation to these materials.

As you will see, many of the various demolition techniques described do not, by themselves, cause Category I nonfriable ACM to become RACM. However, in many cases, post-demolition waste consolidation, cleanup, and recycling efforts can cause both Category I nonfriable ACM and Category II nonfriable ACM to become RACM. If that is likely to happen, such materials must be considered RACM and be treated as such. Post-demolition activities which can affect Category I and II materials will be detailed later in this manual.

RESILIENT FLOOR COVERING (TILES)

Depending on the types of activities occurring at a demolition site, floor tiles (and mastic) may or may not become subject to the provisions of the asbestos NESHAP.

Pre-demolition Floor Tile Removal

Although not usually required by the asbestos NESHAP, removal of asbestos-containing resilient floor tiles may occur prior to demolition. Such removal may be required when the substrate to which the floor covering is attached (particle board, wood, concrete) is to be recycled or salvaged.

Since the presence of mastic is not desirable on materials intended for resale or recycling, contractors use a variety of methods to remove this material as well.

A wide variety of floor tile removal methods exists, some of which cause the floor tiles and mastic to become RACM and subject to the provisions of the asbestos NESHAP. The following describes various removal methods and the applicability of the asbestos NESHAP to them.

Water/Amended Water/Solvents

Water, amended water, or solvents may be spread onto floor tiles in order to loosen them. After a period of soaking, the tiles may be removed using long-handled scrapers (ice chippers), or gas- or electrically-powered mechanical chisels. In cases where tile breakage is minimal, the floor tiles are not considered RACM. However, where breakage is extensive, the tiles are RACM and are subject to the provisions of the asbestos NESHAP.

Dry Ice

Although rarely used for this purpose nowadays, dry ice (frozen carbon dioxide) can be used to remove floor tiles. When dry ice is applied to the tiles, the intense cold causes the tiles to contract and detach from the substrate. As long as the tiles are not extensively damaged, they are not considered RACM.

Infrared Machines

Infrared machines may be used in the removal of floor tiles. These machines heat the flooring, thereby softening the tiles and adhesive, and allow for its easy removal. Since most tiles detach intact, they are not friable, and therefore are not considered RACM.

Shot-blasters

Shot-blasters are sometimes used in the removal of floor tiles. These machines direct a barrage of small pellets (shot) against the tiles and continually vacuum up and separate the mixture of pulverized tile and pellets. The pellets are reused immediately and the pulverized materials are segregated for disposal. EPA allows the use of shot-blasters only on wetted floor tiles. Floor tiles and mastic removed by shot-blasters are considered RACM and are therefore subject to the asbestos NESHAP.

Demolition with Floor Tiles in Place

Since ordinary demolition activities do not include the sanding, grinding, cutting and abrading of floor tiles, floor tiles and associated mastic that are not in poor condition and not friable are not considered RACM and are allowed to remain in place during demolition.

ASPHALT ROOFING PRODUCTS

The pre-demolition terms and conditions (governmental regulations, contract specifications) discussed in Section 2 also influence the handling of asbestos-containing roofing materials.

Pre-demolition Roof Removal

If preliminary assessment has determined that roofing materials contain asbestos, and regulations or contract specifications dictate removal of such material prior to demolition, licensed abatement contractors may be required to do the removal. Alternatively, the demolition contractor may undertake the operation.

Roofs may be removed in a variety of ways. Demolition personnel may use sledge hammers, pry bars, axes, adzes, shovels, ice chippers and roof-cutting saws to remove the roofing materials. They also may use tractor-mounted rotating blade cutters, power plows and power slicers. Use of roof-cutting saws, either hand- or power-driven, or tractor-mounted, are of great concern, since they can generate asbestos-containing dust from roofing materials. The sawing of Category I nonfriable ACM roofing material and the debris created by the sawing are regulated by the asbestos NESHAP. Since power plows and power slicers do not sand, grind, cut or abrade the roofing materials, their use and resultant debris are not subject to the asbestos NESHAP regulation. Category I nonfriable ACM roofing squares that have been decontaminated may be disposed of with other demolition debris or at an asbestos landfill.

Demolition with Roofing Materials in Place

Since demolition activities do not include sanding, grinding, cutting, or abrading, Category I asbestos-containing roofing materials not in poor condition and not friable are not considered RACM and are allowed to remain in place during demolition.

ASBESTOS-CEMENT PRODUCTS

Asbestos-cement products (such as transite) are commonly used for duct insulation, pipes, and siding. Being a Category II nonfriable ACM, asbestos-cement products need to be removed prior to demolition if they have a high probability of becoming crumbled, pulverized, or reduced to powder during demolition activities. EPA believes that most demolition activities will subject such Category II nonfriable ACM to the regulation.

Whether asbestos-cement products are subject to the asbestos NESHAP should be determined by the owner or operator on a case-by-case basis based on the demolition techniques to be used.

In general, if contractors carefully remove asbestos-cement materials using tools that do not cause significant damage, the materials are not considered RACM and can be disposed of with other construction debris.

However, if demolition is accomplished through the use of cranes (equipped with wrecking balls, clamshells or buckets), hydraulic excavators, or implosion/explosion techniques, asbestos-cement products will be crumbled, pulverized or reduced to powder, and are subject to the provisions of the asbestos NESHAP.

Some demolition contractors do not treat significantly damaged asbestos-cement products as RACM; they mix it with other demolition debris and dispose of it in direct violation of the waste-disposal provisions of the asbestos NESHAP.

SECTION 4

DEMOLITION PRACTICES BY METHOD

Methods of destruction employed at demolition sites include the use of heavy machines, explosions/implosions, and hand methods. All of these methods cause Category II nonfriable ACM to become RACM; however, Category I nonfriable ACM (packings, gaskets, resilient floor coverings, asphaltic roofing materials, mastic) that is not in poor condition and not friable prior to the demolition operation may be subjected to most of these techniques without becoming RACM. The following describes various demolition techniques and their effects on nonfriable materials. All Category I nonfriable ACM referenced is presumed not to be in poor condition and not friable prior to the demolition operation.

HEAVY MACHINERY RAZING OPERATIONS

For the purposes of this document heavy machinery (or equipment) includes large motorized vehicles such as bulldozers with rakes, top loaders, backhoes, skid loaders/bobcats, hydraulic excavators, and other similar machinery used for transporting, moving, or dislodging of materials at a demolition site. Cranes equipped with wrecking balls, clamshells, or buckets are also considered heavy machinery.

Heavy machinery is used at demolition sites for both razing operations and post-demolition activities. "Razing", the process which reduces a building's structural skeleton to rubble, typically occurs after the building's interior has been gutted by hand.

Use of heavy machinery during the razing process causes Category II nonfriable ACM, but not Category I nonfriable ACM to become RACM. Use of such equipment during subsequent operations, such as waste consolidation, however, is a major concern which will be addressed in Section 5 of this document.

Bulldozers and Similar Machinery

Included in this grouping of heavy machinery are all types of bulldozers, backhoes, top loaders and skid loaders/bobcats commonly used in conjunction with hand methods to raze buildings. Bulldozers move on tracks whereas backhoes, top loaders, and skid loaders operate on rubber tires.

Only if a great deal of working space exists at a site, and a precisely-controlled demolition is not necessary, can bulldozers such as 977 loaders and D-9s be used to demolish a building. These bulldozers are typically equipped with giant rakes designed to ram building walls and move debris.

977's or D-9s may be used to undermine a building, but hydraulic excavators (discussed later in this section) are usually used for this purpose.

Backhoes and top loaders are mainly used for moving debris and tearing off sections of walls and other building components.

Skid loaders, machines commonly used to load skids or pallets onto trucks, may be specially equipped with a type of ram for use during demolitions and are usually of the "bobcat" type.

The razing of a building using the heavy machinery described above causes Category II nonfriable ACM, but not Category I nonfriable ACM to become RACM.

Hydraulic Excavators

Hydraulic excavators, such as EL-300s, 225s or 215s, resemble a combination bulldozer/backhoe and operate on tracks. They are easier to use and provide greater control during demolition than the bulldozers described above. However, since they too raze buildings by ramming and tearing, like bulldozers, their use in congested areas is limited. Nearby buildings must be protected from the falling debris; plywood may be applied over the windows and rubber tires may be used to cushion and prevent damage to walls of adjacent structures.

On rare occasions, hydraulic excavators may be used to topple one- or two-story buildings by means of an undermining process. The strategy is to undermine the building while controlling the manner and direction in which it falls. The demolition project manager (who in many jurisdictions must be licensed by the city or state) must determine where undermining is necessary so that a building falls in the desired manner and direction. The walls are typically undermined at a building's base, but this is not always the case as building designs may dictate otherwise. Safety and cleanup considerations are also taken into account in determining the methods to be used.

Since the toppling of a building constitutes a safety hazard and generates enormous quantities of dust, many cities and towns will not approve of this method of demolition. Where the practice is allowed, the contractor may be required to keep the structure wet during demolition. Hydrant permits may be required and, because of the wetting restrictions, such demolitions may be impossible to accomplish during the winter.

Hydraulic excavators are also used to conduct cleanup activities such as excavation, fill burial, material reduction, and material load-out.

The use of hydraulic excavators during the razing process causes Category II nonfriable ACM, but not Category I nonfriable ACM to become RACM.

Cranes (Wrecking Ball, Clamshell, Bucket)

Although often employed in the past, particularly during demolitions of high-rise structures, cranes are now rarely used. They are expensive to operate and usually not necessary, since renovation has displaced demolition as the method of choice in dealing with many out-of-date

structures. Cranes are currently used only in situations where other equipment cannot be employed.

Cranes may be equipped with wrecking balls, clamshells or buckets, which are used in a variety of ways. All three may be dropped or swung against the structure to demolish it. When employed in this manner, clamshells provide the greatest force of the three and result in the fastest, most efficient demolition projects.

Buckets and clamshells allow a greater degree of control than wrecking balls. Buckets may be raised to the level where internal demolition of the building is taking place and be used merely to transport and segregate hand-loaded demolition materials collected from within. Clamshells can take big bites out of the structure and facilitate the segregation of demolition debris.

When demolition is accomplished by crane, the process can begin at the roof and progress continually downward, or alternate up and down. Materials are segregated to the greatest degree possible as the demolition progresses so that the need for post-demolition handling is minimized. In the case of high-rise structures, the interiors are usually gutted by hand prior to razing.

Effect on Category I Materials

The use of cranes during the razing process does not cause Category I nonfriable ACM to become RACM; therefore, Category I materials which are not in poor condition and not friable may remain in the building during such demolition.

Effect on Category II Materials

The use of wrecking balls on asbestos-cement (A/C) siding (a Category II nonfriable ACM) on buildings is specifically addressed in the November 1990 asbestos NESHAP revision (see SUPPLEMENTARY INFORMATION, Section IV - Significant Comments..., *Demolition and Renovation, Nonfriable ACM*):

"...the A/C siding on a building that is to be demolished using a wrecking ball is very likely to be crumbled, or pulverized with increased potential for the release of significant levels of asbestos fibers. Such material in this instance should be removed prior to demolition."

Therefore, A/C siding, although a nonfriable material, is considered RACM when a wrecking ball is being used to demolish the structure. Whenever buckets and clamshells are to be swung like wrecking balls, A/C materials should also be considered RACM.

EXPLOSIONS/IMPLOSIONS

Building implosions utilizing explosive devices constitute a rarely-used demolition technique. In simplest form, this method is accomplished through the use of explosive charges placed

strategically throughout a building so that the building collapses in on itself and debris does not radiate outward to any appreciable distance. Relatively large quantities of dust are created, however, and the direction and magnitude of transport are matters of concern.

Effect on Category I Materials

The asbestos NESHAP does not require the removal of Category I nonfriable ACM that is not in poor condition and not friable prior to building implosions. Normal implosion techniques do not cause nonfriable materials to become RACM. The destruction of buildings during military target practice is considered to be another form of explosive demolition. Category I materials may remain in place during target practice. However, if it can be expected that the building and ACM will burn as a result of explosive demolition, the ACM must be removed prior to demolition.

Recent examination of asbestos-containing floor tiles and roofing materials contained in a large building demolished by implosion revealed that the floor tile was in fair to good condition and had not become friable. Tiles had been broken up into small quantities of large pieces as the individual floors collapsed upon each other. The roofing materials were similarly affected; they too remained nonfriable following demolition by implosion.

EPA does not consider Category I material to be RACM as a result of building implosions. If, however, Category I materials are to be subjected to sanding, grinding, cutting, or abrading after demolition, they must be treated as RACM and be removed from the building before demolition.

Effect on Category II Materials

Category II materials, such as transite, found in or on buildings scheduled for implosion/explosion destruction must be removed before such demolition. Such materials are considered RACM because they have "a high probability of becoming crumbled, pulverized or reduced to powder" during such activities.

HAND METHODS OF DEMOLITION

This section of the manual addresses hand methods employed during demolition and includes segregation activities which take place during demolition (as opposed to cleanup) and their effects on Category I materials. "Hand methods", for the purposes of this manual, refer to the use of motorized and non-motorized tools that can be operated by hand and are not used for transportation. The methods discussed include not only those used in the gutting of building interiors prior to razing, but also those used during razing itself. Unless otherwise noted, "hand methods" refers to those methods that do not significantly damage the ACM and therefore do not cause Category I nonfriable ACM to become RACM.

Most buildings of ten floors or less are currently razed at least partially, if not fully, by hand. Hand methods allow much greater control over a building's collapse than other methods and permit easier segregation of demolition materials for resale or recycling than other demolition methods. In addition, hand methods may be required because of workspace limitations.

Depending on the size of the job and demolition schedule, the size of a demolition crew may vary from as few as five individuals to 30 or more. As a general rule, workers use relatively inexpensive tools such as pry bars, hand-held saws, power saws, sledge hammers, axes, bolt cutters, and acetylene torches during gutting and razing operations.

As the gutting/salvage activities progress, demolition debris is typically deposited into a trailer or dumpster strategically placed outside a window of the building being demolished. The window frame is removed and materials are loaded into the storage containers by hand, or, where possible, by bobcats operating within the building. Many jobs require the use of dust-tight chutes for the transport of such debris.

On the rare occasion where onsite burial of demolition debris is allowed, the first activity to take place in the building is the removal of the first story's flooring. This is done so that as waste materials accumulate on upper floors, they can be sent down into the basement through the center of the building, typically through elevator shafts, for disposal. Chutes may be used if elevator shafts are not available. Such onsite disposal typically is allowed only for noncombustible materials such as cement and brick. Waste consolidation activities which occur in the basement area are of great concern to EPA and are discussed in Section 5 of this manual.

Excess demolition wastes are loaded out for transport to a landfill that accepts construction debris. If no basement area exists, or if materials cannot be sent into dumpsters or trailers immediately as previously described, debris may be stored in piles scattered around the site. These materials may subsequently be moved by hand or through the use of light or heavy machinery. Section 5 of this manual details such operations.

Floor Removal and Disposition

The techniques used in removing flooring depend upon its ultimate fate. Where it is in poor condition and incapable of being reused or recycled, the flooring is typically ripped out using pry bars and sledge hammers and sent offsite for disposal. Sometimes wood flooring and other debris is burned to reduce the volume of waste. In this case, the asbestos must be removed prior to burning the wood debris. Since demolition debris disposal costs are so high (\$100 - \$500 per 60-100 cubic yard load) as much salvage/recycling of materials is done as possible.

Wood or particle board flooring is sometimes segregated and sold to recycling centers where it is chipped up and sold as filler or mulch (composting, gardening, etc.). If resilient asbestos-containing floor covering is attached to such flooring it is considered RACM and must be removed prior to recycling. Tiles are often chipped or scraped off the substrate using the methods described in Section 3.

Large planks and joists, and beams (both wooden and steel) may also be saved if they are in good condition. Wooden planks are usually lifted with pry bars, whereas the larger joists and beams are segregated for reuse following the razing of the structure.

Where demolition debris will be recycled, any asbestos remaining on the debris must be removed prior to any recycling that will sand, grind, cut, or abrade the asbestos or otherwise cause it to become RACM.

Roof Removal and Disposition

On occasion one may find that the roof of a building being demolished is removed before the building is razed. Such removal may be required when buildings are very close to one another, or when the roofing contains asbestos-containing materials.

There are two major types of roofing: "built-up roofing" and "sheet goods". Built-up roofing contains multiple layers of felt and asphalt. Sheet goods typically consist of a single layer of material.

Roofs are often taken out by hand, typically by using pry bars, sledge hammers, axes, adzes, bolt cutters, ice chippers, shovels and roof-cutting saws. If the roof contains asbestos materials (felt, cork, etc.), an asbestos removal contractor may be employed to remove it. Some abatement contractors wet the roof with plain or amended water and then use shrouded power saws whose exhaust is HEPA-filtered to cut the roofing into manageable (often 2' x 3') pieces. After the pieces are lifted, the edges may be encapsulated. Other abatement contractors may build a full containment and establish a reduced pressure environment prior to removing the roofing materials.

Depending upon the contractors involved and the condition of the asbestos-containing roof debris, the debris may or may not be segregated from other demolition debris. Abatement contractors may store roof debris in lined dumpsters onsite and dispose of it at an asbestos landfill; if the asbestos-containing roofing material is not in poor condition and is not friable however, it may be disposed of in a landfill which accepts ordinary demolition waste.

Asbestos-containing roofing material may not be ground up for recycling into other products.

Work Progression

Demolition crews typically work downward, floor by floor. Materials such as doors, windows, electrical and other fixtures which can be salvaged are removed first. Interior partitions are then ripped, cut, or knocked out using various hand-held tools including sledge hammers, axes, adzes and pry bars. Brick is generally segregated immediately after being knocked out of walls so it can be examined at the site by potential buyers. Ceilings are also ripped out using pry bars, axes and sledge hammers. Steel and other metal materials are typically placed in separate debris piles from other materials. Work proceeds in a similar floor/wall, floor/wall pattern until the first floor is once again reached.

Sawing/Cutting Operations

In order to raze a building by hand, load-bearing members must be cut. Based upon the composition, thickness, and condition of the structural member being cut, saws selected range

from hand saws to Sawz-alls™ and gas-driven carbide blade hand saws. Large bolt cutters are also used to cut steel members. Category I materials subjected to sawing or cutting are subject to the provisions of the asbestos NESHAP; however, typical demolition sawing/cutting operations rarely involve such materials.

Grinding Operations

Grinding operations are not common occurrences at most demolition sites. On occasion, however, asbestos-containing mastic and remaining pieces of floor tile may be ground off concrete destined for recycling. Category I material so treated is RACM and is subject to the provisions of the asbestos NESHAP.

Pulverizing Operations

On occasion, asbestos-containing floor tiles are removed from their substrate by hand, using either hand-held ice choppers or electrically- or gas-powered mechanical chippers. If use of such methods pulverizes, crumbles or reduces the floor tiles to powder, the tiles must be considered RACM and must be handled in accordance with the requirements of the asbestos NESHAP.

Summary

On rare occasions Category I nonfriable ACM may be subjected to hand methods involving the uncontrolled drilling, cutting, sawing, grinding or abrading of such materials; under these circumstances Category I materials are considered RACM.

ed.

SECTION 5

ONSITE WASTE HANDLING PROCEDURES

INTRODUCTION

At the present time it is not demolition operations and ordinary cleanup activities but the post-demolition activities involving waste consolidation and recycling of Category I and II materials which are of greater concern. If such activities subject either Category I or II nonfriable ACM to sanding, grinding, cutting or abrading, the materials become RACM and are then subject to the provisions of the asbestos NESHAP.

In general, since cleanup activities such as loading waste debris onto trucks for disposal do not subject nonfriable materials to sanding, grinding, cutting or abrading, such materials are not considered asbestos-containing waste materials and are not regulated by the asbestos NESHAP.

However, waste consolidation efforts which involve the use of jack hammers or other mechanical devices such as grinders to break up asbestos-containing concrete or other materials covered or coated with Category I nonfriable ACM, are subject to the regulation.

In addition, operations such as waste recycling which sand, grind, cut, or abrade Category I or II nonfriable ACM are subject to the asbestos NESHAP. When these types of activities are performed, Category I and II nonfriable ACM become RACM.

The following details the post-demolition activities of waste consolidation (segregation and reduction), waste load-out and onsite waste disposal and their effects on nonfriable ACM.

WASTE CONSOLIDATION

Waste consolidation operations involve segregation and reduction activities that have as their ultimate goal the resale, recycling, and disposal of demolition debris.

Segregation of Demolition Debris

Demolition contractors segregate demolition debris primarily to maximize their profits. As much material as possible is collected for resale and recycling (e.g., wood, brick, steel and concrete); the remaining debris is most often transported offsite for disposal.

Segregation may involve cutting and grinding operations, the breaking and tearing apart of materials to separate them by material type, and the transport of materials within the demolition site boundaries.

Since segregation activities may be accomplished using hand methods and heavy equipment, nonfriable ACM may or may not become friable in the process. The following text details various segregation activities and describes their effects on nonfriable materials.

Segregation by Hand

Materials such as wood, brick and steel are generally separated from other demolition debris using equipment such as sledgehammers, prybars, adzes and axes. If any hand equipment is used to cut, sand, grind, or abrade Category I or II materials, RACM is thus created and the provisions of the asbestos NESHAP apply.

Material Transport

Since heavy equipment is often used to move and segregate demolition debris, questions have been raised concerning the effect of such transport particularly on Category I nonfriable ACM.

If Category I nonfriable ACM is transported across a demolition site in the bucket of a top loader, backhoe, hydraulic excavator or other similar vehicle, it is not considered RACM since it is not subjected to sanding, grinding, cutting or abrading during this activity.

Use of bulldozers, on the other hand, is expected to have a greater impact on Category I materials. However, EPA has stated that "...if the bulldozer is moving the debris or picking it up to be put in a vehicle and inadvertently runs over Category I material, then it is not subject to the NESHAP standard" (see Appendix I). Consequently, the moving of debris by bulldozers, whether by carrying it in a bucket or pushing it along the ground does not in itself cause Category I nonfriable ACM to become RACM.

Category II nonfriable ACM subjected to sanding, grinding, cutting or abrading during collection and transport is considered RACM and thus subject to the asbestos NESHAP.

Vehicular Traffic Impact

Rubber-tired Vehicles

If nonfriable ACM is intentionally run over by rubber-tired vehicles as a means of segregation, it does not automatically become RACM but must be examined for damage. If it has become extensively damaged, i.e., it was sanded, ground, cut or abraded during segregation, it becomes RACM and is subject to the NESHAP regulation.

Tracked Vehicles

Although tractor treads present greater risks of causing extensive damage to nonfriable ACM, limiting their use at demolition sites is not considered practical. Intentionally running over nonfriable ACM with tractor treads as a means of segregation is considered grinding; material thus treated becomes RACM.

Intentional segregation in this manner is addressed in the preamble to the revised asbestos NESHAP (SUPPLEMENTARY INFORMATION, Section IV, Significant Comments and Changes to the Proposed Revisions, Demolition and Renovation, Nonfriable ACM):

"Examples of practices...included the breaking of nonfriable insulation from steel beams by repeatedly running over the beams with a crawler tractor...these and other similar practices involving nonfriable asbestos material were considered to render nonfriable ACM into dust capable of becoming airborne."

Reduction of Demolition Debris

Reduction activities are of the greatest concern to EPA, since they are most likely to cause both Category I and Category II nonfriable ACM to become RACM.

Category I Reduction

The use of bulldozers to reduce the volume of Category I materials causes them to become RACM as discussed elsewhere in this manual and in the following EPA correspondence:

"If, after a demolition, material left in the facility... is intentionally ground up (such as repeatedly running over the debris with a bulldozer to compact the material), then 61.150(a)(3) applies. The material must be adequately wetted and kept adequately wet during collection and transport to a site or facility operated in accordance with 61.154 or 61.155." (See Appendix I).

Reduction by the use of sledgehammers does not normally cause Category I nonfriable ACM to become RACM. The use of pneumatic hammers, however, whether hand-operated or attached to heavy machinery, does cause these materials to become RACM. The use of cranes with clamshells or other heavy machinery with rakes or buckets to partially reduce Category I nonfriable ACM is permissible if the material is left recognizable in its original form. Extensively damaged Category I ACM (that which has been sanded, ground, cut, or abraded) becomes RACM. Consolidating waste materials containing Category I nonfriable ACM in the hole (basement) of a building and subsequently grinding or crushing it via bulldozer subjects the operation to the asbestos NESHAP.

For wood/tile debris, demolition crews sometimes use tree chippers to grind the material up. Any Category I nonfriable ACM subjected to this treatment becomes RACM.

Category II Reduction

Reduction of Category II materials such as asbestos-cement pipe and concrete following demolition is also a matter of concern.

Asbestos-Cement Pipe

EPA considers asbestos-cement pipe to be a "facility component" (as defined in 40 CFR §61.141) of the facility which owns or utilizes the pipe. In addition, EPA considers asbestos-cement pipe to be Category II nonfriable asbestos containing material. This material becomes "regulated asbestos containing material" (RACM), as defined in 40 CFR §61.141, when it becomes "friable asbestos material" or when it "has a high probability of becoming or has become crumbled, pulverized or reduced to powder by the forces expected to act on the material during the course of demolition or renovation operations regulated by [40 CFR Part 61 Subpart M]." Consequently, the crushing of asbestos-cement pipe with mechanical equipment will cause this material to become RACM. The demolition and renovation provisions in 40 CFR §61.145 and the waste disposal provisions in 40 CFR §61.150 apply to asbestos-cement pipe where the pipe is considered RACM, and the amount of pipe being removed and crushed is at least 260 linear feet for a single renovation project or during a calendar year for individual nonscheduled operations.

Concrete

At certain demolition sites demolition contractors may rent and operate large concrete-pulverizing machines called PC-400s. Since the asbestos content of concrete is rarely known, use of such machines is a matter of concern to EPA. Under no circumstances should asbestos-containing concrete, or concrete to which asbestos-containing resilient flooring is attached, be subjected to such treatment.

Onsite Waste Disposal

As mentioned in other sections of this manual, using heavy machinery to crush demolition debris containing Category I or II nonfriable ACM in place prior to or during burial, can cause the ACM to become RACM subject to the provisions of sections §61.150 (waste disposal) and §61.151 (inactive waste disposal sites) or §61.154 (active waste disposal sites). If Category I or II materials are not rendered friable, they are not subject to the asbestos NESHAP.

EPA has recently responded to a question regarding the onsite disposal of crushed asbestos-cement pipe, a Category II material. The response is applicable as well to the burying of Category I material which has been sanded, ground, cut or abraded. In its correspondence EPA stated that the practice of backfilling and burying crushed asbestos-cement pipe in place causes these locations to become active waste disposal sites subject to the requirements of §61.154. Furthermore, if no additional asbestos-containing waste material is buried at that location for a year, the site becomes an inactive waste disposal site subject to the requirements of §61.151(e) and §61.154(h).

Consequently, the owner of the land would be required to comply with the requirements for active and inactive waste disposal sites.

In order to avoid the creation of a waste disposal site which is subject to the Asbestos NESHAP, it was suggested that the owners or operators of the pipe consider other options for dealing with it. If the pipe is left in-place or removed in such a way that it is not crumbled, pulverized or reduced to powder, it would not be subject to the NESHAP. If the pipe must be crushed, the creation of an active waste disposal site can be avoided by removing the pipe from the site and transporting it to a landfill which accepts asbestos waste material.

An alternative method suggested involved the pumping of grout into the buried lines which are no longer in service.

Waste Load Out

As mentioned previously, waste load out activities generally do not cause Category I nonfriable ACM to become RACM. Top loaders are typically used to deposit demolition debris containing Category I nonfriable ACM into trucks for hauling to landfills that accept construction debris.

Recent EPA correspondence discusses the hauling and ultimate disposal of both Category I and Category II ACM as follows:

It is required under §61.150(a)(3) that asbestos-containing waste material be kept adequately wet. Asbestos-containing waste material as applied to demolitions and renovations includes RACM waste and materials contaminated with asbestos including disposable equipment and clothing. Category I or Category II nonfriable ACM that has been contaminated by RACM, and cannot be decontaminated (e.g., building debris in a pile contaminated with RACM) must be treated as asbestos-containing waste material. Category I or Category II ACM that does not meet the definition of RACM after a demolition or renovation, and is not contaminated with RACM, is not asbestos-containing waste material and is not subject to the wetting requirement of §61.150(a)(3).

Category I or II nonfriable ACM that is not subject to §61.150(a)(3) would still have to be disposed of in a landfill that accepts building debris, in a landfill that operates in accordance with §61.154, or at a facility that operates in accordance with §61.155. This waste material would not be allowed to go to any facility that would sand, grind, cut or abrade the non-RACM waste or otherwise turn it into RACM waste (such as a cement recycling facility). In addition, if Category I or II nonfriable ACM is sanded, ground, cut or abraded during disposal at a landfill, before it is buried, it is subject to the NESHAP. (See Appendix I).

SECTION 6

OFFSITE WASTE HANDLING PROCEDURES

The issues discussed in this section include landfills, recycling centers, conversion facilities, and renovation activities. Since EPA has taken a "cradle to grave" approach regarding the disposition of ACM, responsibility for the ultimate fate of Category I ACM rests with all individuals involved in handling the material.

Landfills

Category I and II ACM that has become RACM must be disposed of in a landfill that operates in accordance with §§61.150 and 61.154, or in an EPA-approved conversion facility described in §61.155 of the asbestos NESHAP.

Category I and II nonfriable ACM which has not become RACM during demolition may be disposed of in a landfill that normally accepts construction debris. However, if Category I or II nonfriable ACM is sanded, ground, cut or abraded before it is buried at the landfill, it is subject to the asbestos NESHAP.

Recycling Centers

At the present time, EPA does not allow either Category I or II nonfriable demolition debris to go to any facility (e.g., a cement recycling facility) that will sand, grind, cut or abrade it or otherwise turn it into RACM waste. Recycling facilities which cause non-RACM waste to become RACM waste are subject to the provisions of the asbestos NESHAP (See Appendix I).

Conversion Facilities

Conversion facilities are addressed in Section 61.155 of the November 1990 revised asbestos NESHAP. Owners/operators of such facilities must handle ACWM according to the provisions of the asbestos NESHAP.

APPENDIX I

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAR 18 1992

OFFICE OF
AIR AND RADIATION

Ms. Ann Bieller, Area Manager
Environmental Management
Southwestern Bell Telephone
Procurement Organization
500 North Broadway, Room 1400
St. Louis, Missouri 63102

Dear Ms. Bieller:

This letter is in response to your January 28, 1992 letter requesting a clarification of 40 CFR §61.150(a)(3) as it relates to §61.145(c)(1)(i) and (iv), of the Asbestos NESHAP Revision; Final Rule, dated November 20, 1990.

In your letter, you present your understanding that there are no special requirements for adequately wetting Category I or Category II nonfriable asbestos-containing material (ACM) during the course of a demolition or renovation if it does not meet the definition of regulated asbestos-containing material (RACM). You also state that this conclusion is further supported by §61.150(a)(5), until §61.150(a)(3) is taken into consideration. Section 61.150(a)(3) requires, "for facilities demolished where RACM is not removed prior to demolition according to §61.145(c)(1)(i), (ii), (iii) and (iv) or for facilities demolished according to §61.145(c)(9), adequately wet asbestos-containing waste material at all times after demolition and keep wet during handling and loading for transport to a disposal site." You question the correctness of the §61.150(a)(3) reference to §61.145(c)(1)(i) and (iv).

Section 61.150(a)(3) correctly cites §61.145(c)(1)(i), (ii), (iii) and (iv). It is required under §61.150(a)(3) that asbestos-containing waste material be kept adequately wet. Asbestos-containing waste material as applied to demolitions and renovations includes RACM waste and materials contaminated with asbestos including disposable equipment and clothing. Category I or Category II nonfriable ACM that has been contaminated by RACM, and cannot be decontaminated (e.g., building debris in a pile contaminated with RACM) must be treated as asbestos-containing waste material. Category I or Category II ACM that does not meet the definition of RACM after a demolition or renovation, and is not contaminated with RACM, is not asbestos-containing waste material and is not subject to the wetting requirement of §61.150(a)(3).

If, after a demolition, material left in the facility according to §61.145(c)(1)(i) or (iv) is intentionally ground-up (such as by repeatedly running over the debris with a bulldozer to compact the material), then §61.150(a)(3) applies. The material must be adequately wetted and kept adequately wet during collection and transport to a site or facility operated in accordance with §61.154 or §61.155. However, if the bulldozer is moving the debris or picking it up to be put in a vehicle and inadvertently runs over Category I material, then it is not subject to the NESHAP standard.

Category I or II nonfriable ACM that is not subject to §61.150(a)(3) would still have to be disposed of in a landfill that accepts building debris, in a landfill that operates in accordance with §61.154, or at a facility that operates in accordance with §61.155. This waste material would not be allowed to go to any facility that would sand, grind, cut or abrade the non-RACM waste or otherwise turn it into RACM waste (such as a cement recycling facility). In addition, if Category I or II nonfriable ACM is sanded, ground, cut or abraded during disposal at a landfill, before it is buried, it is subject to the NESHAP.

This response has been coordinated with EPA's Office of Enforcement and with the Emission Standards Division of the Office of Air Quality Planning and Standards. If you have any questions, please contact Tom Ripp of my staff at (703)368-8727.

Sincerely,

Richard Biondi

Richard Biondi, Acting Director
Stationary Source Compliance Division
Office of Air Quality Planning and Standards

cc: Sims Roy, ESD (MD-13)
Omayra Salgado, SSCD (EN-341W)
Scott Throwe, SSCD (EN-341W)
Charlie Garlow, OE (LE-134A)
Regional Asbestos NESHAP Coordinators

APPENDIX D

UNDERSTANDING THE ASBESTOS NESHAP



Understanding the Asbestos NESHAP

Fact Sheet

The Clean Air Act (CAA) requires the U.S. Environmental Protection Agency (U.S. EPA) to develop and enforce regulations to protect the general public from exposure to airborne contaminants that are known to be hazardous to human health. The U.S. EPA established the National Emission Standards for Hazardous Air Pollutants (NESHAP) under the authority of Section 112 of the CAA, and asbestos was one of the first hazardous air pollutants regulated. The Asbestos NESHAP was promulgated on April 6, 1973, and it was revised in 1990.

Asbestos was widely used in buildings for fireproofing, thermal and acoustical insulation, condensation control, and decoration. It was sprayed on beams and ceilings, used to cover piping and boilers, and sprayed onto ducts. Asbestos was used extensively until the 1970s when U.S. EPA banned certain applications.

The Asbestos NESHAP protects the public by minimizing the release of asbestos fibers during renovation and demolition activities. Accordingly, this regulation specifies work practices to be followed for demolitions and renovations of all structures, installations, and buildings. Privately owned residential dwellings or apartments that are demolished for urban renewal or as part of a public or commercial project would be covered under the NESHAP regulations. Residential dwellings containing four units or less under private control or ownership would not be subject to the NESHAP. In addition, the Asbestos NESHAP contains notification requirements for the owner of the building and/or the contractor. Both the owner and contractor(s) are liable for compliance with the Asbestos NESHAP requirements.

The purpose of this publication is to describe who is subject to the Asbestos NESHAP and to explain the requirements of this standard. A brief glossary is provided at the end of this document to assist in understanding some of the terms (appearing in **boldface** text) discussed in this fact sheet. This fact sheet is to be used only as a guide and is not a substitute for reading and understanding the final rule which is found in Title 40, Part 61, Subpart M of the Code of Federal Regulations (40 CFR Part 61). For a copy of the final rule, see the "Where To Get Additional Information" section on page 10.

WHAT AGENCIES REGULATE ASBESTOS?

There are three state agencies in Michigan that regulate **asbestos**: the Michigan Department of Environmental Quality (DEQ), the Michigan Department of Licensing and Regulatory Affairs (DLARA) and the Michigan Department of State Police (MSP). The DEQ is concerned about the release of asbestos fibers to the outer air and proper waste disposal, while DLARA focuses on worker protection during renovation and demolition activities, contractor licensing, and worker training.

- **Michigan Department of Environmental Quality (DEQ)**

The U.S. EPA has delegated the Air Quality Division (AQD) of the DEQ with the authority to enforce the Asbestos NESHAP in Michigan. In addition, the state of Michigan has adopted the federal regulations into the Michigan Administrative Code (MAC), 1995 AACS R 336.1942 (Rule 942), which is in effect as of November 30, 2000 and revised September 11, 2008. A violation of the federal asbestos regulations is also a violation of the MAC. The AQD administers the asbestos NESHAP for the entire state: reviewing the notifications, inspecting demolitions and asbestos removals, and initiation enforcement actions when violations occur. Approximately 7000

Understanding the Asbestos NESHAP

notifications are received each year by this agency and are reviewed for completeness and timeliness. Inspections are made based on contractor history, areas of the state, and type of project. Inspections are also performed in response to complaints. The U.S. EPA can and does conduct independent inspections of NESHAP projects.

The Waste Management Division of the DEQ regulates disposal of asbestos..

- **Michigan Department of Licensing and Regulatory Affairs (DLARA)**

The Occupational Health Division of DLARA implements the Asbestos Abatement Contractors Licensing Act, the Michigan Occupational Safety and Health Act (MIOSHA), the Asbestos Workers Accreditation Act, and the MIOASHA Asbestos Construction Standard. Some of the requirements in these acts and standards include work practices, training, and project notification. DLARA also licenses those who train asbestos removal workers about the regulations. For more information about the DLARA Asbestos Program, see the "Where to Get Additional Information" section on page 10.

- **Michigan Department of State Police (MSP)**

The Hazardous Materials and Investigations Unit of the MSP is responsible for enforcing the U.S. Department of Transportation's (U.S.DOT) regulations regarding shipping and transporting of packaged materials by highway. Asbestos, transported for disposal as a hazardous material, is regulated under 49 CFR Parts 100-185. For more information, refer to the "Where to Get Additional Information" section on page 10.

ASBESTOS NESHAP APPLICABILITY

To determine applicability to the Asbestos NESHAP, three questions must be answered:

- ☞ Is the facility regulated by the NESHAP?
- ☞ Is the activity a demolition or a renovation?
- ☞ Does the amount of **regulated asbestos-containing material (RACM)** meet or exceed the thresholds?

- ☞ **Is the Facility Regulated by the Asbestos NESHAP?**

A **facility** subject to the NESHAP can be any institutional, commercial, or industrial structure, **installation**, or building. Examples include, but are not limited to:

- ✓ Bridges;
- ✓ Tunnels;
- ✓ Docked ships;
- ✓ Military installations, including dependent housing;
- ✓ Chemical/power plant installations;
- ✓ Indoor shopping malls;
- ✓ School buildings in a school district;
- ✓ Post office buildings;
- ✓ Apartment buildings containing five or more dwelling units;
- ✓ Certain condominiums, cooperatives, and lofts;
- ✓ Dwellings which are part of an urban renewal project, highway construction, shopping mall, or other private development (which are not privately owned and held);

Understanding the Asbestos NESHAP

- ✓ Groups of residential buildings under control of the same owner/operator and part of the same renovation/demolition project (even if the buildings are not proximate to each other);
- ✓ Amusement parks or state fairgrounds;
- ✓ Jails or prisons;
- ✓ Nursing homes or homes for disabled persons;
- ✓ Parking garages;
- ✓ Farms;
- ✓ Churches, monasteries, convents, or rectories; and
- ✓ Residential dwellings intentionally burned for fire training, etc.

Some examples of facilities not subject to the Asbestos NESHAP include:

- ✓ Privately owned homes, not demolished for urban renewal or as part of a public or commercial project;
- ✓ Privately-owned, multi-dwelling units with four or less dwelling units; and
- ✓ Mobile sources.

Is the Activity a Demolition or a Renovation?

A **demolition** is the wrecking or taking out of any load-supporting **structural member** of a facility together with any related handling operations or the intentional burning of any facility. A **renovation** is altering a facility or one or more facility components in any way, including the **stripping or removal** of RACM from a facility component (excluding operations in which load-supporting structural members are wrecked or taken out). Table 1 lists some examples of demolition and renovation activities.

Table 1. Examples of Demolition and Renovation Activities

Demolition	Renovation
The wrecking or taking out of any load-supporting structural member or the intentional burning of any facility.	Altering a facility or one or more facility components in any way, including the stripping or removal of RACM from a facility component, but excluding operations in which load-supporting structural members are wrecked or taken out.
<ul style="list-style-type: none"> • Wrecking or taking out building Beams or load-supporting walls; • Removing the structural steel Supports of outdoor pipe racks; • Intentional burning, including intentional burning for fire training (this includes privately-owned, single-family dwellings); • Wrecking or tearing down a portion of a structure that is load-supporting; or • Renovating or remodeling a facility that includes wrecking or removing a load-supporting wall or component, etc. 	<ul style="list-style-type: none"> • Scraping asbestos insulation off a ceiling; • Removing a boiler covered with friable asbestos from a building; • Removing pipe covered with friable asbestos from a pipe rack; • Gross removal of boiler asbestos insulation; • Glove bag stripping of asbestos pipe wrap; • Drilling through asbestos ceiling plaster to build a dropped ceiling; • Removing soundproofing, ceiling tiles, or plaster containing asbestos; • Removing vinyl asbestos floor tile or any asbestos-containing material that is normally nonfriable that is in poor condition (cracking, peeling, or showing other signs of deterioration). For example, it can be crumbled or pulverized by hand pressure; or • Activities that will render nonfriable material friable, such as grinding, sanding, crumbling, pulverizing, sawing, or other abrasive action, etc.

Understanding the Asbestos NESHAP

☞ When Must an Asbestos Inspection and Detection Survey Be Completed?

The Asbestos NESHAP requires that a thorough inspection be conducted for all renovations and all demolitions. All inspections must be completed before the commencement of a subject renovation and/or demolition activity, and the contractor performing the inspection must be listed on the joint DEQ/DLARA "Notification of Intent to Renovate/Demolish" form. Inspections utilizing just visual examination are not acceptable unless the building is primarily steel and concrete materials or no materials in the building are likely to contain asbestos. Both contractors and their legal representatives, as well as owners and their legal representatives, are fully responsible for fulfilling the Asbestos NESHAP inspection requirements.

Although the Asbestos NESHAP does not specifically state that the person who does the inspection and conducts the site survey be trained in recognizing potential asbestos-containing material, the prerequisite of a trained survey inspector still may be a requirement under the Occupational Safety and Health Administration's (OSHA) Asbestos Standards. The federal OSHA Asbestos Standard for Construction (29 CFR 1926.1101) and the OSHA Asbestos Standard for General Industry (29 CFR 1910.1001) are administered by the DLARA's, MIOSHA program. Each standard requires that all **public and commercial buildings** constructed prior to 1981, where employees may enter, work, or contact building materials, must be inspected for **asbestos-containing materials (ACM)**. This includes any houses, garages, apartments, etc. where employees work and may disturb asbestos. Additionally, all such vacant buildings scheduled for renovation or demolition must have an asbestos building survey completed prior to the start of the work.

Inspections under the OSHA standards must also adhere to the AHERA inspection protocol and be performed by a Michigan-accredited asbestos building inspector or a Certified Industrial Hygienist (CIH). The building survey must document the presence, location, and quantity of all "suspect" ACM. Laboratory analysis information should be a part of the building survey document and be kept by the building owner.

Once an asbestos building survey has confirmed or assumed the presence of ACM, all employees who work around, but do not disturb the ACM (i.e., persons conducting janitorial, building maintenance, and/or housekeeping activities) must receive, at a minimum, asbestos awareness training. Additionally, employees who may disturb ACM (i.e., persons working with any of the mechanical systems that have ACM) are required to have additional asbestos-related training. See the section entitled, "Where to Get Additional Information," for further assistance with the standard's inspection, licensing, and training requirements.

☞ Does the Amount of RACM Meet or Exceed the Thresholds?

Thoroughly inspect the facility for asbestos, including **Category I and Category II nonfriable asbestos-containing material (ACM)**. Determine if the combined amount of RACM is at or above the thresholds listed in Table 2. RACM includes:

- ✓ Friable asbestos material;
- ✓ Category I nonfriable ACM that has become friable;
- ✓ Category I nonfriable ACM that will be or has been subjected to sanding, **grinding**, **cutting**, or abrading; or
- ✓ Category II nonfriable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material during demolition or renovation.

To determine whether **planned renovation operations** involving individual **nonscheduled renovation operations** are subject, predict the combined additive amount of RACM to be removed during a calendar year of January 1 through December 31.

Understanding the Asbestos NESHAP

Table 2. Applicability Thresholds

Location of Asbestos	Threshold Level of RACM
Pipes	80 linear meters (260 linear feet)
Other facility components	15 square meters (160 square feet)
Asbestos that is already off facility components where the length or area could not be measured previously.	1 cubic meter (35 cubic feet)

Any demolition or renovation activity that meets or exceeds the applicability thresholds in Table 2 is subject to all the renovation/demolition requirements of the NESHAP. Demolition activities below the thresholds (even for facilities with no asbestos) are subject to the notification requirement. Figure 1 summarizes the process for determining applicability to the Asbestos NESHAP.

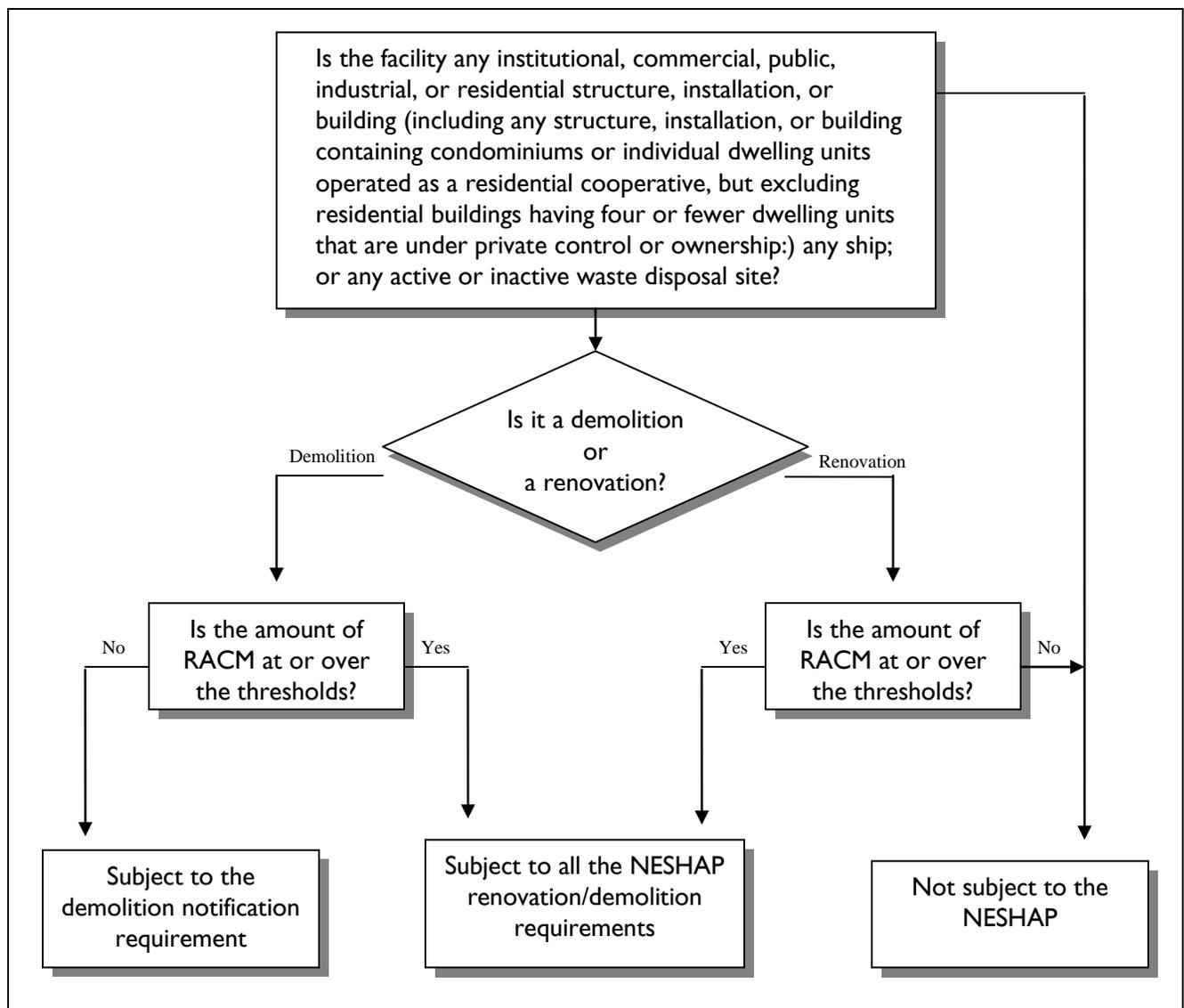


Figure 1. Flowchart for Determining Applicability to the Asbestos NESHAP

Understanding the Asbestos NESHAP

Examples of operations that are neither demolitions nor subject renovations and, therefore, not subject to the Asbestos NESHAP include:

- ✓ Renovation below the threshold levels unless it is above the threshold levels cumulatively in a calendar year (notification may be required by DLARA);
- ✓ Removal of **nonfriable asbestos-containing material**, as long as the material is not in poor condition and it remains nonfriable during all phases of removal, handling, and waste disposal;
- ✓ Asbestos encapsulation (notification may be required by DLARA); and
- ✓ Removal of interior, non-load supporting walls that are not associated with any regulated asbestos-containing material.

ASBESTOS NESHAP NOTIFICATION REQUIREMENT

An important aspect of the NESHAP is the advance notification requirement, which enables the AQD to ensure that all precautions are being taken to minimize asbestos emissions. Building **owners** or contractors must submit notifications for all subject demolitions and for subject renovations where the amount of RACM meets or exceeds the thresholds. Notifications should be entered online using Michigan Business One Stop <http://www.michigan.gov/business> at least ten **working days prior** to beginning regulated demolition or renovation activities. For planned renovation operations involving individual, nonscheduled operations, the notification is required at least ten working days before the beginning of the calendar year for which notice is being given. Notifications must be entered as early as possible, but not later than the following work day for ordered demolitions and for emergency renovation operations. An **emergency renovation operation** means that the renovation operation was not planned but results from a sudden, unexpected event that, if not immediately attended to, presents a safety or public health hazard, is necessary to protect equipment from damage, or is necessary to avoid imposing an unreasonable financial burden.

The notification must include the following information:

- ✓ Date of notification (or date of revision);
- ✓ Type of notification (original, revised, canceled, annual);
- ✓ Type of operation (demolition or renovation);
- ✓ Scheduled starting and completion dates of asbestos removal work;
- ✓ Scheduled starting and completion dates of demolition or renovation;
- ✓ Abatement contractor information;
- ✓ Demolition contractor information (if project is a demolition);
- ✓ Facility owner information;
- ✓ Facility description including location;
- ✓ Disposal site information;
- ✓ Waste transporter information;
- ✓ Ordered demolition information (if project is an ordered demolition);
- ✓ Estimate of amount of RACM to be removed and amount of Category I and Category II nonfriable ACM that will not be removed before demolition;

Understanding the Asbestos NESHAP

- ✓ Project description, including surfaces asbestos will be removed from, removal method, and method of demolition;
- ✓ Engineering controls description;
- ✓ Procedure if unexpected asbestos is found;
- ✓ Procedure used to detect asbestos;
- ✓ Emergency renovation information (if project is an emergency renovation); and
- ✓ Certification that at least one trained person will supervise the asbestos stripping and removal.

Michigan's "Notification of Intent to Renovate/Demolish" form should be used to fulfill the notification requirement using Michigan Business One Stop. For the online link, along with guidelines on how to complete the form, see the "Where to Get Additional Information" section on page 10. Delivery of the notification should be made through Michigan Business One Stop, U.S. Postal Service, commercial delivery service, or hand delivery (or revisions to notifications) is not recommended. Telefaxing notifications is not acceptable. It is not necessary to send copies of NESHAP notifications to the U.S. EPA for renovation or demolition activities in Michigan

• **Revising a Notification**

A revised notification should be sent any time there is a change in any of the required information previously submitted. Go to the e-cabinet using Michigan Business One-Stop and enter your document # from your original notification. Change the notification type from "original" to "revised" and any other changes needed before submitting. The NESHAP specifically requires a revision if the amount of asbestos reported changes by 20% (either a decreased amount or an increased amount). An increased amount refers to additional asbestos unexpectedly found while working on the specific project covered in the notification. If the scope of the project increases, a new notification is required. For example, removing asbestos from an area of the building not covered by the original notification would be considered a change in project scope.

• **Revising Project Dates**

If the project will begin on a date later than the date in the original notice (or latest revision), revise the notification no later than the previously scheduled start date. If the project will start earlier than the original start date (or latest revision), provide the new start date at least ten working days before beginning the project. **Under no circumstances shall a NESHAP project begin on a date other than the date in the notification (or the latest revised notification).**

If a project will be postponed indefinitely and a new start date cannot be predicted immediately submit a revised notification canceling the project. If the project is rescheduled, a new notification must be submitted at least ten working days prior to beginning the project. It is unacceptable to indefinitely postpone a project and then submit a revised start date less than ten working days before the project is to begin.

WORK PRACTICE STANDARDS

For a demolition project, the RACM is not required to be removed or stripped if any of the following criteria are met:

- ✓ It is Category I nonfriable ACM that is not in poor condition, is not **friable**, and a licensed asbestos abatement contractor is made available at the demolition site.
- ✓ It is on a **facility component** that is encased in concrete or other similarly hard material and is adequately wet whenever exposed during demolition.
- ✓ It was not accessible for testing and, therefore, was not discovered until after the demolition began and as a result of the demolition cannot be safely removed.

Understanding the Asbestos NESHAP

- ✓ It is Category II nonfriable ACM with low probability of becoming crumbled, pulverized, or reduced to powder during demolition.
- ✓ For large facility components (reactor vessels, large tanks, steam generators, etc. but not beams): the component is removed, transported, stored, disposed of, or reused without disturbing or damaging the RACM; the component is encased in a **leak-tight** wrapping; and the leak-tight wrapping is properly labeled during loading, unloading, and storage.

If a facility is demolished by intentional burning (e.g., fire training), all ACM including Category I and Category II nonfriable ACM is regulated and must be removed before burning.

Remove all RACM from a facility being demolished or renovated before any activity begins that would break up, dislodge, or similarly disturb the material. When stripping asbestos from a facility component while it remains in place in the facility, **adequately wet** the asbestos. After a facility component that is covered with asbestos is taken out of a facility, it shall be stripped or contained in leak-tight wrapping. When stripping, adequately wet the component or use a local exhaust ventilation and collection system designed and operated to capture the particulate asbestos material.

The following requirements must be followed for RACM, including material that has been removed or stripped:

- ✓ Adequately wet the material and ensure that it remains adequately wet until collected and contained or treated in preparation for disposal;
- ✓ Carefully lower the material to the ground and floor, not dropping, throwing, sliding, or otherwise damaging or disturbing the material; and
- ✓ Transport the material to the ground via leak-tight chutes or containers if it has been removed or stripped more than 50 feet above ground level and was not removed as units or in sections.

There are two situations for which the requirement for adequately wetting the material does not apply. The first case is when the temperature at the point of wetting is below 32° F. The temperature must be recorded at the beginning, middle, and end of each work day; and these records must be kept for two years. The second situation involves renovation operations where wetting would unavoidably damage equipment or present a safety hazard. For these operations, written approval must be obtained from DEQ (submit a request for a waiver for not wetting in writing to DEQ [address listed in "Where to Get Additional Information" section on page 10]), and the following emission control methods must be used:

- (1) A local exhaust ventilation and collection system designed and operated to capture the particulate asbestos material;
- (2) A glove-bag system designed and operated to contain the particulate asbestos material; and
- (3) Leak-tight wrapping to contain all RACM prior to dismantlement.

WASTE DISPOSAL

The Asbestos NESHAP specifies that no **visible emissions** can be discharged to the outside air from the collection, processing, transport, and disposal of **asbestos-containing waste materials**. After wetting, seal all asbestos-containing waste material in leak-tight containers. If the waste will not fit into containers, it must be placed in leak-tight wrapping. Label the containers or wrapped materials being taken away from the facility using warning labels specified by the Occupational Safety and Health Administration (OSHA) and the U.S. DOT. The label should include the name of the **waste generator** and the location at which the waste was generated. Asbestos-containing waste materials must be deposited as soon as practical to an appropriate waste disposal site. Vehicles used to transport asbestos-containing waste materials must be marked during the loading and unloading of waste. U.S. DOT regulations require the proper identification number of "NA2212" be placed on shipping papers and package marking.

Understanding the Asbestos NESHAP

Waste shipment records must be maintained by the owner or operator of a demolition/renovation operation. The following information is required on waste shipment records:

- ✓ Generator name, address, and telephone;
- ✓ Asbestos NESHAP program agency name and address;
- ✓ Quantity of asbestos-containing waste materials (cubic meters or cubic yards);
- ✓ A monitored emergency response telephone number for a person who is knowledgeable of the hazardous material being shipped and has comprehensive emergency response and incident mitigation information, or who has immediate access to a person with such knowledge;
- ✓ Waste disposal site operator name and telephone;
- ✓ Disposal site name and physical location;
- ✓ Transport date;
- ✓ Transporter name, address, and telephone; and
- ✓ Certification.

Provide a copy of the waste shipment record to the disposal site owner or operator at the time of delivery. If a copy of the waste shipment record signed by the owner or operator of the waste disposal site is not received by the waste generator within 35 days, contact the transporter and disposal site to determine the status of the waste shipment. Notify the AQD in writing if a signed waste shipment record is not received from the waste disposal site within 45 days. Keep a copy of all waste shipment records, including the signed copy, for at least two years.

Under Part 115 of Michigan Public Act 451 of 1994, as amended, administered by DEQ, all asbestos-containing material regulated by any state or federal regulations must be disposed of at a Type II (municipal solid waste) landfill. Asbestos-containing material that is nonfriable AND is not in poor condition or will not become friable at any time can be disposed of in a Type III (construction and demolition) landfill. Contact your local DEQ District Office or the Environmental Assistance Center (800-662-9278) if you have waste disposal questions.

TRAINING

Training is required by three different federal and state agencies when it comes to the handling of asbestos, its removal, and the transportation of the material as a hazardous waste. The Asbestos NESHAP requires at least one trained supervisor to be present when asbestos-containing material is stripped, removed, disturbed, or otherwise handled. Training includes, at a minimum: applicability, notification, material identification, control procedures, waste disposal, reporting and recordkeeping, asbestos hazards, and worker protection. Refresher training is required every two years. Evidence of this training must be posted and made available for inspection at the demolition or renovation site. In addition to training supervisors, the DLARA requires that asbestos workers receive training. For a list of certified trainers and/or for more information about DLARA training requirements, contact the DLARA Asbestos Program at 517-322-1320. Finally, Hazmat employers are required to certify and document that Hazmat employees (as defined in 49 CFR 171.8) receive training in accordance with 49 CFR Part 172, Subpart H and Part 177. The training requirements would apply to any employee that transports asbestos, offers asbestos for transportation, prepares asbestos for transportation, or certifies a shipping paper or manifest for transportation. U.S. DOT training requirements cover such topics as general awareness/familiarization with 49 CFR Chapter I, Subchapter C; function-specific training for employees; safety methods and emergency response procedures; and security awareness training for risks associated with the transport of hazardous materials.

Understanding the Asbestos NESHAP

WHY COMPLY WITH THE ASBESTOS NESHAP

Compliance with the Asbestos NESHAP will reduce the public's and workers' exposure to asbestos and will keep facility owners and contractors operating within the law. Non-compliance with the NESHAP is a significant violation. The AQD attempts to reach a settlement with the owner and operator when violations of the Asbestos NESHAP occur. If a settlement acceptable to the U.S. EPA is not reached in a timely manner, the U.S. EPA may pursue enforcement action at the federal level. The U.S. EPA may decide to pursue an escalated enforcement action on its own. Violations of the NESHAP notification and work practice requirements may result in written warnings, administrative orders, civil penalties and/or criminal charges. Typically, violations are resolved with a consent order requiring the facility to pay a penalty and to comply with the regulations for all future demolitions or renovations. Some owners and operators who have knowingly violated the Asbestos NESHAP have been sentenced to prison terms.

WHERE TO GET ADDITIONAL INFORMATION

Additional information about asbestos is available on the Internet through the U.S. EPA's homepage (www.epa.gov/asbestos). In addition, the Asbestos NESHAP notification form, guidelines for completing the form, and regulations are located at www.michigan.gov/air. Select "Asbestos". Questions about the federal OSHA standards or the state's asbestos compliance and training requirements can be obtained by visiting the DLARA Asbestos Program's web site at www.michigan.gov/asbestos. Questions related to the transportation of asbestos can be addressed by the U.S. Department of Transportation's (U.S. DOT) Hazmat Information Center at 800-467-4922. You can also visit the U.S. DOT, Pipeline and Hazardous Materials Safety Administration's web site at <http://hazmat.dot.gov>.

- **Government Agency Contacts:**

NESHAP Asbestos Coordinator
Air Quality Division
Michigan Department of Environmental Quality
PO Box 30260
Lansing, Michigan 48909
517-284-6777.

Department of Licensing and Regulatory Affairs
Occupational Health Division
Asbestos Program
PO Box 30671
Lansing, Michigan 48909-8171
517-322-1320

Michigan State Police
Commercial Vehicle Enforcement Division
Hazardous Materials Unit
333 S. Grand Ave.
PO Box 30634
Lansing, Michigan 48913
Sgt. John Holder
517-241-0551

U.S. Environmental Protection Agency
Asbestos Coordinator AT-18J
77 W. Jackson Boulevard
Chicago, Illinois 60604
Hotline: 1-800-621-8431 or 312-886-2395

Understanding the Asbestos NESHAP

ACRONYMS

ACM	Asbestos-Containing Material
AQD	Air Quality Division
CAA	Clean Air Act
C&E	Compliance and Enforcement
DEQ	Michigan Department of Environmental Quality
DLARA	Michigan Department of Licensing and Regulatory Affairs
NESHAP	National Emission Standards for Hazardous Air Pollutants
OSHA	Occupational Safety and Health Administration
PLM	Polarized Light Microscopy
RACM	Regulated Asbestos-Containing Material
U.S. DOT	U.S. Department of Transportation
U.S. EPA	U.S. Environmental Protection Agency

DEFINITIONS

This section contains a list of definitions from the Asbestos NESHAP. Not all of these terms are used in this fact sheet.

Active waste disposal site: Any disposal site other than an inactive site.

Adequately wet: Sufficiently mix or penetrate with liquid to prevent the release of particulates. If visible emissions are observed coming from asbestos-containing material, then that material has not been adequately wetted. However, the absence of visible emissions is not sufficient evidence of being adequately wet.

Asbestos: The asbestiform varieties of serpentinite (chrysotile), riebeckite (crocidolite), cummingtonite-grunerite, anthophyllite, and actinolite-tremolite.

Asbestos-containing materials: Any materials containing more than 1% asbestos.

Asbestos-containing waste materials: Mill tailings or any waste that contains commercial asbestos and is generated by a source subject to the Asbestos NESHAP. This includes filters from control devices, friable asbestos waste material, and bags or other similar packaging contaminated with commercial asbestos. As applied to demolition and renovation operations, this term also includes regulated asbestos-containing material waste and materials contaminated with asbestos including disposable equipment and clothing.

Asbestos mill: Any facility engaged in converting, or in any intermediate step in converting, asbestos ore into commercial asbestos. Outside storage of asbestos material is not considered a part of the asbestos mill.

Asbestos tailings: Any solid waste that contains asbestos and is a product of asbestos mining or milling operations.

Asbestos waste from control devices: Any waste material that contains asbestos and is collected by a pollution control device.

Category I nonfriable asbestos-containing material (ACM): Asbestos-containing packings, gaskets, resilient floor covering, and asphalt roofing products containing more than 1% asbestos as determined using Polarized Light Microscopy.

Category II nonfriable ACM: Any material, excluding Category I nonfriable ACM, containing more than 1% asbestos as determined using Polarized Light Microscopy that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

Commercial asbestos: Any material containing asbestos that is extracted from ore and has value because of its asbestos content.

Cutting: To penetrate with a sharp-edged instrument and includes sawing, but does not include shearing, slicing, or punching.

Understanding the Asbestos NESHAP

Demolition: The wrecking or taking out of any load-supporting structural member of a facility together with any related handling operations or the intentional burning of any facility.

Emergency renovation operation: A renovation operation that was not planned but results from a sudden, unexpected event that, if not immediately attended to, presents a safety or public health hazard, is necessary to protect equipment from damage, or is necessary to avoid imposing an unreasonable financial burden. This term includes operations necessitated by nonroutine failures of equipment.

Fabricating: Any processing (e.g., cutting, sawing, drilling) of a manufactured product that contains commercial asbestos, with the exception of processing at temporary sites (field fabricating) for the construction or restoration of facilities. In the case of friction products, fabricating includes bonding, debonding, grinding, sawing, drilling, or other similar operations performed as part of fabricating.

Facility: Any institutional, commercial, public, industrial, or residential structure, installation, or building (including any structure, installation, or building containing condominiums or individual dwelling units operated as a residential cooperative but excluding residential buildings having four or fewer dwelling units); any ship; and any active or inactive waste disposal site. For purposes of this definition, any building, structure, or installation that contains a loft used as a dwelling is not considered a residential structure, installation, or building. Any structure, installation, or building that was previously subject to the Asbestos NESHAP is not excluded, regardless of its current use or function.

Facility component: Any part of a facility including equipment.

Friable asbestos material: Any material containing more than 1% asbestos as determined using Polarized Light Microscopy, that when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

Fugitive source: Any source of emissions not controlled by an air pollution control device.

Glove bag: A sealed compartment with attached inner gloves used for the handling of asbestos-containing materials. Properly installed and used, glove bags provide a small work area enclosure typically used for small-scale asbestos stripping operations.

Grinding: To reduce to powder or small fragments and includes mechanical chipping or drilling.

Hazmat employee: means a person who is employed by a hazmat employer and who, in the course of employment, directly affects hazardous materials transportation safety. This term includes an owner-operator of a motor vehicle which transports hazardous materials in commerce. This term includes an individual, including a self-employed individual, employed by a hazmat employer who, during the course of employment:

1. Loads, unloads, or handles hazardous materials;
2. Manufactures, tests, reconditions, repairs, modifies, marks, or otherwise represents containers, drums, or packagings as qualified for use in the transportation of hazardous materials;
3. Prepares hazardous materials for transportation;
4. Is responsible for safety of transporting hazardous materials; or
5. Operates a vehicle used to transport hazardous materials.

Hazmat employer: means a person who uses one or more employees in connection with: transporting hazardous materials in commerce; causing hazardous materials to be transported or shipped in commerce; or representing, marking, certifying, selling, offering, manufacturing, reconditioning, testing, repairing, or modifying containers, drums, or packagings as qualified for use

Understanding the Asbestos NESHAP

in the transportation of hazardous materials. This term includes an owner-operator of a motor vehicle which transports hazardous materials in commerce. This term also includes any department, agency, or instrumentality of the United States, a state, a political subdivision of a state, or an Indian tribe engaged in an activity described in the first sentence of this definition.

In poor condition: The binding or the material is losing its integrity as indicated by peeling, cracking, or crumbling of the material.

Inactive waste disposal site: Any disposal site or portion of it where additional asbestos-containing waste material has not been deposited within the past year.

Installation: Any building or structure or any group of buildings or structures at a single demolition or renovation site that is under the control of the same owner or operator (or owner or operator under common control).

Leak-tight: Solids or liquids cannot escape or spill out. It also means dust-tight.

Malfunction: Any sudden and unavoidable failure of air pollution control equipment or process equipment or of a process to operate in a normal or usual manner so that emissions of asbestos are increased. Failures of equipment shall not be considered malfunctions if they are caused in any way by poor maintenance, careless operation, or any other preventable upset conditions, equipment breakdown, or process failure.

Manufacturing: The combining of commercial asbestos—or, in the case of woven friction products, the combining of textiles containing commercial asbestos—with any other material(s), including commercial asbestos, and the processing of this combination into a product. Chlorine production is considered a part of manufacturing.

Natural barrier: A natural object that effectively precludes or deters access. Natural barriers include physical objects such as cliffs, lakes or other large bodies of water, deep and wide ravines, and mountains. Remoteness by itself is not a natural barrier.

Nonfriable asbestos-containing material: Any material containing more than 1% asbestos as determined using Polarized Light Microscopy, that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

Nonscheduled renovation operation: A renovation operation necessitated by the routine failure of equipment, which is expected to occur within a given period based on past operating experience but for which an exact date cannot be predicted.

Outside air: The air outside buildings and structures, including, but not limited to, the air under a bridge or in an open air ferry dock.

Owner or operator of a demolition or renovation activity: Any person who owns, leases, operates, controls, or supervises the facility being demolished or renovated or any person who owns, leases, operates, controls, or supervises the demolition or renovation operation, or both.

Particulate asbestos material: Finely divided particles of asbestos or material containing asbestos.

Planned renovation operations: A renovation operation, or a number of such operations, in which some RACM will be removed or stripped within a given period of time and that can be predicted. Individual, nonscheduled operations are included if a number of such operations can be predicted to occur during a given period of time based on operating experience.

Regulated asbestos-containing material (RACM): Any all of following: (a) friable asbestos material, (b) Category I nonfriable ACM that has become friable, (c) Category I nonfriable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading, or (d) Category II nonfriable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations.

Understanding the Asbestos NESHAP

Remove: To take out RACM or facility components that contain or are covered with RACM from any facility.

Renovation: Altering a facility or one or more facility components in any way, including the stripping or removal of RACM from a facility component. Operations in which load-supporting structural members are wrecked or taken out are demolitions.

Resilient floor covering: Asbestos-containing floor tile, including asphalt and vinyl floor tile and sheet vinyl floor covering containing more than 1% asbestos as determined using Polarized Light Microscopy.

Roadways: Surfaces on which vehicles travel. This term includes public and private highways, roads, streets, parking areas, and driveways.

Strip: To take off RACM from any part of a facility or facility components.

Structural member: Any load-supporting member of a facility, such as beams and load supporting walls, or any nonload-supporting member, such as ceilings and nonload-supporting walls.

Visible emissions: Any emissions, which are visually detectable without the aid of instruments, coming from RACM or asbestos-containing waste material, or from any asbestos milling, manufacturing, or fabricating operation. This does not include condensed, uncombined water vapor.

Waste generator: Any owner or operator of a source covered by the Asbestos NESHAP whose act or process produces asbestos-containing waste material.

Waste shipment record: The shipping document, required to be originated and signed by the waste generator, used to track and substantiate the disposition of asbestos-containing waste material.

Working day: Monday through Friday including holidays that fall on any of the days Monday through Friday.

APPENDIX D

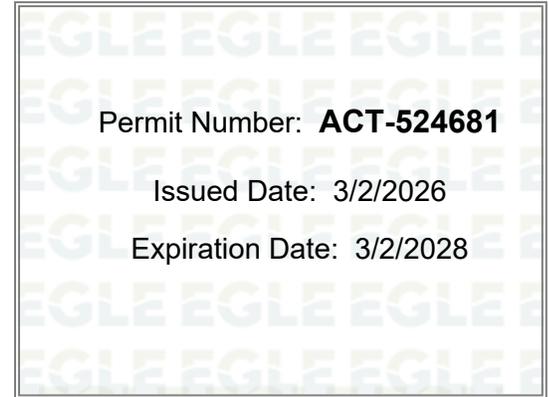
ACT 399 PERMIT

PERMIT FOR WATER SUPPLY SYSTEMS

(Construction – Alteration – Addition or Improvement) as Described Herein
*Required under the Authority of 1976 PA 399, as amended (Act 399)**

Water System Project:

Water Supply Name: ELK RAPIDS, VILLAGE OF
Public Water Supply ID: MI0002090
Project Name: Phase 2 Water and Sewer Improvements
Project Purpose: Replacement
Project Location: Village of Elk Rapids
Project County: Antrim



This permit only authorizes the construction and/or alteration of the waterworks system as described below and detailed in the approved drawings and specifications in accordance with Part 13 of the Administrative Rules of Act 399.

**ISSUED UNDER THE AUTHORITY OF THE DIRECTOR OF
THE MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY**

Reviewed by: Taylor Quillan

Issued by: Jamie Wade

This permit expires if construction or alteration has not commenced by the expiration date, 3/2/2028, in accordance with R 325.11306.

Requests for extension of this permit may be made in [MiEHDWIS](#) Construction Permit Activity ACT-524681 or by contacting your EGLE representative.

Facilities Description:

Replace existing watermain with the installation of new watermain: 4,722 LF of 8" PVC C900, 140 LF of 14" HDPE and associated tees, valves, reducers, bends, hydrants, and services. Abandon existing watermain following successful completion of new watermain.

Conditions:

Phase 2 Water and Sewer Improvements Facilities

Mains

Length (ft)	Size (in)	Material	Construction Type	Comments
3298	8	PVC	Replacement or Rehabilitation	Lake St from Industrial Park Dr to Ames St
53	6	PVC	Replacement or Rehabilitation	Installed at the intersection of Washington St and Lake St
125	14	HDPE	Replacement or Rehabilitation	Installed under US-31, West of Green St
1118	8	PVC	Replacement or Rehabilitation	Loomis Street between US-31 and Lake Street
306	8	PVC	Replacement or Rehabilitation	Henry Street between Ames Street and Buckley Street

Tanks

Volume (GL)	Tank Type	Construction Type	Comments
-------------	-----------	-------------------	----------

Wells

Diameter (in)	Depth (ft)	Capacity (GPM)	Pump Type	Construction Type	Comments
---------------	------------	----------------	-----------	-------------------	----------

Pumps

Total Dynamic Head (TDH)	Capacity at TDH (GPM)	Pump Type	Number of Pumps	Construction Type	Comments
--------------------------	-----------------------	-----------	-----------------	-------------------	----------

Treatment Processes

Construction Type	Treatment	Comments
-------------------	-----------	----------

Other Facilities

Type of Facility	Description
------------------	-------------

* This Act 399 Permit is issued under the authority of the Director of the Michigan Department of Environment, Great Lakes, and Energy (EGLE) and allows the construction and/or alteration of the water system as described herein in accordance with Part 13 of the Administrative Rules of Act 399.

The issuance of this permit does not authorize violation of any federal, state, or local laws or regulations, nor does it obviate the necessity of obtaining such permits, including any other EGLE permits, or approvals from other units of government as may be required by law.

This permit expires if construction or alteration has not commenced by the expiration date indicated above in accordance with R 325.11306. Requests for extension of this permit can be made through MiEHDWIS or by contacting your EGLE representative.

Revisions of the approved plans and specifications must be done in accordance R325.11309.

Noncompliance with the conditions of this permit and the requirements of Act 399 constitutes a violation of the Act.

Intentionally providing false information in this application constitutes fraud which is punishable by fine and/or imprisonment.

Where applicable for water withdrawals, the issuance of this permit indicates compliance with the requirements of Part 327 of Act 451, Great Lakes Preservation Act.