CONTRACT DOCUMENTS

BLAIR TOWNSHIP HALL
WELLFIELD PIPING IMPROVEMENTS

BLAIR TOWNSHIP
2121 COUNTY ROAD 633
GRAWN, MI 49637

OCTOBER 10, 2025

PREPARED BY:
WADE TRIM
10850 E. Traverse Hwy.
Suite 2260
Traverse City, MI 49684

SECTION 00 01 10 - TABLE OF CONTENTS

APPENDICES

END OF SECTION

SECTION 00 11 13
ADVERTISEMENT FOR BIDS

Blair Township Hall Wellfield Piping Improvements

Sealed Bids will be received by Blair Township at the Blair Township Hall, 2121 County Road 633, Grawn, Michigan, 49637, until 2:00PM, Local Time, November 4, 2025 at which time and place said Bids will be opened and publicly read aloud.

Bids will be received for the following Work:

Installation of approximately 1,200 linear feet of 8-inch and 12-inch water main, associated valves, fittings, and a hydrant, PVC conduit, retention basin expansion, replacement of 12-inch discharge piping, fencing, restoration, and other work.

Contract Documents may be examined at the following locations:

A. Blair Township, 2121 County Road 633, Grawn, MI 49637

B. Builders Exchange of Northwest Michigan, 3175 Continental Drive, Suite A, Traverse City, MI 49686

C. Wade Trim Associates, Inc., 10850 East Traverse Highway, Suite 2260, Traverse City, MI 49684

Plans and specifications are also available for viewing (not to be used for bidding purposes) at no cost online at: www.wadetrim.com/resources/bid-tab/

Documents downloaded from our website will bear a watermark on various signature pages and will be considered unofficial copies for bidding purposes; copies obtained from anywhere other than Wade Trim will be considered unofficial copies and will not be considered a responsible bid.

Copies of the Contract Documents for bidding purposes must be obtained at the office(s) of Wade Trim Associates, Inc., 10850 East Traverse Highway, Suite 2260, Traverse City, MI 49684, starting on October 13, 2025.

Each Bid will be accompanied by a bid bond, in the amount of at least **five (5)** percent of the amount bid, drawn payable to Blair Township as security for the proper execution of the Agreement.

Blair Township reserves the right to accept or reject any or all bids and to waive any informality in any bids should it consider same to be in its best interest.

Bids may not be withdrawn for the period of 60 days after date of receiving bids.

Inquiries will be directed to Garth A. Bogart, PE at Phone: (231) 735-5960 or email: gbogart@wadetrim.com.

Questions will be received until October 27, 2025 at 5:00 PM. No further questions will be answered after this date and time.

SECTION 00 21 13 - INSTRUCTIONS TO BIDDERS

PART 1 GENERAL

1.01 DEFINED TERMS

A. Terms used in these Instructions to Bidders have the meanings assigned to them in the General Conditions.

B. The term "Bidder" means one who submits a Bid to Owner as distinct from a subbidder who submits a Bid to a Bidder.

C. The term "Successful Bidder" means the lowest, qualified, responsible Bidder to whom the Owner makes an award.

D. The term "Owner" means Blair Township, 2121 County Road 633, Grawn, MI 49637 a Municipal Corporation and being a party of the first part of this Contract.

E. The term “Engineer” means Wade Trim Associates, Inc., 10850 East Traverse Highway, Suite 2260, Traverse City, MI 49684, or a duly authorized representative.

1.02 BIDDERS QUALIFICATIONS

A. No Bid will be considered from any Bidder unless known to be skilled and regularly engaged in work of a character similar to that covered by the Contract Documents. In order to aid the Owner in determining the responsibility of any Bidder, the Bidder, within 48 hours after being requested in writing by the Owner to do so, must furnish evidence, satisfactory to the Owner, of the Bidder's experience and familiarity with Work of the character specified, and Bidder's financial ability to properly prosecute the proposed Work to completion within the specified time. The evidence requested may include the following:

1. Address and description of the Bidder's plant or permanent place of business.

2. Bidder's performance records for all Work awarded to or started by Bidder within the past three years.

3. An itemized list of the Bidder's equipment available for use on the proposed Contract.

4. Bidder's financial statement, including statement of ownership of equipment necessary to be used in executing Work under Contract.

5. Evidence that the Bidder is authorized to do business in the state in which the project is located, in case of a corporation organized under the laws of any other state; and,

6. Such additional information as will satisfy the Owner that the Bidder is adequately prepared to fulfill the Contract.

1.03 EXAMINATION OF CONTRACT DOCUMENTS AND SITE

A. It is the responsibility of each Bidder before submitting a Bid, to:

1. Examine the Contract Documents thoroughly,

2. Visit the site to familiarize himself with local conditions that may in any manner affect cost, progress or performance of the Work,

3. Consider federal, state, and local Laws and Regulations that may affect cost, progress, performance, or furnishing of the Work; and

4. Study and carefully correlate Bidder's knowledge and observations with the Contract Documents and such other related data; and

5. Promptly notify the Engineer in writing of conflicts, errors, ambiguities or discrepancies which Bidder has discovered in or between Contract Documents and such related documents.

6. Purchase official Procurement Documents from the Engineer in order to be included on the project Plan Holder List and be considered eligible for bidding.

B. Reference is made to the Supplementary Conditions for the identification of those reports of investigations and tests of subsurface and latent physical conditions at the site or otherwise affecting cost, progress or performance of the Work which have been relied upon by the Engineer in preparing the Contract Documents.

1. If such reports are not included as appendices to the Contract Documents, the Owner will make copies available to any Bidder requesting them. These reports are included for reference only and are not guaranteed as to accuracy or completeness, nor are they part of the Contract Documents.

2. Bidder may rely upon the general accuracy of the “technical data” contained in such reports but not upon other data, interpretations, opinions or information contained in such reports or otherwise relating to the subsurface conditions at the site, nor upon the completeness thereof for bidding or construction purposes.

3. Before submitting their Bid each Bidder will, at Bidder's own expense, make such additional investigations and tests as the Bidder may deem necessary to determine Bidder's Bid for performance of the Work in accordance with the time, price and other terms and conditions of the Contract Documents.

C. On request, the Owner will provide each Bidder access to the site to conduct such investigations and tests as each Bidder deems necessary for submission of their Bid. Bidder must fill all holes and clean up and restore the site to its former conditions upon completion of such investigations and tests.

D. The lands upon which the Work is to be performed, rights-of-way for access thereto and other lands designated for use by the Contractor in performing the Work are identified in Section 01 11 00 - Summary of Work, or on the Plans.

E. The locations of utilities as shown on the Plans are taken from sources believed to be reliable. Neither the Owner nor the Engineer will be responsible for any omissions of, or variations from, the indicated location of existing utilities which may be encountered in the Work.

1. The submission of a Bid will constitute an incontrovertible representation by the Bidder that the Bidder has complied with every requirement of this Article, that without exception the Bid is based upon performing and furnishing the Work required by the Contract Documents and applying the specific means, methods, techniques, sequences or procedures of construction (if any) that may be shown, indicated or required by the Contract Documents, that Bidder has given the Engineer written notice of all conflicts, errors, ambiguities and discrepancies that Bidder has discovered in Contract Documents and the resolution by the

Engineer is acceptable to Bidder, and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performing and furnishing the Work, and that the time stated in the Proposal is sufficient to complete the project.

1.04 INTERPRETATIONS AND ADDENDA

A. Should any prospective bidder find discrepancies in, or omissions from the Plans, Specifications or other parts of the Contract Documents, the prospective bidder may submit a written request to the Engineer for an interpretation thereof. The person submitting the request will be held responsible for its prompt delivery at least seven (7) days prior to the date for opening of Bids. Questions received less than seven (7) days prior to the date for opening of bids will not be answered. Any interpretation of inquiry will be made by Addendum duly issued to all prospective bidders.

B. Any change in or addition to the Contract Documents deemed necessary by the Owner must be made in the form of an Addendum issued to all prospective bidders who have taken out Contract Documents and all such Addenda will become a part of the Contract Documents as though same were incorporated into same originally. Oral explanations and information do not constitute official notification and are not binding.

1.05 BID SECURITY

A. Bid Security must be made payable to the Owner, in an amount of **five (5)** percent of the Bidder's maximum Bid price, as indicated in Section 00 11 13 - Advertisement for Bids. Bid Bonds, if indicated as acceptable in Section 00 11 13, will be issued on the form included in the Contract Documents by a Surety meeting the requirements of paragraph 5.01 of Section 00 72 00 - General Conditions.

B. Bid Security of the Successful Bidder will be retained until such Bidder has executed Section 00 52 00 - Agreement and furnished the required Contract Security, whereupon it will be returned; if the Successful Bidder fails to execute and deliver the Agreement and furnish the required Contract Security within 15 days of the Notice of Award, the Owner may annul the Notice of Award and the Bid Security of that Bidder will be forfeited.

C. Bid Security of any Bidder whom the Owner believes to have a reasonable chance of receiving the award may be retained by the Owner until the earliest of the seventh day after the "Effective Date of Agreement" (which term is defined in the General Conditions) or the expiration of the hold period on the Bids. Bid Security of other Bidders will be returned within 14 days of the Bid opening, unless indicated otherwise in the Advertisement.

1.06 CONTRACT TIME

A. The number of days within which, or the date by which, the Work is to be Substantially Completed, if applicable, and also completed and ready for final payment (the Contract Time) are set forth in the Agreement.

1.07 SUBSTITUTE AND “OR-EQUAL” ITEMS

A. The Contract, if awarded, will be on the basis of materials and equipment described in the Plans or specified in the Specifications without consideration of possible substitute or “or-equal” items.

B. Whenever it is indicated in the Plans or specified in the Specifications that a substitute or an “or-equal” item of material or equipment may be furnished or used by the Contractor if acceptable to the Engineer, application for such acceptance will not be considered by the Engineer until after the effective date of the Agreement.

C. In addition, in no case will the Engineer’s denial of the Contractor’s application give rise to any claim for additional cost, it being understood by the Contractor that acceptance of substitute or an “or equal” item of material is at the sole discretion of the Engineer.

1.08 RECEIPT AND FORM OF BID

A. Bids must be submitted at the time and place indicated in the Advertisement for Bids and must be accompanied by the Bid Security and other required documents.

1. Bids must be in an opaque sealed envelope, marked with the Project title and name and address of the Bidder and accompanied by the Bid Security and other required documents.

2. If the Bid is sent through the mail or other delivery system, the sealed envelope must be enclosed in a separate envelope with the notation "BID ENCLOSED" on the face thereof.

B. Bids received after the scheduled time and place indicated in the Advertisement for Bids will be returned unopened.

C. Owner invites bids on the Proposal and any other form(s) attached thereto.

D. The complete set of Contract Documents must be used in preparing Bids; neither the Owner nor the Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Contract Documents.

E. The quantities as shown in Section 00 42 43 - Proposal are approximate only and will be used as a basis of comparison of Bids, and award of Contract(s).

1. Payment will be made on basis of actual quantities of Work performed in accordance with the Contract Documents.

F. Unit Prices must include such amounts as the Bidder deems proper for overhead, profit, taxes, General Conditions and such other incidentals as noted in the Contact Documents.

G. Bidder must acknowledge of receipt of Addenda as provided for in the electronic bidding platform. Failure to acknowledge Addenda will be cause for rejection of bid.

H. The Legal Status of Bidder Form, located in Section 00 43 45 - Legal Status of Bidder, must be submitted with each Bid and must clearly state the legal position of a Bidder. In the case of a corporation, the home address, name and title of all officers must be given. In the case of a partnership, show names and home addresses of all partners. If an individual, so state. Any individual bid not signed by the individual must have attached, thereto, a power of attorney evidencing authority to sign.

I. Other documents to be attached to the Proposal and made a condition thereof are identified in the Proposal.

J. A tabulation of the amounts of the base bids and any alternates will be made available after the opening of Bids.

K. To obtain Contract Documents and submit a Bid, Bidders:

1. Must proceed to the Wade Trim website at www.wadetrim.com/Resources and download the Contract Documents.

1.09 MODIFICATIONS AND WITHDRAWAL OF BIDS

A. Bids may be modified or withdrawn by an appropriate document duly executed (in the manner that a Bid must be executed) and delivered to the place where Bids are to be submitted at any time prior to the opening of Bids.

B. If, within 24 hours after Bids are opened, any Bidder files a duly signed written notice with the Owner and promptly thereafter demonstrates to the reasonable satisfaction of the Owner that there was a material and substantial mistake in the preparation of their Bid, that Bidder may withdraw their Bid and the Bid Security will be returned.

1. Thereafter, at the sole option of the Owner, that Bidder will be disqualified from further Bidding on the Work to be provided under the Contract Documents.

1.10 AWARD OF CONTRACT

A. Owner reserves the right to reject any and all Bids for any reason, to waive any and all informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder, and the right to disregard all nonconforming, non-responsive, unbalanced, or conditional Bids.

B. Discrepancies between words and figures will be resolved in favor of words. Discrepancies in the multiplication of units of work and unit prices, will be resolved in favor of unit price.

C. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

D. In evaluating Bids, the Owner will consider the qualifications of the Bidders, whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices and other data if requested in the Bid forms. It is the Owner's intent to accept alternates (if any are accepted) in the order in which they are listed in the Bid form but the Owner may accept them in any order or combination.

E. Subject to the approval of the Owner, the Contract will be awarded to the lowest responsive and responsible Bidder. Responsibility of Bidder will be determined on basis of past performance and Work of similar character, equipment and labor available to do the Work and financial status.

F. The Contract will be considered to have been awarded after the approval of the Owner has been duly obtained and a formal Notice of Award duly served on the Successful Bidder by the Owner.

G. If the Contract is to be awarded, the Owner will give the Successful Bidder a Notice of Award within 60 days after the day of the Bid opening, unless such other time is specified in the Advertisement for Bids.

H. The Contract will not be binding upon the Owner until the Agreement has been duly executed by the Bidder and the duly authorized officials of the Owner.

1.11 SIGNING OF AGREEMENT

A. Within twenty (20) days after the Owner gives a Notice of Award to the Successful Bidder, the Contractor must sign and deliver the specified number of counterparts of the Agreement to the Owner with all other Contract Documents attached.

B. Within ten (10) days thereafter, the Owner will deliver three fully signed counterparts to the Contractor. Engineer will identify, date or correct those portions of the Contract Documents not fully signed, dated or executed by the Owner and the Contractor and such identification, dating or correction will be binding on all parties.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 00 42 43
PROPOSAL

Owner: Blair Township

Project: Blair Township Hall Wellfield Piping Improvements

Project Location: Blair Township Hall, 2121 County Road 633

BIDDER INFORMATION

Bidder Name: _____

By (Printed Name): _____

Signature: _____

Address: _____

Phone No: _____

Email: _____

Bidder proposes and agrees, if their Bid is accepted, to enter into an Agreement with the Blair Township in the form included in the Contract Documents to complete all Work as specified or indicated in the Contract Documents for the Contract Price and within the Contract Time indicated in the Agreement, and in accordance with the Contract Documents.

In submitting their Bid, Bidder represents, as more fully set forth in the Agreement, that:

Bidder has examined copies of Contract Documents, (consisting of Plans dated October 10, 2025 and Project Manual dated October 10, 2025) which Bidder understands and accepts as sufficient for the purpose, including any and all Addenda officially issued, the receipt of which has been acknowledged.

A. Addendum _____ Acknowledged by: _____ Date: _____

B. Addendum _____ Acknowledged by: _____Date: _____

C. Addendum _____ Acknowledged by: _____ Date: _____

Bidder has examined the surface and subsurface conditions where the Work is to be performed, the legal requirements and local conditions affecting cost, progress, furnishing or performance of the Work, and has made such independent investigations as Bidder deems necessary.

Bidder, by submitting a Bid, agrees that their Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any Agreement or rules of any group, association, organization or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any person, firm or a corporation to refrain from bidding; and Bidder has not sought by collusion to obtain for himself any advantage over any other Bidder or over the Owner.

Bidder agrees to complete the Work, in accordance with the Contract Documents, for the following Contract Price:

Item	Description	Quantity	Unit	Unit Price	Amount
1.	Mobilization, Max. 5%	1	LSUM	$_____	$_____
2.	Steel Discharge Pipe, Remove, 10-inch Dia.	60	LFT	$_____	$_____
3.	Fence, Remove	91	LFT	$_____	$_____
4.	Site Grading	1	LSUM	$_____	$_____
5.	Rip-Rap, MDOT Plain	2	CYD	$_____	$_____
6.	Bituminous Pavement, Remove and Replace, LVSP, 330 lbs/SYD	63	SYD	$_____	$_____

7.	Fence, Chainlink, 6-ft Tall	306	LFT	$_____	$_____
8.	Water Main, Open Cut, PVC, 12-inch Dia., AWWA C900	1,186	LFT	$_____	$_____
9.	Gate Valve and Box, 8-inch Dia	2	Each	$_____	$_____
10.	Gate Valve and Box, 12-inch Dia	2	Each	$_____	$_____
11.	Fire Hydrant Assembly	1	Each	$_____	$_____
12.	Connection to Existing Water Main	1	Each	$_____	$_____
13.	Discharge Pipe, Open Cut, HDPE N-12, 12-inch Dia.	80	LFT	$_____	$_____
14.	End Section, HDPE N-12, 12-inch Dia.	1	Each	$_____	$_____
15.	Discharge Pipe, Connection to Existing Manhole	1	Each	$_____	$_____
16.	Electrical Conduit, PVC Sch. 80, 2-inch	1,990	LFT	$_____	$_____
17.	Restoration	1	LSUM	$_____	$_____

Total Contract Price (Items 1 through 17) $_____

Bidder, by submitting a Bid, thereby certifies that Bidder or a qualified designated person in Bidder's employ has examined the Contract Documents provided by the Owner for bidding purposes. Further, they certify that Bidder or Bidder's qualified employee has reviewed the Bidder's proposed construction methods and finds them compatible with the conditions which Bidder anticipates from the information provided for Bidding.

Bidder, by submitting a Bid, agrees to complete the Work under any job circumstances or field conditions present and/or ascertainable prior to bidding. In addition, Bidder agrees to complete the Work under whatever conditions Bidder may create by Bidder's own sequence of construction, construction methods, or other conditions he may create, at no additional cost to the Owner.

Bidder, by submitting a Bid, declares that Bidder has familiarized them self with the location of the proposed Work and the conditions under which it must be constructed. Also, Bidder has carefully examined the Plans, the Specifications, and the Contract Documents, which Bidder understands and accepts as sufficient for the purpose, and agrees that Bidder will Contract with the Owner to furnish all labor, material, tools, and equipment necessary to do all Work specified and prescribed for the completion of the Project.

Bidder will provide a bid bond, in the amount of at least **five (5)** percent of the amount Bid, drawn payable to Blair Township as security for the proper execution of the Agreement.

Bidder, by submitting a Bid, agrees that if awarded Contract, to sign the Agreement and submit satisfactory bonds and certificates of insurance coverage and other evidence of insurance required by the Contract Documents within 15 days after the date of Owner's Notice of Award.

Bidder, by submitting a Bid, agrees that time is of the essence and, if awarded Contract, that the Work will be Completed on or before the dates/days as specified in the Agreement.

Liquidated damages, as specified in the General Conditions, Supplementary Conditions and Agreement, will also apply to the Substantial Completion date.

Engineering and inspection costs incurred after the final completion date will be paid by the Contractor to the Owner as specified in the Conditions of the Contract and Agreement.

Proposals may not be withdrawn for a period of 60 days after bid opening.

The following documents are made a condition of this Proposal:

A. Required Bid Security

B. Legal Status of Bidder

SECTION 00 43 13
BID BOND FORM

KNOW ALL BY THESE PRESENT, that we, the undersigned, _____ as Principal, hereinafter called the Principal, a corporation duly organized under the laws of the State of _____, and duly authorized to transact business in the state of Michigan, as Surety, _____, hereinafter called the Surety, are held and firmly bound unto the Owner, hereinafter called Owner, in the sum of _____ Dollars ($_____) for the payment of which sum well and truly to be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a Bid for Blair Township Hall Wellfield Piping Improvements.

NOW, THEREFORE, if the Owner accepts the Bid of the Principal and the Principal will enter into a Contract with the Owner in accordance with the terms of such Bid, and give such Bond or Bonds as may be specified in the Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Principal to enter such Contract and give such Bond or Bonds, if the Principal pays to the Owner the difference not-to-exceed the penalty hereof between the amount specified in said Bid and such larger amount for which the Owner may in good faith contract with another party to perform the Work covered by said Bid, then this obligation will be null and void, otherwise to remain in full force and effect.

Signed and sealed this _____ day of _____, 20___.

_____ _____

(Witness) (Principal)

_____

(Title)

_____ _____

(Witness) (Surety)

_____

(Title)

SECTION 00 43 45
LEGAL STATUS OF BIDDER

(The Bidder should check the appropriate box and complete the information requested therein)

☐ A corporation, duly authorized and doing business under the laws of the State of Michigan, for whom _____ whose signature is affixed to this Bid, is duly authorized to execute contracts.

☐ A limited liability company, duly authorized and doing business under the laws of the State of Michigan, for whom _____, whose signature is affixed to this Bid, is duly authorized to execute contracts.

☐ A partnership, all partners with their addresses are:

_____ _____

_____ _____

_____ _____

☐ An individual, whose signature is affixed to this Bid.

_____ _____

SECTION 00 51 00
NOTICE OF AWARD

Attention: _____ Date: _____

Project: Blair Township Hall Wellfield Piping Improvements

Pursuant to the provisions of Article 1.11 of the Instructions to Bidders (Section 00 21 13), you are hereby notified that the _____ (Owner) during a _____Meeting held on _____, _____, 20___ has directed the acceptance of your Bid for the above referenced Project in the amount of _____Dollars ($_____).

This Project consists of: Installation of of approximately 1,200 linear feet of 8-inch and 12-inch water main, associated valves, fittings, and a hydrant, PVC conduit, retention basin expansion, replacement of 12-inch discharge piping, fencing, restoration, and other work. as delineated in your Bid submitted to Blair Township on 11-04-2025.

Please comply with the following conditions within15 days of the date of this Notice of Award; that is by _____, 20_____.

Deliver to Engineer _____ (_____) fully executed counterparts of the Agreement (Section 00 52 00) including all the Contract Documents.

Deliver with the executed Agreement the Contract Security (Bonds), on the form included in the Contract Documents, as specified in the General Conditions (Article 5, Section 00 72 00).

Deliver with the executed Agreement the Insurance Certificates (and other evidence of insurance) as specified in the General Conditions (Article 5, Section 00 72 00).

Please do not date Agreement and Contract Security (Bonds), as these will be dated by the Owner when executed by them.

It is important to comply with these conditions and time limits as failure to comply with these conditions within the time specified will entitle Owner to consider your bid abandoned, to annul this Notice of Award and to declare your Bid Security forfeited.

Within10 days after you comply with those conditions, Owner will return to you 2 fully signed counterparts of the Agreement with the Contract Documents attached.

In accordance with paragraph 2.05 of the General Conditions (Section 00 72 00), please submit to Engineer the required schedules prior to the scheduling of a Pre-Construction Meeting.

Owner: _____

Authorized Signature: _____

Copy to Wade Trim Associates, Inc.

SECTION 00 52 00
AGREEMENT

This Agreement, made and entered into this _____ day of _____ in the year 20___, by and between Blair Township hereinafter called Owner, and _____ hereinafter called Contractor, in consideration of the mutual covenants hereinafter sent forth, agree as follows:

Contractor will complete the Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

Installation of of approximately 1,200 linear feet of 8-inch and 12-inch water main, associated valves, fittings, and a hydrant, PVC conduit, retention basin expansion, replacement of 12-inch discharge piping, fencing, restoration, and other work.

The Work will be substantially completed on or before **June 16, 2026,** and completed and ready for final payment in accordance with paragraph 14.11 of Section 00 72 00 - General Conditions on or before **June 30, 2026.**

Engineering and inspection costs incurred after the specified final completion date will be paid by the Contractor to the Owner prior to final payment authorization.

Charges will be made at such times and in such amounts as the Engineer will invoice the Owner, provided however said charges will be in accordance with the Engineer's current rate schedule at the time the costs are incurred.

The costs of the Engineer incurred after the specified final completion date will be deducted from the Contractor's progress payments.

Owner and Contractor recognize that time is of the essence of this Agreement and that the Owner will suffer financial loss if the Work is not Substantially Complete within the time specified in paragraph 1.03.A above, plus any extensions thereof allowed in accordance with Article 12 of Section 00 72 00. They also recognize the delays, expense and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by the Owner if the Work is not Substantially Complete on time. Accordingly, instead of requiring any such proof, the Owner and the Contractor agree that as liquidated damages for delay (but not as penalty) the Contractor will pay the Owner Five Hundred Dollars ($500.00) for each day that expires after the time specified in paragraph 1.03.A above for Substantial Completion until the Work is Substantially Complete.

Liquidated damages charged will be deducted from the Contractor's progress payment.

Owner will pay Contractor as provided in the attached Proposal for performance of the Work in accordance with the Contract Documents.

Progress payments and retainage under this Contract are governed by the provisions of PA 1980, No. 524 (MCLA 125.1561 et seq.). That Act is incorporated herein by reference and made a part of this Contract. Without excluding any provisions of the Act from this Contract, but in order to comply therewith and summarize certain provisions, the following will apply:

Person representing the Contractor who will submit written requests for progress payments will be: _____

Person representing the Owner to whom requests for progress payments are to be submitted will be:

_____

Contractor's representative, listed above, will submit Applications for Payment on the form provided in the Contract Documents in accordance with Article 14 of Section 00 72 00. Applications for Payment will be processed as provided in Section 00 72 00.

In order to induce the Owner to enter into this Agreement, the Contractor makes the following representations:

Contractor has considered the nature and extent of the Contract Documents, Work, locality, and all local conditions and federal, state and local laws, and regulations that may affect cost, progress, performance, or furnishing of the Work.

Contractor has studied carefully all reports of investigations and tests of subsurface and latent physical conditions at the site or otherwise affecting cost, progress or performance of the Work which were relied upon in the preparation of the Plans and Specifications and which have been identified in the Supplementary Conditions (Section 00 73 00).

Contractor has made or caused to be made examinations, investigations and tests and studies of such reports and related data in addition to those referred to above as the Contractor deems necessary for the performance of the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents; and no additional examinations, investigations, tests, reports or similar data are or will be required by the Contractor for such purposes.

Contractor has correlated the results of such observations, examinations, investigations, tests, reports and data with the terms and conditions of the Contract Documents.

Contractor has given Engineer written notice of conflicts, errors or discrepancies that Engineer has discovered in the Contract documents and the written resolution thereof by Engineer is acceptable to the Contractor.

The Contract Documents which comprise the entire Contract between the Owner and the Contractor are attached to this Agreement, made a part hereof, and consists of the following:

A. Procurement Requirements (including the Advertisement for Bids, Instructions to Bidders, Proposal, Legal Status of Bidder, and other Documents listed in the Table of Contents thereof).

B. This Agreement

C. Performance and other Bonds

D. Notice of Award

E. Notice to Proceed (if issued)

F. Conditions of the Contract (including Section 00 72 00 - General Conditions and Section 00 73 00 - Supplementary Conditions, if any)

G. Specifications contained within Division 01 through 49 of the Project Manual

H. Plans bearing the following general title: Blair Township Hall Wellfield Piping Improvements

I. Addenda numbers _____ to _____, inclusive

J. Documentation submitted by the Contractor prior to Notice of Award

K. Any Modification, including Change Orders, duly delivered after execution of Agreement.

Terms used in this Agreement which are defined in Article 1 of Section 00 72 00 will have the meanings indicated in Section 00 72 00.

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

Owner and Contractor each binds them self, partners, successors, assigns and legal representatives to the other party hereto, their partners, successors, assigns and legal representatives in respect to all covenants, agreements and obligations contained in the Contract Documents.

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 the Owner and the Contractor, who 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.

IN WITNESS WHEREOF, the parties hereto have signed this Agreement in three counterparts. One counterpart each has been delivered to Owner and Contractor, and one counterpart has been delivered to the Engineer. The Contract Documents have been signed or identified by Owner and Contractor.

This Agreement will be effective on _____, 20____.

Owner: Blair Township

By: _____

Authorized Signature: _____

Attest: _____

Address for giving notices:

_____

_____

_____

Contractor: _____

By: _____

Authorized Signature: _____

Attest: _____

Address for giving notices:

_____

_____

_____

License No. _____

Agent for service of process: _____

SECTION 00 55 00
NOTICE TO PROCEED

To: _____ Date: _____, 20_____

_____

Attention: _____

Project: Blair Township Hall Wellfield Piping Improvements

Please note that the Contract Time under the above Contract will commence to run on _____, 20___. Within **ten (10)** days of this date you are to start performing the Work. The dates of Substantial Completion and Final Completion are set forth in the Agreement: they are _____, and _____, respectively.

The following conditions must be met by Contractor:

In accordance with Article 2.05 of Section 00 72 00 - General Conditions, please submit to the Engineer the required Schedules prior to the scheduling of a Pre-Construction Meeting.

In accordance with Article 2.05 of Section 00 72 00 - General Conditions, please request a Pre-Construction Meeting from the Engineer prior to delivery of any materials or start of any construction.

Notify the Engineer a minimum of **three (3)** full working days' notice to schedule a Pre-Construction Meeting.

Work at the site must be started by _____, 20_____.

Owner: _____

Authorized Signature: _____

COPY TO Wade Trim Associates, Inc.

SECTION 00 61 12.13
LABOR AND MATERIAL PAYMENT BOND FORM

Bond No. _____

KNOW ALL BY THESE PRESENT, That we, _____, a corporation organized and existing under the laws of the State of, and duly authorized to transact business in the State of Michigan, hereinafter called the "Principal," and _____, a corporation organized and existing under the laws of the State of _____, and duly authorized to transact business in the State of Michigan, as Surety, hereinafter called "Surety", are held and firmly bound unto _____, as Obligee, and hereinafter called "Obligee," in the just and full sum of _____Dollars ($_____) lawful money of the United States of America, to be paid to the said Obligee, to which payment well and truly to be made, we bind ourselves, our heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITIONS OF THIS OBLIGATION is such that, WHEREAS, the above Principal has entered into a contract with the said Obligee, dated the day of _____, 20_____, for _____

_____.

Herein referred to and made a part hereof as fully and to the same extent as if the same were entirely written herein, and

WHEREAS, it was one of the conditions of the award of the said Obligee, pursuant to which said contract was entered into, that these presents should be executed.

AND WHEREAS, this Bond is given in compliance with and subject to the provisions of Act No. 213 of the Public Acts of Michigan for the year 1963, as amended, including all notices, time limitation provisions and other requirements set forth therein, which are incorporated herein by reference.

AND THE SAID SURETY, for value received, hereby stipulates and agrees that no change, extension of time, or any other forbearance, alteration or addition to the terms of the contract or to the Work to be performed thereunder or the Contract Documents accompanying the same will in anywise affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, or any other forbearance, alteration or addition to the terms of the contract or to the Work or to the Contract Documents.

NOW, THEREFORE, the condition of this obligation is such that if all claimants as defined in Act No. 213 of the Public Acts of Michigan for the year 1963, as amended, are timely paid for all labor and material used or reasonably required for use in the performance of the contract, then this obligation will be void; otherwise, it will remain in full force and effect.

Signed and sealed this day of _____, 20_____.

Signed, sealed and delivered in the presence of:

Witness for Contractor: _____

_____ (Principal)

_____ (Title)

By: _____

Witness for Surety: _____

_____ (Surety)

_____ (Title)

By: _____

_____ (Attorney-in-Fact) Seal

Address of Surety: _____

Telephone: _____

SECTION 00 61 13.13
PERFORMANCE BOND FORM

Bond No. _____

KNOW ALL BY THESE PRESENT, That we, _____, a corporation organized and existing under the laws of the State of, and duly authorized to transact business in the State of Michigan, hereinafter called the "Principal," and _____, a corporation organized and existing under the laws of the State of _____, and duly authorized to transact business in the State of Michigan, as Surety, hereinafter called "Surety", are held and firmly bound unto _____, as Obligee, and hereinafter called "Obligee," in the just and full sum of _____ Dollars ($_____) lawful money of the United States of America, to be paid to the said Obligee, to which payment well and truly to be made, we bind ourselves, our heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITIONS OF THIS OBLIGATION is such that, WHEREAS, the above Principal has entered into a contract with the said Obligee, dated the day of _____, 20_____, for _____

_____.

Herein referred to and made a part hereof as fully and to the same extent as if the same were entirely written herein, and

WHEREAS, it was one of the conditions of the award of the said Obligee, pursuant to which said contract was entered into, that these presents should be executed.

AND THE SAID SURETY, for value received, hereby stipulates and agrees that no change, extension of time, or any other forbearance, alteration or addition to the terms of the contract or to the work to be performed thereunder or the Contract Documents accompanying the same will in anywise affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, or any other forbearance, alteration or addition to the terms of the contract or to the Work or to the Contract Documents.

NOW, THEREFORE, if the above Principal will in all respects comply with the terms and conditions of said contract, and their obligations thereunder, including the Contract Documents therein referred to and made a part thereof, and such alteration as may be made in such contract or Contract Documents, as herein or therein provided for, then this obligation will be void; otherwise, this bond and obligation will be and remain in full force and effect.

Signed and sealed this day of _____, 20_____.

Signed, sealed and delivered in the presence of:

Witness for Contractor: _____

_____ (Principal)

_____ (Title)

By: _____

Witness for Surety: _____

_____ (Surety)

_____ (Title)

By: _____

_____ (Attorney-in-Fact) Seal

Address of Surety: _____

Telephone: _____

SECTION 00 61 19.13
MAINTENANCE AND GUARANTEE BOND FORM

Bond No. _____

KNOW ALL BY THESE PRESENT, That we, _____, a corporation organized and existing under the laws of the State of, and duly authorized to transact business in the State of Michigan, hereinafter called the "Principal," and _____, a corporation organized and existing under the laws of the State of _____, and duly authorized to transact business in the State of Michigan, as Surety, hereinafter called "Surety", are held and firmly bound unto _____, as Obligee, and hereinafter called "Obligee," in the just and full sum of _____ Dollars ($_____) lawful money of the United States of America, to be paid to the said Obligee, to which payment well and truly to be made, we bind ourselves, our heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITIONS OF THIS OBLIGATION is such that, WHEREAS, the above Principal has entered into a contract with the said Obligee, dated the day of _____, 20_____, for _____

_____

_____

Herein referred to and made part hereof as fully and to the same extent as if the same were entirely written herein, and

NOW THEREFORE, the condition of this obligation is that under the Contract Documents, Contractor has agreed with Owner that for a period of one (1) year from the date of payment of the Final Estimate, Contractor will keep in good order and repair any defect in the Work, either by Contractor or its Subcontractors that may develop or be discovered during said one (1) year period due to improper materials, defective equipment, workmanship, or arrangements and any other work affected in making good such imperfections. Contractor also agreed to promptly make such repairs as directed by Owner for replacement of the Work, without cost to Owner, except for such parts of the Work as may have been disturbed without the consent of Contractor after the final acceptance of the Work, whenever directed so to do by notice from Owner. If Contractor fails to make such repair within one (1) week from the date of receipt of such notice, then Owner will have the right to purchase such materials and employ such labor and equipment as may be necessary for the purpose and to undertake, to and make such repairs and charge the cost thereof to Contractor and receive payment for the same promptly from the Contractor or Surety.

If any repair is necessary to be immediately made to protect persons or property then, and in such event, Owner may, but will not be required to, take immediate steps to repair such defects without notice to Contractor. In such event, Owner will not be required to obtain the lowest bid for the performance of the Work or any part thereof, and all sums actually paid therefore will be charged to the Contractor or Surety. In this regard, the judgment of Owner will be final and conclusive. Contractor will, for a period of one (1) year from the date of payment of the Final Estimate, keep the Work in good order and repair, except for such parts of the Work which may have been disturbed without the consent of Contractor after the final acceptance of the Work. Contractor will further, whenever notice is given as hereinbefore specified, promptly proceed to make the repair as in said notice directed or reimburse Owner for any cost incurred by Owner in making such repairs.

If Contractor or Surety fail to do as hereinbefore specified, they will jointly and severally indemnity, defend, and hold harmless Owner from and against all and any losses, costs, suits, and actions for damages of every kind and description brought or claimed against Owner for or on account of any injury or damage to persons or property received or sustained by any party or parties by or from any of the acts of omissions or through the negligence of Contractor, its Subcontractors, Suppliers, servants, agents, or employees in connection with the Work and then from any and all claims arising under the Workmen's Compensation Act of the State of Michigan.

IN WITNESS WHEREOF, the parties hereto have caused this Maintenance and Guarantee Bond to be executed by their respective authorized officers this _____, 20_____.

Signed, sealed and delivered in the presence of:

Witness for Contractor: _____

_____ (Principal)

_____ (Title)

By: _____

Witness for Surety: _____

_____ (Surety)

_____ (Title)

By: _____

_____ (Attorney-in-Fact) Seal

Address of Surety: _____

Telephone: _____

SECTION 00 62 75
ENGINEER'S CERTIFICATE FOR PAYMENT

Job Number: _____ Certificate Number: _____ Date: _____

Owner: _____ Contractor: _____

Project: _____

Contract Date: _____

Substantial Completion: _____ Extended To: _____

Final Completion: _____ Extended To: _____

****

Original Contract Price: _____ Total Earned To Date: _____

Adjustments to Quantities: _____ Retention: _____

Extras: _____ Deductions: _____

Total Change Orders: _____ Total Withheld: _____

Amended Contract Price: _____ Total Net Due: _____

Less Total Net Due: _____ Less Previous Certificates: _____

Balance on Contract: _____ Balance Due This Certificate: _____

****

ENGINEER'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on the data comprising the above application, the Engineer to the best of Engineer's knowledge, information, and belief and subject to the limitations stated in the Contract Documents certifies to the Owner that: (1) Work has progressed to the point indicated, (2) that the quality of the Work is in accordance with the Contract Documents, and (3) Contractor is entitled to payment of the TBalance Due This Certificate.

Certified By: _____ Date: _____

SECTION 00 62 76
CONTRACTOR'S APPLICATION FOR PAYMENT

Job Number: _____ Application No: _____ Date: _____

Owner: _____ Contractor: _____

Project: _____

Contract Date: _____

Period of this Application: _____ to _____

****

Total Earned To Date: _____ Less Total Earned to Due: _____

Previous Certificate: _____ Total Earned this Application: _____

CONTRACTOR'S CERTIFICATION

The undersigned Contractor certifies that to the best of Contractor's knowledge, information, and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by Contractor for Work for which previous Certificates for Payment were issued and payments received from Owner, and that current payment shows herein is now due.

By: _____ Title: _____

CONTRACTOR'S DECLARATION

I hereby declare that I have not, during the period covered by this Application, performed any work, furnished any material, sustained any loss, damage, or delay for any reason, including soil conditions encountered or created, or otherwise done anything for which I will ask, demand, sue for, or claim compensation from the Owner or its agents, and the Engineer or its agents, in addition to the regular items set forth in the Contract as dated above executed between myself and the Owner and in the Change Orders for Work issued by the Owner in writing as provided thereunder, except as I hereby make claim for additional compensation and/or extension of time, as set forth on the itemized statement attached hereto.

By: _____ Title: _____

SECTION 00 62 77
PAYMENT SCHEDULE

Application No.: _____ Date: _____ Period: _____

Item of Work	Unit	Original Estimated Quantity	Unit Price	Period Quantity	Period Amount	Total Quantity to Date	Total Amount to Date

SECTION 00 63 25
SUBSTITUTION REQUEST FORM

Specification Section: _____

Specified Product: _____

Proposed Substitution: _____

Does specified product exceed, in any respect proposed substitution?	___Y	___N
Does substitution affect dimensions shown on Plans?	___Y	___N
Does substitution affect other trades more than original product?	___Y	___N
Does warranty differ from that specified?	___Y	___N
Does substitution affect cost to Owner?	___Y	___N
Does substitution result in any license fee or royalty?	___Y	___N

If you indicated "Yes" to any of the items above, attach thorough explanation on your Company letterhead, as follows:

Explain any differences between proposed substitution and specified product.

Summarize experience with product and manufacturer in Project area.

Attach complete technical data and literature.

The undersigned states that the function, appearance, and quality of the proposed substitution is equivalent or superior to the specified item, and that all information above and attached is true and correct.

Submitted By: _____

Signature: _____ Date: _____

Position: _____ Company: _____

Address: _____

Telephone: _____ Email: _____

SECTION 00 63 70
CHANGE PROPOSAL FORM

Project: _____ Date: _____

Contractor: _____

Owner: _____

This Change Proposal is submitted in accordance with paragraph 10.06 of Section 00 72 00 - General Conditions. If this Change Proposal is accepted, either in whole or in part, a Change Order will be issued to modify the Contract Documents accordingly.

Detailed Description of Proposed Change	
____	
Attachments (List documents attached supporting requested change)	
____	
____	
____	
Change in Contract Price	**Change in Contract Time**
Original Contract Price:$____	Original Contract Time: Substantial Completion: MM-DD-YYYY Final Completion: MM-DD-YYYY
Increase or Decrease from previously approved Change Order(s): $_____	Increase or Decrease from previously approved Change Order(s): Substantial Completion: MM-DD-YYYY Final Completion: MM-DD-YYYY
Contract Price prior to this Change Proposal: $____	Contract Time prior to this Change Proposal: Substantial Completion: MM-DD-YYYY Final Completion: MM-DD-YYYY
Increase or Decrease of this Change Proposal: $____	Increase or Decrease of this Change Proposal: Substantial Completion: MM-DD-YYYY Final Completion (days): MM-DD-YYYY
Contract Price incorporating this Change Proposal: $____	Contract Time incorporating this Change Proposal: Substantial Completion: MM-DD-YYYY Final Completion: MM-DD-YYYY
Engineer's Decision on Change Proposal	
____	

Contractor:	Engineer:	Owner:
By: _____	By: _____	By: _____
Date: _____	Date: _____	Date: _____

SECTION 00 65 16
CERTIFICATE OF SUBSTANTIAL COMPLETION

Project: Blair Township Hall Wellfield Piping Improvements

Owner: Blair Township

Contractor: _____

Contract Date: _____ Project No.: _____

Date of Issuance: _____

Project or Designated Portion will include: _____

The Work performed under this Contract has been reviewed and found to be Substantially Complete. The _____ which is also the date of commencement of applicable warranties required by the Contract Documents except as stated below. date of Substantial Completion of the Project or portion thereof designated above is hereby established as: _____

DEFINITION OF DATE OF SUBSTANTIAL COMPLETION

The date of Substantial Completion of the Work or designated portion thereof, is the date certified by the Engineer when construction is sufficiently complete, in accordance with the Contract Documents, so the Owner can occupy or utilize the Work or designated portion thereof for the use for which it is intended, as expressed in the Contract Documents.

A list of items to be completed or corrected, prepared by the Engineer is attached hereto. 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. The date of commencement of warranties for items on the attached list will be the date of final payment unless otherwise agreed to in writing.

The responsibilities of the Owner and the Contractor for security, maintenance, heat, utilities, damage to the Work and insurance will be as follows:

_____

Owner will have **45** calendar days after receipt of this certificate during which Owner may make written objection to Engineer and Contractor as to any provisions of the certificate or attached list. Such objection may be cause for this Certificate of Substantial Completion to be null and void.

Engineer: _____

By: _____

Date: _____

SECTION 00 65 20
SWORN STATEMENT

State of Michigan

County of _____}

being duly sworn, deposes and says:

That _____ is the (Contractor) (Subcontractor) for an improvement to the following described real property situated in _____ County, Michigan described as follows:

Insert Legal Description of Property

That the following is a statement of each Subcontractor and Supplier and laborer, for which the payment of wages or fringe benefits and withholdings is due but unpaid, with whom the (Contractor) (Subcontractor) has (contracted) (subcontracted) for performance under the contract with the Owner or lessee thereof, and that the amounts due to the persons as of the date hereof are correctly and fully set forth opposite their names, as follows:

Name of Subcontractor/ Supplier/ Laborer	Type of Improvement Furnished	Total Contract Price	Amount Already Paid	Amount Currently Owing	Balance to Complete (optional)	Amount of Laborer Wages Due but Unpaid	Amount of Laborer Fringe Benefits and Withholdings Due But Unpaid
TOTALS:							

(Some columns are not applicable to all persons listed)

Contractor has not procured material from, or subcontracted with, any person other than those set forth on the reverse side and owes no money for the improvement other than the sums set forth on the reverse side.

Deponent further says that they make the foregoing statement as the (Contractor) (Subcontractor) or as _____ of the (Contractor) (Subcontractor) for the purpose of representing to the Owner or lessee of the described on the reverse side premises and their agents that the property described on the reverse side is free from claims of construction liens, or the possibility of construction liens, except as specifically set forth on the reverse side and except for claims of construction liens by laborers which may be provided pursuant to Section 109 of the Construction Lien Act, Act No. 497 of the Public Acts of 1980, as amended, being section 570.1109 of the Michigan Compiled Laws.

Warning to Owner: Owner or Lessee of the property described herein may not relay on this Sworn Statement to avoid claim of a Subcontractor, supplier or laborer who has provided a Notice of Furnishing pursuant to Section 109 of the Construction Lien Act to the Designee or to the Owner or Lessee if the Designee is not named or has died.

Warning to Deponent: A person, who with intent to defraud, gives a false Sworn Statement, is subject to criminal penalties as provided in Section 110 of the Construction Lien Act, Act No. 497 of the PUblic Acts of 1980, as amended, being Section 570.1110 of the Michigan Complied Laws.

_____ day of _____, 20____.

Notary Public: _____

_____ County, Michigan

My Commission Expires: _____

INSTRUCTIONS

A Sworn Statement in the preceding form must be provided before any Contractor or Subcontractor can file a Complaint, Cross-Claim, or Counter-Claim to enforce a construction lien.

An Owner or lessee may withhold payment to a Contractor or Subcontractor who has not provided a Sworn Statement. Owner or lessee may withhold from a Contractor or Subcontractor who has provided a Sworn Statement the amount sufficient to pay all sums shown on the statement as owing Subcontractors, Suppliers, and laborers, or the amount shown to be due to lien claimants who have provided Notices of Furnishing pursuant to the Construction Lien Act of 1980.

Owner or lessee may rely on a Sworn Statement to avoid a lien claim unless the lien claimant has provided the Owner or lessee with a Notice of Furnishing pursuant to the Construction Lien Act of 1980.

If the contract provides for payments by the Owner to the Contractor, if any, in the normal course of construction, but the Owner elects to pay lien claimants directly, the first time the Owner elects to make payment directly to a lien claimant they will provide at least 5 business days' notice to the Contractor of the intention to make direct payment. Subsequent direct disbursements to lien claimants need not be preceded by the 5-day notice provided in this section unless the Owner first returns to the practice of paying all sums to the Contractor.

SECTION 00 72 00 - GENERAL CONDITIONS

ARTICLE 1 DEFINITIONS

1.01 DEFINED TERMS

A. Wherever used in these General Conditions or in the other Contract Documents, the following terms have the meanings indicated which are applicable to both the singular and plural thereof:

1. Addenda -- Written or graphic instruments issued prior to the opening of Bids which clarify, correct or change the Contract Documents.

2. Agreement -- The written Agreement between Owner and Contractor covering the Work to be performed; other Contract Documents are attached to the Agreement and made a part thereof as provided therein.

3. Application and Certificate for Payment -- The form included in the Contract Documents which is to be used by Contractor in requesting progress or final payment and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. Bid -- The offer or proposal of the bidder submitted on the prescribed form setting forth the price(s) for the Work to be performed.

5. Bidding Requirements -- The Advertisement for Bids, Instructions to Bidders, Supplementary Instructions to Bidders, Proposal, Legal Status of Bidder, Bid Bond, and any other documents identified in the Proposal, to be submitted with the Bid.

6. Bonds -- Bid, Performance and Payment bonds and other instruments of security.

7. Change Order -- A written order to Contractor, reviewed by Engineer and signed by Owner, issued after execution of the Contract, authorizing a change in the Work or an adjustment in the Contract Price or the Contract Time. The Contract Price and Contract Time may be changed only by Change Order. A Change Order signed by Contractor indicates Contractor's agreement therewith, including that the Change Order constitutes a final adjustment in the Contract Price or Contract Time for all issues addressed or described in the Change Order.

8. 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.

9. Claims --

   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, 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.

10. Constituents 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.

11. Contract -- The entire and integrated written contract between Owner and Contractor concerning the Work.

12. Contract Documents -- Those items so designated in the Agreement, and which together comprise the Contract.

13. Contract Price -- The monies or other considerations payable by Owner to Contractor for completion of acceptable Work in accordance with the Contract Documents as stated in the Agreement.

14. Contract Time -- The number of days or the date stated in the Agreement:

    a. to achieve Substantial Completion of all or any specified portions of the Work, and;

    b. to complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment in accordance with paragraph 14.11.

15. Contractor -- The person, firm or corporation with whom Owner has entered into the Agreement.

16. 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 in paragraph 12.01.

17. Day -- A calendar day of 24 hours measured from midnight to the next midnight.

18. Defective -- An adjective which when modifying the word Work refers to Work that is unsatisfactory, faulty or deficient, in that it does not conform to the Contract Documents or does not meet the requirements of any inspection, reference standard, test or approval referred to in the Contract Documents, or has been damaged prior to Engineer's recommendation of final payment.

19. Drawings -- See Plans.

20. Effective Date of Agreement -- The date indicated in the Agreement on which it becomes effective, but if no such date is indicated it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

21. 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.

22. 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.

23. Engineer -- The person, firm, or corporation identified in the Supplementary Instructions to Bidders hired by Owner to prepare Plans and Specifications for the Project and to assist Owner in interpreting Plans and Specifications during the performance of the Work. Engineer's authority and responsibility are set forth in the Contract between Owner and Engineer. Contractor acknowledges and agrees that Engineer's obligations and duties under Engineer's contract with Owner are obligations and duties to Owner only, and Engineer has no independent obligation to Contractor of any kind, including but not limited to providing services, or to take any action or to refrain from taking action on behalf of Contractor or any Subcontractor, Sub-Subcontractor or Supplier.

24. Field Order -- A written order issued by Engineer which clarifies or interprets the Contract Documents or orders minor changes in the Work in accordance with paragraph 9.04 and paragraph 9.05 but which does not involve a change in the Contract Price or the Contract Time.

25. Hazardous Environmental Conditions -- 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.

26. Laws and Regulations; Laws or Regulations -- Any and all applicable laws, rules, regulations, ordinances, codes and orders of any and all governmental bodies, agencies, authorities and courts having jurisdiction.

27. Lump Sum -- Construction Work where Owner pays a single stipulate price (Lump Sum) for the entire scope of Work; plus or minus alternates and/or allowances. However, unit prices may be required for individual items of Work for the purposes of changes, additions, or deletions.

28. Milestone -- A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of the Work.

29. Notice of Award -- The written notice by Owner to the apparent successful Bidder stating that, upon compliance by the apparent successful Bidder with the conditions precedent enumerated therein, within the time specified, Owner will sign and deliver the Agreement.

30. Notice to Proceed -- A written notice given by Owner to Contractor (with a copy to Engineer) fixing the date on which the Contract Time will commence to run and on which Contractor will start to perform Contractor's obligation under the Contract Documents.

31. Owner -- The public body or authority, corporation, limited liability company, association, partnership, or individual with whom Contractor has entered into the Agreement and for whom the Work is to be provided and as identified in the Supplementary Instructions to Bidders.

32. Partial Utilization -- Use by Owner of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work.

33. Plans -- The part of the Contract Documents which graphically show the extent, character and Scope of the Work to be furnished and performed by Contractor and which have been prepared or approved by Engineer or Owner; sometimes also referred to as Drawings.

34. 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.

35. Project -- The total construction of which the Work to be provided under the Contract Documents may be the whole or a part as indicated elsewhere in the Contract Documents.

36. Project Manual -- The volume assembled for the Project which may include, among other parts, Procurement Requirements, Contracting Requirements and Specifications.

37. Proposal -- The offer or bid of the Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

38. Radioactive Material -- Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 as amended.

39. Resident Project Representative -- The authorized representative of Engineer who may be assigned to the Site or any part thereof.

40. Samples -- Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

41. Schedule of Submittals -- A schedule, prepared and maintained by Contractor, of required Submittals and the time requirements for Engineer’s review of the Submittals.

42. 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.

43. Shop Drawings -- All drawings, diagrams, illustrations, schedules and other data or information required by the Contract Documents which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate material or equipment for some portion of the Work.

44. 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.

45. Specifications -- That part of the Contract Documents which consist of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the Work and certain administrative details applicable thereto.

46. Subcontractor -- An individual, firm or corporation having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.

47. 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.

48. Substantial Completion -- The Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer as evidenced by the Certificate of Substantial Completion, it is sufficiently complete, in accordance with the Contract Documents, so that the Work (or specified part) can be utilized for the purposes for which it was intended; or if no such certificate is issued, when the Work is complete and ready for final payment as evidenced by Engineer's written recommendation of final payment in accordance with paragraph 14.11. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

49. Supplementary Conditions -- The part of the Contract Documents which amends or supplements these General Conditions.

50. Supplementary Instructions to Bidders -- The part of the Contract Documents which amends or supplements the Instructions to Bidders.

51. Supplier -- A manufacturer, fabricator, supplier, distributor, material man, or vendor having a direct contract with Contractor, or with any Subcontractor, or with Owner, to furnish materials or equipment to be incorporated in the Work by Contractor or any Subcontractor.

52. Unit Price -- Construction Work where Owner pays a fixed sum (Unit Price) per each completed unit of Work. Units are listed on the Proposal Form.

53. Utilities – Underground or above ground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments, and any structures or encasements containing such facilities, which have been installed to furnish any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or other control systems, water or other liquids or chemicals.

54. Work -- The entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents. Work includes and is the result of performing or furnishing labor and furnishing and incorporating materials and equipment into the construction, and performing or furnishing services and furnishing documents, all as required by the Contract Documents.

55. Work Change Directive -- A written directive to Contractor, issued on or after the Effective Date of the Agreement and signed by Owner and reviewed by Engineer, ordering an addition, deletion or revision in the Work, or responding to differing or unforeseen physical conditions under which the Work is to be performed as provided in paragraph 4.03 or to emergencies under paragraph 6.18. A Work Change Directive will not change the Contract Price or Contract Time but is evidence that the parties expect that the change directed or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Time as provided in paragraph 10.01.

1.02 TERMINOLOGY

A. The following words, terms, or phrases are not defined but, when used in the Contract Documents, have the following meaning:

1. Whenever in the Contract Documents the terms “as ordered,” “as directed,” “as required,” “as allowed,” “as approved” or terms of like effect or import are used; or the adjectives “reasonable,” “suitable,” “acceptable,” “proper” or “satisfactory” or adjectives of like effect or import are used to describe a requirement, direction, review or judgment of Engineer as to the Work, it is intended that such requirement, direction, review or judgment will be solely to evaluate, in general, the completed Work for compliance with the technical requirements of and information in the Contract Documents and conformance with the design concept of the completed 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 will not be effective to assign to Engineer any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraph 9.10 or any other provision of the Contract Documents.

2. The word “furnish,” when used in connection with services, materials, or equipment, will mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

3. The word “install,” when used in connection with services, materials, or equipment, will mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

4. The words “perform” or “provide,” when used in connection with services, materials, or equipment, will mean to furnish and install said services, materials, or equipment complete and ready for intended use.

5. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, “provide” is implied.

B. Unless stated otherwise in the Contract Documents, words or phrases which have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 PRELIMINARY MATTERS

2.01 DELIVERY OF BONDS AND INSURANCE

A. When Contractor delivers the executed Agreement to Owner, Contractor will also deliver to Owner such Bonds and Insurance Certificates and other evidence of Insurance requested as Contractor may be required to furnish in accordance with Article 5. No Work at the site may begin or progress payments made to Contractor until all Bonds and Insurance Certificates in the form and substance required in Article 5 have been submitted and approved by Owner.

2.02 COPIES OF DOCUMENTS

A. Owner will furnish to Contractor up to five (5) copies of the Contract Documents (including at least one fully signed counterpart of the Agreement) as are reasonably necessary for the execution of the Work. Additional copies will be furnished, upon request, at the cost of reproduction.

2.03 COMMENCEMENT OF CONTRACT TIME; NOTICE TO PROCEED

A. Time is of the essence in the performance of the Work. The Contract Time will commence to run on the 30th day after the effective date of the Agreement, 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 Agreement. In no event will the Contract Time commence to run later than the 30th day after the effective date of the Agreement. Time limits stated in the Contract Documents are of the essence of the Agreement.

2.04 STARTING THE PROJECT

A. Contractor will start to perform the Work within 10 days of when the Contract Time commences to run, but no Work will be done at the Site prior to the date on which the Contract Time commences to run. Contractor will notify Engineer at least 3 working days in advance of the time Contractor intends to start Work.

2.05 PRECONSTRUCTION MEETING

A. Within 10 days of the Effective Date of the Agreement and prior to the delivery of materials or the start of any construction, Contractor will request a Preconstruction Meeting from Engineer. A minimum of 3 full working days' notice will be required.

B. Prior to the scheduling of the Preconstruction Meeting, Contractor will submit to Engineer for review:

1. A preliminary Progress Schedule indicating the starting and completion dates of the various stages of the Work, including any Milestones specified in the Contract Documents;

2. A preliminary Schedule of Submittals which will list each required Submittal and the times for submitting, reviewing and processing such Submittal;

3. An estimated monthly payment schedule, and a preliminary Schedule of Values for all of the Work.

C. The Preconstruction Meeting will be held for review and acceptance of the schedules, to establish procedures for handling Shop Drawings and other Submittals, for processing Applications for Payment, and to establish a working understanding among the parties as to the Work.

2.06 ELECTRONIC TRANSMITTALS

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

B. If the Contract does not establish protocols for Electronic Means, then Owner, Engineer, and Contractor will 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 AND 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; or

3. any obligation on the part of Engineer to Contractor.

3.02 REFERENCE TO STANDARDS AND SPECIFICATIONS OF TECHNICAL SOCIETIES

A. Reference to standards, specifications, manuals or codes of any technical society, organization or association, or to the Laws or Regulations of any governmental authority, whether such reference be specific or by implication, will mean the latest standard, specification, manual, or Laws or Regulations in effect at the time of opening of Bids or, on the effective date of the Agreement if there were no Bids, except as may be otherwise specifically stated in the Contract Documents.

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. Any Work, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be furnished and performed whether or not it is specifically called for.

C. No provision of any standard, specification, manual, code or instruction will be effective to change the duties and responsibilities of Owner, Contractor or Engineer, or any of their Subcontractors, consultants, agents, or employees from those set forth in the Contract Documents, nor will it be effective to assign to Owner, Engineer or any of Engineer's consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of paragraph 9.10 or any other provision of the Contract Documents.

3.03 REPORTING AND RESOLVING DISCREPANCIES

A. Before undertaking each part of the Work, Contractor will carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor has a duty to and will promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor should reasonably have discovered and will obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.

B. If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, Contractor will report it to Engineer in writing at once, and, Contractor will not proceed with the Work affected thereby (except in an emergency as authorized by paragraph 6.18) until receiving written instruction or clarification from Engineer or Owner. However, Contractor will not be liable to Owner or Engineer for failure to report any such conflict, error, ambiguity or discrepancy unless Contractor knew or reasonably should have known thereof.

C. Except as otherwise specifically stated in the Contract Documents or as may be provided by amendment or supplement issued by one of the methods indicated in paragraph 3.05, the provisions of the Contract Documents will take precedence in resolving any conflict, error, ambiguity or discrepancy between the provisions of the Contract Documents and;

1. the provisions of any standard, specification, manual, code or instruction (whether or not specifically incorporated by reference in the Contract Documents); or

2. 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 CONTRACT DOCUMENTS

A. During the performance of the Work and until final payment, Contractor and Owner will submit to 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 paragraph 11.01.

3.05 ORDER OF PRECEDENCE

A. In resolving conflicts, errors or discrepancies between Plans and Specifications,

1. Figured dimensions will govern over scaled dimensions;

2. Plans will govern over Reference Standards;

3. Project Specifications will govern over Refrence Standards and Plans.

3.06 AMENDING AND SUPPLEMENTING CONTRACT DOCUMENTS

A. The Contract Documents may be amended to provide for additions, deletions and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways:

1. a Field Order (pursuant to paragraph 9.05), or,

2. a Change Order (pursuant to paragraph 10.01.A.1), or

3. a Work Change Directive Order (pursuant to paragraph 10.01.A.2)

B. In addition, the requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, in one or more of the following ways:

1. a Field Order (pursuant to paragraph 9.05),

2. Engineer's review of a Shop Drawing or Sample (pursuant to paragraph 6.21), or

3. Engineer's written interpretation or clarification (pursuant to paragraph 9.04).

3.07 REUSE OF DOCUMENTS

A. Neither Contractor nor any Subcontractor, manufacturer, fabricator, Supplier, distributor, or other person or organization performing or furnishing any of the Work under a direct or indirect contract with Owner:

1. will have or acquire any title to or ownership rights in any of the Plans, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or Engineer's Consultant, and

2. they will not reuse any of such Plans, Specification, other documents or copies on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.

3.08 ELECTRONIC DATA

A. Except as otherwise stated elsewhere in the Contract Documents, Owner, Engineer and Contractor may transmit, and will accept, Project-related correspondence, text, data, documents, drawings, information and graphics, including but not limited to Shop Drawings and other Submittals, in electronic media or digital format, either directly or through access to a secure Project website.

B. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

4.01 AVAILABILITY OF LANDS

A. Owner will furnish, as indicated in the Contract Documents and not later than the established date for beginning Work on the Contract, the lands upon which the Work is to be performed, rights of way and easements for access thereto, and such other lands which are designated for the use of Contractor. Owner will identify any encumbrances or restrictions not of general application but specifically related to use of lands so furnished with which Contractor will have to comply in performing the Work. Easements for permanent structures or permanent changes in existing facilities will be obtained and paid for by Owner, unless otherwise provided in the Contract Documents. Contractor will provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment unless otherwise provided in the Contract Documents.

4.02 SUBSURFACE AND PHYSICAL CONDITIONS; INVESTIGATIONS AND REPORTS

A. Reference is made to the Supplementary Conditions for identification of those reports of investigations and tests of subsurface and physical conditions at the Site or otherwise affecting cost, progress or performance of the Work which have been reviewed in preparation of the Contract Documents. Such reports are not guaranteed as to accuracy or completeness and are not part of the Contract Documents.

B. The locations of utilities or other physical conditions relating to existing surface or subsurface structures at or contiguous to the Site as shown on the Plans are taken from drawings from sources believed to be reliable. Neither Owner nor Engineer will be responsible for any omissions of, or variations from, the indicated location of existing utilities which may be encountered in the Work.

C. Contractor will draw its own conclusions as to the general accuracy of the “technical data” contained in such reports and drawings, and confirms such reports and drawings are not Contract Documents. Contractor may not rely upon or make any Claim against Owner, Engineer or any of Engineer’s Consultants with respect to:

1. the completeness of such reports and drawings for Contractor’s purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto, or

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

3. any Contractor interpretation of or conclusion drawn from any “technical data” or any such data, interpretations, opinions or information.

D. The cost of all the following will be included in the Contract Price and Contractor will have full responsibility for:

1. reviewing and checking all such information and data,

2. locating all Utilities during construction,

3. coordination of the Work with the owners of such Utilities, and

4. the safety and protection of all such Utilities as provided in paragraph 6.15 and repairing any damage thereto resulting from the Work.

4.03 UNFORESEEN PHYSICAL CONDITIONS

A. If Contractor discovers one or both of the following physical conditions of surface or subsurface at the Project or improvement Site, before disturbing the physical condition, Contractor will immediately notify Owner and Engineer of the physical condition; and follow up within 48 hours in writing:

1. A subsurface or a physical condition at the Site differing materially from those indicated in the Contract Documents, or

2. An unknown physical condition at the Site of a nature differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for the improvement project.

B. Engineer's Review. After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine the necessity of Owner's obtaining additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in paragraph 4.03.A above; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding 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 will issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.

D. Possible Price and Times Adjustments:

1. Contractor will be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

    a. such condition must fall within any one or more of the categories described in paragraph 4.03.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 12.03; and

    c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times pursuant to paragraph 10.05.

2. Contractor wil not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:

    a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise; or

    b. the existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or

    c. Contractor failed to give the written notice as required by paragraph 4.03.A.

3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment will be set forth in a Change Order or Work Change Directive.

4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of Owner's written statement to Contractor regarding the subsurface or physical condition in question.

4.04 UTILITIES

A. Contractor's Responsibilities. The information and data shown or indicated in the Contract Documents with respect to existing Utilities at or adjacent to the Site, if any, is based on information and data furnished to Owner or Engineer by the owners of such Utilities, including Owner, or by others.

1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and

2. the cost of all of the following will be included in the Contract Price, and Contractor will have full responsibility for:

a. reviewing and checking all information and data regarding existing Utilities at the Site;

b. locating all Utilities shown or indicated in the Contract Documents as being at the Site;

c. coordination of the Work with the owners (including Owner) of such Utilities, during construction; and

d. the safety and protection of all existing Utilities at the Site, and repairing any damage thereto resulting from the Work.

B. Notice by Contractor. If Contractor believes that an Utilities that is uncovered or revealed at the Site was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, then Contractor will, 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 6.18), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.

C. Engineer's Review. Engineer will:

1. promptly review the Utilities and conclude whether such Utilities was not shown or indicated in the Contract Documents,

2. or was not shown or indicated with reasonable accuracy;

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

4. prepare recommendations to Owner regarding Contractor's resumption of Work in connection with the Utilities in question;

5. 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 Utilities;

6. and advise Owner in writing of Engineer's findings, conclusions, and recommendations.

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

E. Owner's Statement to Contractor Regarding Utilities. After receipt of Engineer's written findings, conclusions, and recommendations, Owner will issue a written statement to Contractor (with a copy to Engineer) regarding the Utilities 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.

F. Possible Price and Times Adjustments:

1. Contractor will be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing Utilities at the Site that was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

a. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Utilities in question;

b. With respect to Work that is paid for on a Unit Price basis, any adjustment in Contract Price will be subject to the provisions of paragraph 12.03;

c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times; and

d. Contractor gave the notice required in paragraph 4.04.B.

2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment 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, or both, no later than 30 days after Owner's issuance of Owner's written statement to Contractor regarding the Underground Facility in question.

4.05 REFERENCE POINTS

A. Owner will provide engineering surveys for construction to establish property corners, monuments, bench marks and similar reference points which in Contractor's judgment are necessary to enable Contractor to proceed with the Work. Contractor will be responsible for the preservation of established reference points and will make no changes or relocations without the prior written approval of Owner. Contractor will report to Engineer whenever any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations. Reference points destroyed by negligence of Contractor will be replaced by Owner at the expense of Contractor. Construction Staking will be furnished by Owner as provided in Division 01 of the Specifications.

4.06 CONSTITUENTS OF CONCERN

A. Owner will be responsible for any Constituents of Concern uncovered or revealed at the Site which was not shown or indicated in Plans or Specifications or identified in the Contract

Documents to be within the scope of the Work and which may present a substantial danger to persons or property exposed thereto in connection with the Work at the Site. Owner will not be responsible for any such materials brought to the Site by Contractor, Subcontractor, Suppliers or anyone else for whom Contractor is responsible.

B. Upon discovering any such material, Contractor will immediately:

1. stop all Work in connection with such Hazardous Environmental Condition and in any area affected thereby (except in emergency as required by paragraph 6.18), and

2. notify Owner and Engineer (and thereafter confirm such notice in writing). Owner will promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such Hazardous Environmental Condition or take corrective action, if any.

C. Contractor will not be required to resume Work in connection with such Hazardous Environmental Condition or in any such affected areas until after Owner has obtained any required permits related thereto and delivered to Contractor special written notice:

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.

D. If Owner and Contractor cannot agree as to entitlement to, or the amount, or extent of an adjustment, if any, in Contract Price or Contract Terms as a result of such Work stoppage or such special conditions under which Work is agreed by Contractor to be resumed, either party may make a Claim therefor as provided in paragraph 11.01.

E. If after receipt of such special 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 such portion of the Work that is in connection with such condition, or in such affected area, to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to, or the amount, or extent of an adjustment, if any, in Contract Price or Contract Time as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in paragraph 11.01. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with paragraph 7.01.

F. To the fullest extent permitted by Laws and Regulations, Owner will indemnify and hold harmless Contractor, Subcontractors, Engineer, Engineer's Consultants and the officers, directors, employees, agents, other consultants and subcontractors of each and any of them from and against all claims, costs, losses, damages and expenses arising out of or resulting from such condition per this paragraph 4.06, provided that:

1. any such claim, cost, loss or damage is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, and

2. nothing in this paragraph 4.06 will obligate Owner to indemnify any person or entity from and against the consequences of that person's or entity's own negligence.

G. The provisions of paragraph 4.03 are not intended to apply to the presence of Constituents of Concern or Hazardous Environmental Conditions uncovered or revealed at the Site.

ARTICLE 5 BONDS AND INSURANCE

5.01 PERFORMANCE AND OTHER BONDS

A. Contractor will furnish performance and payment Bonds, on the form included in the Contract Documents, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These Bonds will remain in effect at least until 1 year after the date when final payment becomes due, except as otherwise provided by Laws and Regulations or as specified in the Contract Documents or Bond. Contractor will also furnish such other Bonds as are required by the Supplementary Conditions.

B. All Bonds will be in the forms prescribed by the Contract Documents and be executed by such Sureties as

1. are licensed to conduct business in the state where the Project is located, and

2. are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the U.S. Department of Treasury, Financial Management Service, Surety Bond Branch.

C. Bonds signed by an agent must be accompanied by a certified copy of such agent’s authority to act.

D. If Surety on any Bond furnished by Contractor is declared as bankrupt or becomes insolvent, or its right to do business is terminated in any state where any part of the Project is located, or it ceases to meet the requirements of clauses (1) and (2) of paragraph 5.01, Contractor will within 5 days thereafter substitute another Bond and Surety, both of which will be acceptable to Owner.

5.02 LICENSED INSURERS AND SURETIES

A. Bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor will be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue Bonds or insurance policies for the limits and coverages so required.

5.03 INSURANCE

A. Contractor will purchase and maintain during the term of the Project such insurance as will protect him, Owner(s) and Engineer(s) from Claims arising out of the Work described in this Contract and performed by Contractor, Subcontractor(s) or Sub subcontractor(s) consisting of:

1. Workers' Compensation Insurance including Employer's Liability to cover employee injuries or disease compensable under the Workers' Compensation Statutes of the states in which Work is conducted under this Contract; disability benefit laws, if any; or Federal compensation acts such as U.S. Longshoremen or Harbor Workers', Maritime Employment, or Railroad Compensation Act(s), if applicable. Self-insurance plans approved by the regulatory authorities in the state in which Work on this Project is performed are acceptable.

2. An occurrence form Commercial General Liability policy to cover bodily injury to persons other than employees and for damage to tangible property, including loss of use thereof,

plus appropriate endorsements to protect Owner and Engineer against Claims, demands, and lawsuits from employees of Contractor and Subcontractors, including the following exposures:

a. All premises and operations.

b. Explosion, collapse and underground damage.

c. Contractor's Protective coverage for independent contractors or Subcontractors employed by him.

d. Broad form blanket, contractual liability for the obligation assumed in the Indemnification or Hold Harmless agreement found in the General Conditions or Supplementary Conditions of this Contract.

e. Personal Injury Liability endorsement with no exclusions pertaining to employment.

f. Products and Completed Operations coverage. Coverage will extend through the Contract guarantee period.

g. Broad form property damage.

h. Cross liability endorsement.

i. For design professional additional insureds, ISO Endorsement CG 20 32 04 13, “Additional Insured-Engineers, Architects or Surveyors Not Engaged by the Named Insured” or its equivalent.

3. Comprehensive Automobile Liability policy to cover bodily injury and property damage arising out of the ownership, maintenance or use of any motor vehicle, including owned, non-owned and hired vehicles. Comprehensive General Liability and the Comprehensive Auto Liability will be written by the same insurance carrier, though not necessarily in one policy.

4. Contractor will purchase for Owner an Owner's Protective Liability policy to protect Owner, Engineer, their consultants, agents, employees and such public corporations in whose jurisdiction the Work is located for their liability for Work performed by Contractor, the Subcontractor(s) or the Sub subcontractor(s) under this Contract.

5. When a limit of liability is identified in the Supplementary Conditions, Contractor will purchase a Builder's Risk Installation Floater in a form acceptable to Owner covering property of the Project for the full cost of replacement as of the time of any loss which will include, as named insureds,

a. Contractor,

b. all Subcontractors,

c. all Sub subcontractors,

d. Owner, and Engineer(s) or Architect(s), as their respective interests may prove to be at the time of loss, covering insurable property which is the subject of this Contract, whether in place, stored at the Site, stored elsewhere, or in transit at the risk of the insured(s).

e. Coverage will be effected on an "All Risk" form including, but not limited to, the perils of fire, wind, vandalism, collapse, theft, flood and earthquake, with removal of passive design error exclusion. Except as may otherwise be required by Owner, Contractor may arrange for such deductibles as Contractor deems to be within Contractor's ability to self-assume, but Contractor will be held solely responsible for the amount of such deductible and for any co-insurance penalties. Any insured loss will be adjusted with Owner and Contractor and paid to Owner and Contractor as Trustee for the other insureds.

6. Umbrella or Excess Liability:

   a. Contractor is granted the option of arranging coverage under a single policy for the full limit required or by a combination of underlying policies with the balance provided by an Excess or Umbrella Liability policy equal to the total limit(s) requested. Umbrella or Excess policy wording will be at least as broad as the primary or underlying policy(ies) and will apply both to Contractor's General Liability and Automobile Liability Insurance and will be written on an occurrence basis.

7. Railroad Protective Liability:

   a. Where any of the Work is within a railroad right-of-way or where a limit of liability is identified in the Supplementary Conditions, Contractor will provide coverage in the name of each railroad company having jurisdiction over rights of way across which Work under the Contract is to be performed. The form of policy and the limits of liability will be determined by the railroad company(ies) involved. See Section 00 73 00 - Supplementary Conditions for limits and coverage requested.

8. Contractor's Professional Liability Insurance:

   a. If Contractor will provide or furnish professional services under this Contract through a delegation of professional design services or otherwise, then Contractor will be responsible for purchasing and maintaining applicable professional liability insurance. This insurance will provide protection against Claims arising out of performance of professional design or related services caused by a negligent error, omission, or act for which the insured party is legally liable. It will be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.

B. Owner's responsibilities in respect of purchasing and maintaining insurance are set forth below:

1. Owner will assume responsibility for such boiler and machinery insurance as may be required or considered to be necessary by Owner in the course of construction, testing or after completion.

   a. Owner will assume responsibility for such insurance as will protect Owner against any loss of use of Owner's property due to those perils insured pursuant to paragraph 1 above.

5.04 LIMITS OF LIABILITY

A. The required limits of liability for insurance coverages required in paragraphs 5.03 will be not less than those specified in Section 00 73 00 - Supplementary Conditions .

5.05 NOTICE OF CANCELLATION OR INTENT NOT TO RENEW

A. Policies will be endorsed to provide that at least 30 days written notice will be given to Owner and to Engineer of cancellation, intent not to renew, or material modification of the coverage.

5.06 EVIDENCE OF COVERAGE

A. Prior to commencement of the Work, Contractor will furnish to Owner and Engineer, Certificates of Insurance in force on current Accord® Certificate of Insurance form. Other forms of Certificate are acceptable only if;

1. they include all of the items prescribed in the current Accord® Certificate of Insurance form, including agreement to cancellation provisions outlined in paragraph 5.05 above; and

2. they have approval of Owner and Engineer.

B. Prior to the commencement of the Work, Contractor will furnish to Owner complete "originally signed" copies of the Owner's Protective Liability Policy. The number of copies will be the same as the number of counterparts of the Agreement. Owner reserves the right to request complete copies of other policies if deemed necessary to ascertain details of coverage not provided by the certificates. Such policy copies will be "Originally Signed Copies," and so designated.

5.07 QUALIFICATION OF INSURERS

A. In order to determine financial strength and reputation of insurance carriers, all companies providing the coverages required will be licensed or approved by the Insurance Bureau of the state in which the Project is located and will have a financial rating not lower than XI and a policyholder's service rating no lower than B+ as listed in A.M. Best's Key Rating Guide, current edition. Companies with ratings lower than B+:XI will be acceptable only upon written consent of Owner.

5.08 DAMAGE CLAIMS - ACKNOWLEDGMENT AND REPORTS

A. Contractor will furnish to Owner an acknowledgment receipt from the insurance carrier for each damage claim against the Project. The receipt will include the insurance carrier’s assigned claim number.

B. Upon request, Contractor or Contractor's insurance carrier will also furnish to Owner a status report on all damage claims. This report will include inspections made, the disposition of claims, and what action has been taken towards settlement of each claim.

C. Failure of Contractor to comply with this paragraph 5.08 may result in the amount of such damage claims being withheld from Contractor’s monthly pay estimate. Such withholding will be reimbursed in the monthly pay estimate following compliance with this paragraph.

5.09 COST OF INSURANCE

A. The unit cost of the insurance herein specified will not be a specific bid item, but the cost of such insurance will be included by Contractor in the various prices bid.

5.10 WAIVER OF RIGHTS

A. Owner and Contractor intend that all policies purchased in accordance with paragraph 5.03 will protect Owner, Contractor, Subcontractors, Engineer, Engineer's Consultants (and all other persons or entities identified in the Supplementary General Conditions to be listed as insureds or additional insureds in such policies) and will provide primary coverage for all losses and damages caused by the perils covered thereby. Such policies will contain provisions to

B. the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder.

C. Owner and Contractor waive all rights against each other and their respective officers, directors, employees and agents for all losses and damages caused by, arising out of or resulting from any of the perils covered by such policies and any other property insurance applicable to the Work; and in addition, waive all such rights against Subcontractors, Engineer, Engineer's Consultants and any other persons or entities identified in the Supplementary General Conditions to be listed as insureds or additional insureds under such policies for loss and damages so caused. None of the above waivers will extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.

5.11 RECEIPT AND APPLICATION OF INSURANCE PROCEEDS

A. Any insured loss under the policies of insurance required by paragraph 5.03.A.5 will be adjusted with Owner and made payable to Owner as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause. If no other special agreement is reached the damaged Work will be repaired or replaced, the monies so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order, Field Oder or Work Change Directive.

B. Owner as fiduciary will have power to adjust and settle any loss under the policies required by paragraph 5.03.A.5 with the insurers unless one of the parties in interest will object in writing within fifteen days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary will make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary will adjust and settle the loss with the insurers.

ARTICLE 6 CONTRACTOR'S RESPONSIBILITIES

6.01 SUPERVISION AND SUPERINTENDENCE

A. Contractor will supervise and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor will be solely responsible for the means, methods, techniques, sequences and procedures of construction. Contractor will be responsible to see that the finished Work complies with the Contract Documents. However, if specific means, methods, techniques, sequences and procedures of construction are prescribed in the Plans or Specifications, Contractor will be responsible to comply therewith, but may implement such prescribed Work in a manner of Contractor's choosing so long as the Work complies with the requirements of the Plans and Specifications.

B. At all times during the progress of the Work, Contractor will assign and maintain a competent superintendent who will not be replaced without written notice to Owner and Engineer except under extraordinary circumstances. Any superintendent or foreman who neglects to have Work done in accordance with the Plans and Specifications will be removed from the Project. The superintendent will be Contractor's representative at the Site and will have authority to act on behalf of Contractor. All communications given to the superintendent will be as binding as if given to Contractor.

6.02 LABOR AND WORKING HOURS

A. Contractor will provide competent, suitably qualified personnel in their various duties. Contractor will at all times maintain good discipline and order at the Site. Except as otherwise required for the safety or protection of persons, the Work, property at the Site or adjacent thereto, and except as otherwise indicated in the Contract Documents, all Work at the Site will be performed during regular working hours (7:00 a.m. to 7:00 p.m.), and Contractor will not permit the performance of Work on Sunday or any legal holiday without Owner's written consent given after prior written notice to Engineer.

6.03 SERVICES, MATERIALS AND EQUIPMENT

A. Unless otherwise specified in the Contract Documents, Contractor will furnish 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 furnishing, performance, testing, start up and completion of the Work.

B. All materials and equipment will be of good quality and new, except as otherwise provided in the Contract Documents. All warranties and guarantees specifically called for by the Contract Documents will expressly run to the benefit of Owner. If required by Engineer, Contractor will furnish satisfactory evidence, (including reports of required tests) as to the kind and quality of materials and equipment to be incorporated in the Work. Contractor will not use material in the Work until Shop Drawing or Submittals have been reviewed by Engineer. All materials which do not meet the requirements of the Specifications at the time they are to be used will be rejected, and unless otherwise permitted by Engineer, will be plainly marked and removed immediately from the Work.

C. All materials and equipment will be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instructions of the applicable manufacturer, fabricator, Supplier or distributor, except as otherwise provided in the Contract Documents.

6.04 SUBSTITUTES AND “OR-EQUALS”

A. Whenever an item of materials or equipment is specified or described in the Contract Documents for installation in the Work by using the name of a proprietary item or the name of a particular manufacturer, fabricator, supplier or distributor; or means, methods, techniques, sequences and procedures of construction are prescribed in the Plans or Specifications; the specification or description is intended to establish the type, function and quality required or the means, methods, techniques, sequences and procedures of construction required. Unless the specification or description contains or is followed by words indicating that no like, equivalent or “or-equal” item or no substitution is permitted, other items of material or equipment or materials or equipment of other manufacturers, fabricators, suppliers or distributors; or other means,

methods, techniques, sequences and procedures of construction may be accepted by Engineer under the following circumstances:

1. “Or-Equal”: If in Engineer’s sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an “or-equal” item, in which case review and approval of the proposed item may, in Engineer’s sole discretion, be accomplished without compliance with some or all of the requirements for acceptance of proposed substitute items.

2. Substitute Items: If in Engineer’s sole discretion an item of material or equipment proposed by Contractor does not qualify as an “or-equal” item under paragraph 6.04.A; or a proposed means, methods, techniques, sequences and procedures of construction are different from what is prescribed in the Plans or Specifications, it will be considered a proposed substitute item.

B. Contractor will submit sufficient information as provided below to allow Engineer to determine that the item of material or equipment or means, methods, techniques, sequences and/or procedures proposed is essentially equivalent to that named and an acceptable substitute therefor. The procedure for review by Engineer will include the following, as supplemented in the Specifications, and as Engineer may decide is appropriate under the circumstances. Requests for review of substitute items of material and equipment will not be accepted by Engineer from anyone other than Contractor.

C. If Contractor wishes to furnish or use a substitute, Contractor will make written application to Engineer on the Substitution Request Form provided for acceptance thereof, certifying that the proposed substitute will:

1. perform adequately the functions and achieve the results called for by the general design,

2. be similar in substance to that specified,

3. and be suited to the same use and capable of performing the same function as that specified.

4. The application will state the extent, if any, to which the evaluation and acceptance of the proposed substitute will prejudice Contractor’s achievement of Substantial Completion on time, whether or not acceptance of the proposed substitute for use in the Work will require a change in the Contract Documents (or in the provisions of any other direct contract with Owner for work on the Project) to adapt the design to the proposed substitute, and whether or not incorporation or use of the substitute in connection with the Work is subject to payment of any license fee or royalty.

D. All variations of the proposed substitute from that specified will be identified in the application and available maintenance, repair and replacement service will be indicated. The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which will be considered by Engineer in evaluating the proposed substitute. Engineer may require Contractor to furnish additional data about the proposed substitute.

E. All data to be provided by Contractor in support of any proposed “or-equal” or substitute item will be at Contractor’s expense. Engineer will be the sole judge of acceptability, and Engineer’s

determination will be final and binding, may not be reversed through an appeal under any provisions of the Contract Documents, and no “or-equal” or substitute will be ordered, installed or utilized without Engineer's prior written acceptance. Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any “or-equal” or substitute which has been approved by Engineer.

F. Engineer will record time required by Engineer and Engineer's consultants in evaluating substitutions proposed by Contractor and in making changes in the Contract Documents occasioned thereby. Whether or not Engineer accepts a proposed substitute, Contractor will reimburse Owner for the charges of Engineer and Engineer's consultants for evaluating any proposed substitute and in making any changes in the Contract Documents resulting therefrom.

6.05 CONCERNING SUBCONTRACTORS

A. Contractor will not employ any Subcontractor, Supplier or other person or organizations, including those who are to furnish the principal items of materials or equipment, whether initially or as a substitute, against whom Owner or Engineer may have reasonable objection. Contractor will furnish Engineer a complete list of any Subcontractor, Supplier or other person or organization furnishing principal items of material or equipment within 4 days of request. Failure to object to any Subcontractor, Supplier, other person or organization by Owner or Engineer will not constitute a waiver of any right of Owner or Engineer to reject defective Work.

B. If Owner or Engineer, after due investigation, has reasonable objection to any Subcontractor, Supplier, other person or organization proposed by Contractor after the Notice of Award, Contractor will submit an acceptable substitute and the Contract Price will be increased or decreased by the difference in cost occasioned by such substitution, and an appropriate Change Order will be issued. Contractor will not be required to employ any Subcontractor, Supplier, other person or organization against whom Contractor has reasonable objection.

C. Contractor will not award Work to Subcontractor(s), in excess of 50% of the Contract Price, without prior written approval of Owner.

D. Contractor will be fully responsible for all acts and omissions of Contractor's Subcontractors, Suppliers and of persons and organizations performing or furnishing any of the Work under a direct or indirect contract with Contractor just as Contractor is responsible for Contractor’s own acts and omissions. Nothing in the Contract Documents will create for the benefit of any such Subcontractor, Supplier of other person or organization any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other person or organization, nor will it create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any Subcontractor, Supplier or other person or organization. Owner or Engineer may furnish to any Subcontractor, Supplier or other person or organization, to the extent practicable, evidence of amounts paid to Contractor on account of specific Work done.

E. Contractor will be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with Contractor. Contractor will require all Subcontractors, Suppliers and such other persons and organizations performing or furnishing any of the Work to communicate with Engineer through Contractor.

F. If the amount of the subcontract or the nature of the Work to be performed thereunder warrants, Owner may require Subcontractor to furnish, for the benefit of Owner and Contractor jointly, Bonds in an amount proportioned to the amount of Subcontractor's subcontract, and for the same purpose and under the same specifications as those of the general Contract. The Surety on the general Contract will not be eligible to furnish such Subcontract Bonds.

G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as and additional insured on the property insurance provided in paragraph 5.03.A.5, the agreement between Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, Engineer's Consultants and all other additional insureds for all losses and damages caused by, arising out of or resulting from any of the perils covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same. Contractor will file a true copy of such agreement with Owner.

6.06 PATENT FEES AND ROYALTIES

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

B. To the fullest extent permitted by Laws and Regulations, Contractor will defend, indemnify and hold harmless Owner and Engineer and anyone directly or indirectly employed by either of them from and against all claims, costs, losses, damages and expenses arising out of or resulting from 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, and will defend all such claims in connection with any alleged infringement of such rights.

6.07 PERMITS AND LICENSES

A. Contractor will obtain and pay for all construction permits and licenses. Owner will assist Contractor, when necessary, in obtaining such permits and licenses. Contractor will pay all governmental charges, permit, review, and inspection fees necessary for the prosecution of the Work, which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Contractor will pay all charges of utility owners for connections to the Work.

6.08 LAWS AND REGULATIONS

A. Contractor will give all notices and comply with all laws, ordinances, rules, and regulations applicable to furnishing and performance of the Work. Neither Owner nor Engineer will be

responsible for monitoring Contractor's compliance with any Laws, ordinances, rules, and Regulations.

B. If Contractor performs any Work that is contrary to such laws, ordinances, rules and regulations, Contractor will bear all claims, costs, losses, damages and expenses caused by, arising out of, or resulting therefrom. However, it will not be Contractor's primary responsibility to make certain that the Specifications and Plans are in accordance with such laws, ordinances, rules, and regulations, but this will not relieve Contractor of Contractor's obligations under paragraph 3.03.

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

6.09 TAXES

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

6.10 USE OF PREMISES

A. Contractor will confine construction equipment, the storage of materials and equipment and the operations of workers to the Project Site and land and areas identified in and permitted by the Contract Documents and other land and areas permitted by Laws and Regulations, rights of way, permits and easements, and will not unreasonably encumber the premises with construction equipment or other materials or equipment. Contractor will assume full responsibility for any damage to any such land or area or to the owner or occupant thereof or of any adjacent land or areas resulting from the performance of the Work. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor will promptly settle with any such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law. Contractor's continuing obligations under paragraph 6.24 will be applicable to any claim hereunder.

6.11 REMOVAL OF DEBRIS AND CLEANING

A. During the progress of the Work, Contractor will keep the premises free from accumulations of waste materials, rubbish and other debris resulting from the Work. At the completion of the Work Contractor will remove all waste materials, rubbish and debris from and about the premises as well as all tools, appliances, construction equipment and machinery, and surplus materials, and will leave the Site clean and ready for occupancy by Owner at Substantial Completion of the Work. Contractor will restore to their original condition all property not designated for alteration by the Contract Documents. If Contractor will fail to keep the above noted areas cleaned of dust or debris resulting from Contractor's operations, Contractor will be so notified in writing by Engineer. If within 24 hours after receipt of such notice Contractor will fail to clean such areas satisfactorily, Owner may have such other agency as Ownerhe will designate, perform the work and all costs of such cleaning will be paid for by Contractor.

6.12 LOADING STRUCTURES

A. Contractor will not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor will Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.13 PROTECTION OF UTILITIES

A. When it is possible for construction operations to endanger any public or private utility, conduit, or structure, Contractor will notify the utility owner of this possibility, and safeguard and support such utilities, conduits, or structures. Where it is the policy of any utility owner to make its own repairs to damaged conduit or other structures, Contractor will cooperate to the fullest extent with the utility, and Contractor will see that Contractor's operations interfere as little as possible with these operations, and Contractor will assume the cost of any charge against Owner therefor. In cases where existing Utilities or Utility service connections are encountered, Contractor will perform Contractor's operations in such a manner that service will be uninterrupted, and the cost thereof will be at Contractor's expense, unless otherwise provided.

6.14 RECORD DOCUMENTS

A. Contractor will maintain in a safe place at the Site 1 record copy of all Specifications, Plans, Addenda, Change Orders, Work Change Directives, and Field Orders, in good order and annotated to show all changes made during construction. These record documents together with all Samples and all Shop Drawings will be available to Engineer for examination and will be delivered to Engineer for Owner upon completion of the Work.

6.15 SAFETY AND PROTECTION

A. Contractor will be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor will take all necessary precautions for the safety of, and will provide the necessary protection to prevent damage, injury or loss to:

1. all persons on the Work Site or who may be affected by the Work,

2. all the Work and materials or 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, and Utilities and not designated for removal, relocation or replacement in the course of construction.

B. Contractor will comply with all applicable Laws and Regulations and orders of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss; and will erect and maintain all necessary safeguards for such safety and protection. Contractor will notify owners of adjacent property, Utilities, and utility owners when prosecution of the Work may affect them.

C. Contractor will restore, at Contractor's own expense, any public or private property damaged or injured in consequence of any act or omission on Contractor's part, or on the part of Contractor 's employees or agents, to a condition equal or better than that existing before such injury or damage was done. If Contractor neglects to restore or make good such damages or injury, Owner may, upon 48 hours' notice, proceed to restore or make good such damage or injury

and to order the cost thereof deducted from any monies that are due, or may become due, to Contractor for this Work.

D. Contractor's duties and responsibilities for the safety and protection of the Work will continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with paragraph 14.11 that the Work is Acceptable.

E. Contractor will 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.

F. Contractor will 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.

G. 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 14.11 that the Work is acceptable, and Contractor has left the Site (except as otherwise expressly provided in connection with Substantial Completion).

H. 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.

6.16 SAFETY REPRESENTATIVE

A. Contractor will be responsible to designate for itself and its employees, and its Subcontractors a qualified and experienced safety representative at the Site whose duties and responsibilities will be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.17 HAZARD COMMUNICATION PROGRAM

A. Contractor will be responsible for coordinating any exchange of 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 applicable Laws or Regulations.

6.18 EMERGENCIES

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor, without special instruction or authorization from Owner or Engineer, is obligated to act to prevent threatened damage, injury or loss. Contractor will give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued to document the consequences of such action.

6.19 SHOP DRAWINGS AND SAMPLES

A. Contractor will submit Shop Drawings required by the Contract Documents to Engineer for review, in accordance with an accepted schedule. All Submittals will be identified as Engineer may require and in the number of copies specified in the Specifications. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance

and design criteria, materials and similar data to show Engineer the materials and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by paragraph 6.21.

B. Contractor will also submit all samples required by the Contract Documents to Engineer for review in accordance with an accepted schedule. Each Sample will be identified clearly 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 6.21. The number of each sample to be submitted will be as specified in the Specifications.

6.20 SUBMITTAL PROCEDURES

A. Before submitting each Shop Drawing or Sample, Contractor will have determined and verified:

1. all field measurements, quantities, dimension, specified performance criteria, installation requirements, manufacturer's recommendations, material, catalog numbers and similar information with respect thereto,

2. all materials with respect to intended use, fabrication, shipping, handling, storage, assembly and installation pertaining to the performance of the Work, and

3. all information relative to Contractor's responsibilities in respect of means, methods, techniques, sequences and procedures of construction and safety precautions and programs incident thereto.

B. Contractor will have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

C. Each Submittal will bear a stamp or specific written indication that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to review and approval of that Submittal.

D. At the time of each submission, Contractor will in writing call Engineer's attention to any deviations that the Shop Drawings or Samples may have from the requirements of the Contract Documents. This notice will be both a written communication separate from the Shop Drawing's or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review of each such variation.

E. Contractor will make corrections required by Engineer and will return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review. Contractor will direct specific attention in writing to revisions other than the corrections called for by Engineer on previous Submittals.

F. Contractor will furnish required Submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer 's time for reviewing a fourth or subsequent submittal of Shop Drawings, sample, or other item requiring approval, and Contractor will be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.

G. If Contractor requests a change of a previously approved Submittal item, Contractor will be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-

off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

6.21 ENGINEER'S REVIEW

A. Engineer will review Shop Drawings and Samples in accordance with the Schedule of Submittals accepted by Engineer as required by paragraph 2.05. Engineer's review will be only for conformance with the design concept of the Project and for compliance with the information given in the Contract Documents and will not extend to means, methods, sequences, techniques or procedures of construction or to safety precautions or programs incident thereto. The review of a separate item as such will not indicate review of the assembly in which the item functions.

B. Engineer's review of Shop Drawings or samples will not relieve Contractor from responsibility for any variations from the Contract Documents unless Contractor has in writing called Engineer's attention to such variation at the time of submission and Engineer has given written concurrence to the specific variation, nor will any concurrence by Engineer relieve Contractor from responsibility for errors or omissions in the Shop Drawings. Engineer's review will not relieve Contractor from responsibility for complying with the requirements of paragraph 6.20.

C. Where a Shop Drawing or sample is required by the Contract Documents or the Schedule of Submittals accepted by Engineer per paragraph 2.05, no related Work will be commenced until the Submittal has been reviewed by Engineer.

6.22 CONTINUING THE WORK

A. Contractor will 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, except as Contractor and Owner may otherwise agree in writing.

6.23 CONTRACTOR'S GENERAL WARRANTY AND GUARANTEE

A. Contractor warrants and guarantees to Owner, Engineer, and Engineer's Consultants that all work will be in accordance with the Contract Documents and will not be defective. Contractor's warranty and guarantee excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or their employees, agents, or representatives, or any person or entity for whom Contractor is responsible; or

2. normal wear and tear under normal usage.

B. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents will be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

1. observations by Engineer;

2. recommendation of any progress or final payment by Engineer;

3. the issuance of a certificate of Substantial Completion or any payment by Owner to Contractor under the Contract Documents;

4. use or occupancy of any part of the Work by Owner;

5. any acceptance by Owner or failure to do so;

6. any review or approval of a Shop Drawing or Sample Submittal or the issuance of a notice of acceptability by Engineer per paragraph 14.11;

7. any inspection, test or approval by others; or

8. any correction of defective Work by Owner.

C. If Contract requires 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.

D. Contractor will assign to Owner all warranties extended to Contractor by material Suppliers and Subcontractors. If an assignment of warranty requires the material Supplier or Subcontractor to consent to same, then Contractor will secure the material Supplier's or Subcontractor's consent to assign said warranties to Owner.

E. The warranties provided in this section will be in addition to, and not in limitation of, any other warranty or remedy required by law.

6.24 INDEMNIFICATION

A. To the fullest extent permitted by law, Contractor will indemnify, defend (with counsel acceptable to Owner) and hold harmless Owner, Engineer and any additional indemnitees identified in the Supplementary Conditions and their respective directors, officers, members, partners, affiliates, employees, agents and successors, from and against any and all liabilities, claims, causes of action, lawsuits, liens, injuries, damages, losses and expenses (collectively "Demands") to the extent caused by, arising out of, resulting from or occurring in connection with:

1. Contractor's breach of, or failure to comply with, the Agreement, the Contract Documents, or any other contract that it enters into regarding the Work, including any default in performance; or

2. Personal injury or death to any person (including, but not limited to, Contractor, Contractor's employees, Subcontractors, Subcontractors' employees, and material Suppliers) or injury to or destruction of property (including claims for loss of use) caused by, arising out of, resulting from, or in any way connected with

   a. the Work,

   b. any activity associated with the Work, or

   c. the operations or acts of commission or omission of Contractor, Contractor's employees, Subcontractors, Subcontractors' employees, material suppliers, or anyone for whom Contractor is legally liable in the performance of Work, whether arising before or after completion of the Work.

B. To the extent caused by, arising out of, resulting from, or occurring in connection with the provisions of the above paragraph 6.24.A, Contractor's indemnity obligations under this Agreement will include, but are not limited to:

1. Indemnity for all damages and judgment interest, all costs and fees, including, but not limited to, all defense costs, expenses and actual attorneys' fees, and all settlement payments relating to, arising out of, resulting from or in any way connected with any demand requiring indemnity by this Agreement;

2. All expenses, including but not limited to, costs, expenses and actual attorneys' fees, incurred in securing and enforcing indemnity from Contractor if Contractor fails or refuses promptly to fulfill any of the indemnity obligations under this Agreement;

3. All indemnification obligations imposed upon Owner or Engineer, or both, arising out of or in connection with the Work; and

4. Indemnification for any penalties and/or fines arising or resulting from Contractor's or any Subcontractor's failure to comply with laws and/or regulations applicable to its/their Work.

C. Contractor's duty to indemnify under subpart A.2. of paragraph 6.24 is limited to the negligence of Contractor, Contractor's employees, Subcontractors, Subcontractor's employees, material Suppliers, or anyone for whom Contractor is legally liable in the performance of the Work, whether arising before or after the completion of the Work.

D. The indemnification rights under this Agreement will not be construed to negate, abridge, or otherwise reduce any other right or obligations of indemnity which would otherwise exist.

E. Owner, at its option, may select counsel to defend any demand brought against it without impairing any obligation of Contractor to provide indemnification.

F. The indemnification provisions under this Agreement will survive the completion or termination of this Agreement.

G. In the case of claims by any employee of Contractor, anyone directly or indirectly employed by Contractor, or anyone for whose acts Contractor may be liable, the indemnification obligations under this Agreement 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 under workers' compensation acts. Such obligations will not be construed to negate, abridge or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Agreement.

H. Indemnification, additional insured and hold harmless obligations of Contractor and Subcontractor under the Contract Documents will survive the termination of this Agreement.

I. Contractor and Subcontractors will compel their insurance company to waive subrogation against Owner, Engineer and Contractor and Subcontractors identified as additional insureds in the Contract Documents, including any municipal entity now existing or newly created during the term of the Contract Documents.

6.25 DELEGATION OF PROFESSIONAL DESIGN SERVICES

A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences or procedures. Contractor will not be required to provide professional services in violation of applicable Laws and Regulations.

B. If professional design services or certifications by a design professional related to systems, materials, equipment, structures, means, methods, techniques or sequences of construction are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor will cause such services or certifications to be provided by a professional properly licensed in the state in which the project is located, whose signature and seal will appear on all drawings, calculations, specifications, certifications, and other Submittals prepared by such professional. Shop Drawings and other Submittals related to the Work designed or certified by such professional, if prepared by others, will bear such professional's written approval when submitted to Engineer.

C. Owner and Engineer will be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, or approvals performed by such design professionals.

D. Pursuant to this paragraph 6.25, Engineer's review or approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review or approval of Shop Drawings and other Submittals (except design calculations and design drawings) will be only for the purpose stated in paragraph 6.21.

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

ARTICLE 7 WORK BY OTHERS

7.01 RELATED WORK AT SITE

A. In addition to and apart from the Work under the Contract Documents, 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 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 any part of Contractor's Work depends on proper execution or results upon the work of any such other contractor or utility owner, Contractor will inspect and promptly report to Engineer in writing any delays, defects or deficiencies in such other work that render it unavailable, or unsuitable for such proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of the other work as fit and proper for integration with Contractor's Work except for latent or non-apparent defects and deficiencies in the other work.

C. Contractor will afford each contractor who is party to such a direct contract, and each utility owner, (and Owner, if Owner is performing the additional work with Owner's employees), proper and safe access to the Site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work and will properly connect and coordinate the Work with theirs. Unless otherwise provided in the Contract Documents, Contractor will do all cutting, fitting and patching of Contractor's Work that may be required to make its several parts come together properly and integrate with such other work. Contractor will not endanger any work of others by cutting, excavating or otherwise altering their work and will only cut or alter their work with the written consent of Engineer and the others whose work will be affected.

D. If the performance of additional work by other contractors, utility owner, or Owner was not noted in the Contract Documents, written notice thereof will be given to Contractor prior to starting any such additional work. If Contractor believes that the performance of such additional work by Owner or others involves additional expense to Contractor, or requires an extension of the Contract Time, Contractor may make a Claim therefor as provided in paragraph 11.01. Claims for delay or inconveniences due to operations of such other parties for work noted in the Contract Documents will not be allowed.

ARTICLE 8 OWNER'S RESPONSIBILITIES

8.01 COMMUNICATION TO CONTRACTOR

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

8.02 REPLACEMENT OF ENGINEER

A. In case of termination of the employment of Engineer, Owner will appoint an engineer against whom Contractor makes no reasonable objection, whose status under the Contract Documents will be that of the former Engineer.

8.03 FURNISHING DATA

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

8.04 PAY WHEN DUE

A. Owner will make payments to Contractor promptly after they are due as provided in paragraphs 14.05 and 14.11.

8.05 LANDS AND EASEMENTS; REPORTS AND TESTS

A. Owner's duties in respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of investigations and tests of subsurface and latent physical conditions at the Site.

8.06 CHANGE ORDERS

A. In connection with Owner's rights to request changes in the Work in accordance with Article 10, Owner (especially in certain instances as provided in paragraph 10.01) is obligated to execute Change Orders.

8.07 INSPECTIONS, TESTS, AND APPROVALS

A. Owner's responsibility in respect to certain inspections, tests and approvals is set forth in paragraph 13.02.

8.08 LIMITATION ON OWNER’S RESPONSIBILITY

A. Owner will 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 furnishing or performance of the Work. Owner will

not be responsible for Contractor’s failure to perform or furnish the Work in accordance with the Contract Documents.

8.09 UNDISCLOSED HAZARDOUS MATERIALS

A. Owner’s responsibility in respect of undisclosed Constituents of Concern uncovered or revealed at the Site is set forth in Paragraph 4.06.

8.10 OWNER’S DESIGNATED REPRESENTATIVE

A. Owner will designate a person to act as its representatives during the performance of the Work. Owner’s designated representative will attend meetings and perform on behalf of Owner all obligations required of Owner under the provisions of the Contract Documents.

ARTICLE 9 ENGINEER'S STATUS DURING CONSTRUCTION

9.01 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 will be as set forth in the Contract Documents.

9.02 VISITS TO SITE

A. Engineer may make visits to the Site at intervals appropriate to the various stages of construction to observe the progress and quality of the executed Work, and to determine solely for the benefit of Owner, in general, if the Work is proceeding in accordance with the technical requirements of the Contract Documents. It will not be the responsibility of Engineer to make exhaustive or continuous on Site inspections to check the quality or quantity of the Work.

9.03 RESIDENT PROJECT REPRESENTATIVE

A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more continuous observation of the Work. A Resident Project Representative will act as directed by and under the supervision of Engineer. Resident Project Representative's dealings in matters pertaining to the on Site Work will in general be only with Engineer and Contractor, and dealings with Subcontractors will only be through or with the full knowledge of Contractor. The Resident Project Representative's duties and responsibilities include:

1. Schedules:

    a. Review the Progress Schedule, Schedule of Submittals and Schedule of Values prepared by Contractor.

2. Conferences:

    a. Arrange a schedule of progress meetings and other job conferences as required in consultation with Engineer and Owner, and notify those expected to attend in advance.

3. Liaison:

    a. Serve as Engineer's liaison with Contractor, working principally through Contractor's superintendent and assist him in understanding the intent of the technical aspects of

the Contract Documents. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on Site operations.

4. Shop Drawings and Samples:

    a. Advise Engineer and Contractor, or Contractor’s superintendent, immediately of the commencement of any Work requiring a Shop Drawing or Sample submission if the submission was identified on the schedule and has not been reviewed by Engineer.

5. Review of Work, Rejection of Defective Work, Inspections, and Tests:

    a. Conduct on Site observations of the Work and report to Engineer whenever Resident Project Representative believes that technical aspects of any executed Work is unsatisfactory, faulty or defective or does not meet the requirements of any inspections, tests or approval required to be made or has been damaged prior to final payment; and advise Engineer when Resident Project Representative believes that any partially completed portion of the Work should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.

    b. Observe, record and report to Engineer appropriate details relative to test procedures and startups.

    c. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Project, record the outcome of these inspections and report to Engineer.

6. Modifications:

    a. Consider Contractor's suggestions for modifications in Plans or Specifications and report them to Engineer.

7. Reports:

    a. Prepare periodic reports as required of progress of the Work and Contractor's compliance with the approved Progress Schedule and Schedule of Submittals.

8. Completion:

    a. Verify that all items on final list of items requiring completion or correction have been completed or corrected and make recommendations to Engineer concerning acceptance.

9. Exceptions:

    a. Resident Project Representative:

        1) Shall not authorize any deviation from the Contract Documents or approve any substitute materials or equipment.

        2) Shall not approve or accept any portion of the completed Work.

        3) Shall not undertake any of the responsibilities of Contractor, Subcontractors or Contractor's superintendent, or expedite the Work.

        4) Shall not advise on or issue directions relative to any aspect of the means, methods, techniques, sequences or procedures of construction unless such is specifically called for in the Contract Documents.

5) Shall not advise on or issue directions as to safety precautions and programs in connection with the Work.

6) Shall not advise on or issue directions regarding Contractor's failure to comply with Laws and Regulations applicable to the furnishing or performance of the Work.

9.04 CLARIFICATIONS AND INTERPRETATIONS

A. Engineer will issue with reasonable promptness such written clarifications or interpretations of the Contract Documents as Engineer may determine necessary, which will be consistent with or reasonably inferable from the overall intent of the Contract Documents.

9.05 AUTHORIZED VARIATIONS IN WORK - FIELD ORDER

A. Engineer may authorize minor adjustments in the Work to avoid obstructions or interferences which do not involve an adjustment in the Contract Price or the Contract Time, and which are consistent with the overall intent of the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner, and also on Contractor who will perform the change promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a request for a Change Proposal may be made therefore as provided in paragraph 10.06 or a Claim may be submitted as set forth in paragraph 11.01.

9.06 REJECTING DEFECTIVE WORK

A. Engineer will have authority to disapprove or reject completed portions of the Work which Engineer believes to be defective and will also have authority to require special inspection or testing of the Work as provided in paragraph 13.04, whether or not the Work is fabricated, installed or completed.

9.07 SHOP DRAWINGS, CHANGE ORDERS, AND PAYMENTS

A. Engineer's responsibility for Shop Drawings and samples are set forth in paragraphs 6.19 through 6.21 inclusive.

B. Engineer's responsibilities as to Change Orders are set forth in Articles 10, 11, and 12.

C. Engineer's responsibilities in respect of Applications for Payment are set forth in Article 14.

9.08 DETERMINATIONS FOR UNIT PRICE WORK

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review Engineer's preliminary determinations with Contractor on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of paragraph 10.06.

9.09 DECISIONS ON DISAGREEMENTS, CLAIMS

A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work performed thereunder. Claims, disputes and other matters relating to the acceptability of the Work, or the interpretation of the requirements of the Contract Documents pertaining to the execution and progress of the Work, will be referred

initially to Engineer in writing with a request for a formal decision in accordance with this paragraph 9.09.

B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believe that any such decision entitles them to an adjustment in the Contract Price, or Contract Times, or both, a Claim may be made under paragraph 11.01.

C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of paragraph 11.01.

D. In this capacity Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.10 LIMITATIONS ON ENGINEERS RESPONSIBILITIES

A. Neither Engineer's authority to act under this Article 9 or elsewhere in the Contract Documents, nor any decision made by Engineer in good faith either to exercise or not exercise such authority, will give rise to any duty or responsibility of Engineer to Owner or Contractor, any Subcontractor, any manufacturer, fabricator, Supplier, distributor, surety, or any other person, 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 furnishing or performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents. These limitations on authority and responsibility will also apply to Engineer's Consultant's, Resident Project Representative and assistants.

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

D. Engineer will not be responsible to Contractor or any Subcontractor, or Supplier, or to their agents or employees for injuries, damages, claims, losses, or expenses (including attorney's fees) of whatsoever kind resulting from or caused by any act or omission of Engineer in preparation for, arising from, relating to, or concerning the Project. Such acts or omissions include, but are not limited to, Engineer's negligence, tortuous conduct, errors, omissions, strict liability, breach of contract, or breach of warranty. Engineer makes no representations to Contractor, Subcontractors, Suppliers or their agents or employees regarding or respecting any work performed by Engineer in preparation for, arising from, relating to, or concerning the Project.

E. Neither Contractor, its agents or employees, nor any Subcontractors or Suppliers or their agents or employees, are intended beneficiaries of Engineer's agreement with Owner, nor are such parties intended beneficiaries of Engineer's duties or responsibilities arising therefrom. Engineer disclaims all duties to Contractor, Subcontractors, Suppliers or their agents or employees arising from, relating to, or concerning Engineer's involvement in the Project. Owner and Contractor further agree to notify all Contractor's, Subcontractors or Suppliers of this disclaimer of Engineer's liability and require them to abide by this disclaimer.

ARTICLE 10 AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

10.01 AMENDING AND SUPPLEMENTING CONTRACT DOCUMENTS

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

1. Change Orders:

a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.

b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not involve;

1) the performance or acceptability of the Work,

2) the design (as set forth in the Drawings, Specifications, or otherwise), or

3) other engineering or technical matters, without the recommendation of Engineer. Such an amendment will be set forth in a Change Order.

2. 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 10.04 regarding change of Contract Price.

b. Contractor must submit any Change Proposal seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the issuance of the Work Change Directive.

c. Owner must submit any Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.

3. Field Orders:

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 Contractor, which will perform the Work involved promptly.

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

10.02 OWNER-AUTHORIZED CHANGES IN THE WORK

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

supported by Engineer's recommendation, to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive.

B. Upon receipt of any such document, Contractor will 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 will be performed under the applicable conditions of the Contract Documents. Nothing in this paragraph 10.02 will obligate Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

10.03 UNAUTHORIZED CHANGES IN THE WORK

A. Contractor will 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 6.18 or in the case of uncovering Work as provided in paragraph 13.03.

10.04 CHANGE OF CONTRACT PRICE

A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price will comply with the provisions of paragraph 10.06. Any Claim for an adjustment of Contract Price will comply with the provisions of paragraph 11.01.

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 12.03); or

2. where the Work involved is not covered by Unit Prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with paragraph 10.04.C.2); or

3. where the Work involved is not covered by Unit Prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in paragraph 12.01) plus a Contractor's fee for overhead and profit (determined as provided in paragraph 10.04.C).

C. Contractor's Fee: When applicable, 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 paragraph 12.01.B.1 and 12.01.B.2, Contractor's fee will be 15 percent;

b. for costs incurred under paragraph 12.01.B.3, Contractor's fee will be five percent;

c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of paragraphs 10.04.C.2.a and 10.04.C.2.b is that Contractor's fee will be based on:

1) a fee of 15 percent of the costs incurred under paragraphs 12.01.B.1 and 12.01.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;

3) 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 12.01.B.4, 12.01.B.5, and 12.01.C;

e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to 5 percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee will be computed on the basis of the net change in accordance with paragraphs 10.04.C.2.a through 10.04.C.2.e, inclusive.

10.05 CHANGE OF CONTRACT TIMES

A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times will comply with the provisions of paragraph 10.06. Any Claim for an adjustment in the Contract Times will comply with the provisions of paragraph 11.01.

B. An adjustment of the Contract Times will be subject to the limitations set forth in paragraph 12.04, concerning delays in Contractor's progress.

10.06 CHANGE PROPOSALS

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

1. Procedures: Contractor will submit each Change Proposal to Engineer promptly (but in no event later than 5 days) after the start of the event giving rise thereto, or after such initial decision. Contractor will submit supporting data, including the proposed change in Contract

Price or Contract Time (if any) to Engineer and Owner within 15 days after the submittal of the Change Proposal. The supporting data will be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event. Engineer will advise Owner regarding the Change Proposal and consider any comments or response from Owner regarding the Change Proposal.

2. Engineer's Action: Engineer will review each Change Proposal and, within 30 days after receipt of Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions will 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 paragraph 11.01.

3. Binding Decision: Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under paragraph 11.01.

B. Resolution of Certain Change Proposals: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties that 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 paragraph 11.01.

10.07 EXECUTION OF CHANGE ORDERS

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

1. changes in the Contract Price or Contract Times which are agreed to by the Parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;

2. changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;

3. changes in the Work which are:

a. ordered by Owner pursuant to paragraph 10.02,

b. required because of Owner's acceptance of defective Work under paragraph 13.08 or Owner's correction of defective Work under paragraph 13.09, or

c. agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and

4. changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under paragraph 10.06, or Article 16.

B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this paragraph 10.07, it will be deemed to be of full force and effect, as if fully executed.

10.08 NOTIFICATION TO SURETY

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

ARTICLE 11 CLAIMS

11.01 CLAIMS

A. Claims Process: The following disputes between Owner and Contractor will be submitted to the Claims process set forth in this Article:

1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;

2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents; and

3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters.

B. Submittal of Claim: The party submitting a Claim will deliver it directly to the other party to the Contract promptly (but in no event later than 10 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 will also furnish a copy to Engineer, for its information only. The responsibility to substantiate a Claim will rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, Contractor will 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 will review it thoroughly, giving full consideration to its merits. The two parties will 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 will 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 16 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 16 for 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 to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 12 COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

12.01 COST OF 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 12.01 are used 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 prevailing in the locality of the Project, will not include any of the costs itemized in paragraph 12.01.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. Such employees will include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work will be apportioned on the basis of their time spent on the Work. Payroll costs will include, but not be limited to, salaries and wages plus the cost of fringe benefits, which will include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, will be included in the above to the extent authorized by Owner.

2. Costs 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 will 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 will 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 will obtain competitive bids from Subcontractors acceptable to Owner and Contractor and will deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this paragraph 12.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

    a. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

    b. Rentals of all construction equipment and machinery, and the parts thereof, whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts will cease when the use thereof is no longer necessary for the Work.

        1) The rental rate established for each piece of Contractor owned equipment, including appurtenances and attachments to the equipment, used will be determined by use of the Rental Rate Blue Book for Construction Equipment, Volume 1, 2 or 3, as applicable; the edition which is current at the time the Work was started will apply. The established rental rate will be equal to the "Monthly" rate divided by 176; modified by the rate adjustment factor and the applicable map adjustment factor, plus the "Estimated Operating Costs per Hour."

        2) For equipment not listed in the Rental Rate Blue Book, Volume 1, 2 or 3, the rental rate will be determined by using the rate listed for a similar piece of equipment or by proportioning a rate listed so that the capacity, size, horsepower, and age are properly considered.

        3) For equipment for which there are no comparables in the Rental Rate Blue Book, Volume 1, 2 or 3, the monthly rate will be reasonable, but not more than 5 percent of the current list price, or invoice, of the equipment. The base hourly rate will then be determined by dividing the monthly rate by 176 to which 20 percent will be added to the sum which will account for adjustments and operating costs.

c. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by laws and regulations.

d. 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.

e. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with paragraph 5.03), 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 will 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:

1) The cost of utilities, fuel, and sanitary facilities at the Site.

2) 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 will not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in paragraph 12.01.B.1 or specifically covered by paragraph 12.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by Contractor's fee.

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

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

4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in paragraph 12.01.B.

D. Contractor's Fee: When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee will be determined as set forth in paragraph 10.04.C.

E. Documentation: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 12, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer on a daily basis, an itemized cost breakdown together with supporting data.

12.02 ALLOWANCES

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and will 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 of the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. Contingency Allowance: Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price will be correspondingly adjusted.

12.03 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 Proposal.

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 Engineer's preliminary determinations with Contractor on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of the following paragraph 12.03.E.

E. Within 30 days of Engineer's written decision under the preceding paragraph 12.03.D, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking and adjustment in the Contract Price if:

1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimate quantity of such item indicated in the Proposal (in no event will any change in quantities of less than 25% be considered a material or significant change from the estimated quantities); and

2. there is no corresponding adjustment with respect to any other item of Work.

12.04 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 will be entitled to request an equitable adjustment in the Contract Times and Contract Price. However, Contractor's entitlement to an adjustment of the Contract Times or Contract Price is expressly conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

B. Contractor will 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 will 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 and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor will be entitled to an equitable adjustment in Contract Times. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment 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 only the following:

1. severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;

2. acts or failures to act of utility owners (other than those performing other works at or adjacent to the Site by arrangement with Owner, as specified in paragraph 7.01); and

3. 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 will 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 will 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 10.

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 10.04.

F. Contractor will 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.

G. 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 paragraphs 4.03 and 4.06.

H. Paragraph 7.01 governs delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

I. Contractor will not be entitled to any adjustment in Contract Price or Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor.

J. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 5 days of the commencement of the delaying, disrupting, or interfering event.

K. Where Contractor is prevented from completing any part of the Work within the Contract Time (or Milestones) due to delay beyond the control of both Owner and Contractor, an extension of the Contract Times (or Milestones) in an amount equal to the time lost due to such delay will be Contractor's sole and exclusive remedy for such delay. In no event will Owner or Engineer be liable to Contractor, any Subcontractor, any Supplier, or any other person or organization, or to any surety or employee or any agent of them, for 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 resulting from:

1. delays caused by or within the control of Contractor (or Subcontractor or Supplier);

2. delays beyond the control of both Owner and Contractor, including but not limited to fires, floods, epidemics, abnormal weather conditions, acts of God, or acts of neglect by utility owners or other contractors performing other work;

L. Nor will Owner or Engineer or each of them 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.

M. Nothing in this paragraph 12.04 bars a change in Contract Price to compensate Contractor due to delay, interference, or disruption directly attributable to actions or inactions of Owner or anyone for whom Owner is responsible. Except for an adjustment to the Contract Times and Contract Price, Contractor will not be entitled to and hereby waives any and all damages that it may suffer by reason of such delay or for any Act of God, including but not limited lost profits, overhead, and other consequential damages.

ARTICLE 13 TESTS AND INSPECTION; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 ACCESS TO WORK

A. Owner, Engineer and Engineer's representatives, other representatives of Owner, testing agencies and governmental agencies with jurisdictional interests will have access to the Work at reasonable times for their observation, inspection and testing. Contractor will provide proper and safe conditions for such access and advise Owner and Engineer of Contractor’s Site safety procedures and programs so that Owner and Engineer may comply therewith as applicable.

13.02 TESTS AND INSPECTIONS

A. Contractor will give Engineer and testing agency at least 24-hour notice, unless otherwise specified, of readiness of the Work for all required inspections, tests or approvals, and will cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. If any Law and Regulation, code, or order of any public body having jurisdiction requires any Work or part thereof to specifically be inspected, tested or approved, Contractor will assume full responsibility therefor, pay all costs in connection therewith and furnish Engineer the required certificates of inspection, testing or approval.

C. Contractor will also be responsible for and will pay all costs in connection with any inspection or testing required in connection with Owner's or Engineer's acceptance of a manufacturer, fabricator, Supplier or distributor of materials or equipment proposed to be incorporated in the Work, or of materials or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

D. The cost of all other inspections, tests and approvals required by the Contract Documents will be paid by Owner unless otherwise specified.

E. All inspections, tests or approvals other than those required by law, ordinance, rule, regulation, code or order of any public body having jurisdiction will be performed by organizations acceptable to Owner and Contractor or by Engineer if so specified.

F. Cost of materials to be used in inspection and transportation costs will be paid for by Contractor.

G. Neither observations by Engineer nor inspections, tests or approvals by others will relieve Contractor from Contractor's obligations to perform the Work in accordance with the Contract Documents.

13.03 UNCOVERING WORK

A. If any Work that is to be tested, inspected or approved is covered without written concurrence of Engineer, or contrary to the written request of Engineer, it will, if requested by Engineer, be uncovered by Contractor for Engineer's observation. Such uncovering will be at Contractor's expense unless Contractor has given Engineer timely written notice of Contractor's intention to cover such Work and Engineer has not acted with reasonable promptness in response to such notice.

B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, will uncover, expose or otherwise make available for observation, inspection or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment. Except as otherwise specified in paragraph 13.04, the cost of Work will be paid for as follows:

1. If it is found that such Work is defective, Contractor will bear all the expenses of such uncovering, exposure, observation, inspection and testing, and of satisfactory reconstruction, (including, but not limited to, fees and charges of engineers, architects, attorneys, and other professionals) and an appropriate deductive Change Order will be issued. If the parties are unable to agree as to the amount or extent of any change in Contract Price or Contract Time, Owner may make a Claim as provided in paragraph 11.01.

2. If, however, such Work is not found to be defective, Contractor will be allowed an increase in the Contract Price or an extension of the Contract Time or both, directly attributable to such uncovering, exposure, observation, inspection, testing, and reconstruction. If the parties are unable to agree as to the amount or extent of any change in Contract Price or Contract Time, Contractor may make a Claim as provided in paragraph 11.01.

13.04 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.

13.05 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 furnish or perform the Work in such a way that the completed Work will conform to the Contract Documents, 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, Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 CORRECTION OR REMOVAL OF DEFECTIVE WORK

A. If required by Engineer or Owner, Contractor will promptly either correct all defective Work, whether or not fabricated, installed or completed, or if the Work has been rejected by Engineer, remove it from the Site and replace it with non-defective Work. Contractor will pay all claims, costs, losses, damages and expenses caused by or resulting from such correction or removal (including, but not limited to all costs of repair or replacement of work of others) and will take

no action that would void or otherwise impair Owner’s special warranty or guarantee, if any, on such Work.

13.07 GUARANTEE PERIOD

A. If within 1 year after the date of Substantial Completion (or such longer period of time as may be prescribed by Laws or Regulations or by the terms of any applicable special guarantee required by the Contract Documents), or by any specific provision of the Contract Documents, any Work is found to be defective, Contractor will promptly, without cost to Owner and in accordance with Owner's written instructions:

1. repair defective land or areas;

2. correct such defective Work;

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

4. satisfactorily correct or repair or remove and replace any damage to other Work or the work of others or other land or areas resulting therefrom.

B. If Contractor does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or the rejected Work removed and replaced, and all claims, costs, losses, damages and expenses caused by or resulting from such removal and replacement (including but not limited to all costs of repair or replacement or work of others) will be paid by Contractor.

C. Repair or replacements made under the guarantee will bear an additional 1 year guarantee dated from the acceptance of repair or replacement.

13.08 ACCEPTANCE OF DEFECTIVE WORK

A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, also Engineer) prefers to accept it, Owner may do so. Contractor will pay all claims, costs, losses, damages and expenses attributable to Owner’s evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness). In such case, if acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner will be entitled to an appropriate reduction in the Contract Price. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 OWNER MAY CORRECT DEFECTIVE WORK

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with paragraph 13.06, or if Contractor fails to perform the Work in accordance with the Contract Documents (including any requirements of the Progress Schedule), Owner may, after 48 hours' written notice to Contractor and Contractor's Surety without prejudice to any other remedy Owner may have, correct and remedy any such deficiency.

B. In exercising Owner's rights and remedies under this paragraph 13.09, Owner will proceed expeditiously. To the extent necessary to complete corrective and 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, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site 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 will allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer's consultants such access to the Site as may be necessary to enable Owner to exercise Owner's rights and remedies under this paragraph 13.09.

C. All claims, costs, losses, damages and expenses incurred or sustained by Owner in exercising such rights and remedies will be charged against Contractor and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work. Owner will be entitled to an appropriate reduction in the Contract Price equivalent to such claims, costs, losses, damages and expenses including 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 will not be allowed an extension of the Contract Time because of any delay in performance of the Work attributable to the exercise by Owner of Owner's rights under this Article 13.

ARTICLE 14 PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 SCHEDULES

A. At least 10 days prior to submitting the first Application for Payment, Contractor will submit to Engineer a final Schedule of Submittals, and, where applicable, a Schedule of Values for the Work. These schedules will be satisfactory in form and substance to Engineer as provided in Article 2.

B. The Schedule of Values will include quantities and unit prices aggregating the Contract Price and will subdivide the Work into component parts. Each unit cost so established will include its proportionate share of Contractor's general operating charges such as profit, overhead, supervision, insurance, bond premiums, interest, equipment cost, depreciation and rental, contingencies, expendable tools, equipment and supplies. The total cost of the items and quantities Contractor lists in the Schedule of Values will equal the total Contract Price established in the Proposal.

C. The Schedule of Values will include a complete set of detailed work sheets on bid take off and bid summary covering estimated general conditions expense (field overhead), general overhead, profit mark ups and revisions leading to the final bid amount.

D. When the Schedule of Values is approved by Engineer, it will become part of the Agreement and will be used as the basis for Contractor progress payments.

E. Progress payments based upon Unit Price Work will be based upon the number of units completed.

14.02 APPLICATION FOR PROGRESS PAYMENT

A. At least 20 days before each Application for Payment falls due (but not more often than once a month), Contractor will submit to Engineer for review an Application for Payment, Contractor's Declaration, Payment Schedule, and updated Progress Schedules indicating the anticipated completion dates of the various stages of the Work and estimated payments during the next 3

months. Contractor's Application for Payment will be filled out on the form provided in the Contract Documents and signed by Contractor covering the Work completed as of the date of the Application for Payment and accompanied by such supporting documentation as is required by the Contract Documents and as Engineer or Owner may reasonably require. The Payment Schedule will be on the form provided in the Contract Documents or in a format acceptable to Engineer or Owner. On the second and all subsequent payments, partial Waivers of Lien and Sworn Statement will be required for all Work completed and paid for on previous certificates.

B. 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 will also be accompanied by such data, satisfactory to Owner, as will establish Owner's title to the material and equipment and protect Owner's interest therein, including applicable insurance. A receipted vendor's invoice showing the quantities of materials and the amounts paid will be required and will accompany the Application for Payment.

C. Retainage with respect to progress payments will be in accordance with paragraph 14.03, and it will be retained until after completion of the entire Work and its final acceptance. When the amount to be retained is reduced to less than 10 percent, Contractor will file with Owner the written consent of the Surety to such reduction and will furnish an affidavit that all Contractor’s indebtedness by reason of the Contract has been paid.

14.03 RETAINAGE

A. On Contracts with a dollar value of $30,000 and greater or on Contracts that provide for more than 3 progress payments, progress payments and retainage will be governed by the provisions of any statutes, rules or regulations regarding retention and these are incorporated herein by reference and made a part of this Contract.

B. If there are no statutes, rules, or regulations applicable to retention, retainage will be 10%, or such an amount as Owner deems necessary.

14.04 REVIEW OF APPLICATIONS FOR PROGRESS PAYMENT

A. Engineer will, within 10 days after receipt of each Contractor's Application for Payment and Payment Schedule, including each resubmittal, either indicate in writing a recommendation of payment and present an Engineer's Certificate for Payment to Owner, or may 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.

B. Engineer's recommendation of any payment requested in Contractor’s Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's review of the Contractor’s Application for Payment and Certificate for Payment and the accompanying data and schedules, as an experienced and qualified design professional that to the best of Engineer's knowledge, information and belief;

1. the Work has progressed to the point indicated;

2. the quality of the Work is in accordance with the technical aspects of the Contract Documents subject to an evaluation of the Work as a functioning Project upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, a

final determination of quantities and classifications for any Unit Price Work under paragraph 12.03, and any qualifications stated in the recommendation; and

3. 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.

C. However, by recommending any such payment Engineer will not thereby be deemed to have represented that:

1. exhaustive or continuous on-Site inspections have been made to check the quality or the quantity of the Work; or

2. involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or

3. 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.

D. Neither Engineer's review of Contractor's Work for the purpose of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

1. to supervise, direct or control the Work;

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

3. for the failure of Contractor to comply with Laws and Regulations applicable to the furnishing or performance of Work;

4. for any failure of Contractor to perform or furnish Work in accordance with the Contract Documents;

5. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price;

6. to determine that title to any Work, materials, or equipment has passed to Owner free and clear of Liens.

E. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make such representations as stated above to Owner. Engineer may also refuse to recommend any such payment, or, because of subsequently discovered evidence or the results of subsequent inspections or tests, nullify any such payment previously recommended to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

1. the Work is defective, or completed Work has been damaged requiring correction or replacement;

2. the Contract Price has been reduced because of Change Orders;

3. Owner has been required to correct defective Work in accordance with paragraph 1309, or has accepted defective Work in accordance with paragraph 13.08;

4. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;

5. Engineer has actual knowledge of the occurrence of any of the events enumerated in paragraph 15.02.

14.05 PAYMENT BECOMES DUE

A. Thirty (30) days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of paragraph 14.05.B) become due, (or only if Owner is a public agency, within 15 days after Owner receives the funds which are to be provided by a department or agency of the federal or state government, whichever is later, or in accordance with any time periods required by any applicable statute, rule or regulation) and when due will be paid by Owner to Contractor.

B. Owner may refuse to make payment of the full amount recommended by Engineer because:

1. 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,

2. adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

3. 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;

4. Contractor has failed to provide and maintain required bonds or insurance;

5. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;

6. 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;

7. The Work is defective, requiring correction or replacement;

8. Owner has been required to correct defective Work in accordance with paragraph 13.09, or has accepted defective Work pursuant to paragraph 13.08;

9. The Contract Price has been reduced by Change Orders;

10. An event has occurred that would constitute a default by Contractor and therefore justify a termination for cause;

11. Liquidated or other damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;

12. 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;

13. there are other items as set forth in the Contract Documents entitling Owner to a set off against the amount recommended; or

14. Owner has actual knowledge of the occurrence of any of the events enumerated in paragraphs 14.04.E.1 through 14.04.E.5.

C. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner will promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor corrects, to Owner's satisfaction, the reasons for such action. The reduction imposed will be binding on Contractor unless Contractor duly submits a Change Proposal contesting the reduction.

D. If it is subsequently determined that Owner's refusal of payment was not justified, the amount wrongfully withheld will be treated as an amount due as determined by paragraph 14.05.

14.06 CONTRACTOR'S WARRANTY OF TITLE

A. Contractor warrants and guarantees that title to all Work, materials and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner at the time of payment free and clear of all Liens, claims, security interests and encumbrances (hereafter in these General Conditions referred to as "Liens").

14.07 SUBSTANTIAL COMPLETION

A. When Contractor considers the entire Work ready for its intended use Contractor will notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a Certificate of Substantial Completion. Contractor will 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 will 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. Once 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 will attach to the certificate a punch list of items to be completed or corrected before final payment. Owner will 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 therefore. 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 will 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 Contractor will 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 will 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.

14.08 PARTIAL UTILIZATION

A. Use by Owner of completed portions of the Work may be accomplished prior to Substantial Completion of all the Work subject to the following:

1. Owner at any time may request Contractor in writing to permit Owner to use any part of the Work which Owner believes to be substantially complete and which may be so used without significant interference with construction of the other parts of the Work. If Contractor agrees, Contractor will certify to Owner and Engineer that said part of the Work is substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work. Within a reasonable time thereafter Owner, Contractor and Engineer will make an inspection of that part of the Work to determine its status of completion.

    a. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving reasons therefor.

    b. If Engineer considers that part of the Work to be substantially complete, Engineer will execute and deliver to Owner and Contractor a certificate to that effect, fixing the date of Substantial Completion for that part of the Work, attaching thereto a punch list of items to be completed or corrected before final payment.

2. Prior to issuing a certificate of Substantial Completion for that part of the Work, Engineer will deliver to Owner and Contractor a written recommendation as to the division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, maintenance, utilities and insurance for that part of the Work, which will become binding upon Owner and Contractor at the time of issuing the definitive certificate of Substantial Completion for that part of the Work unless Owner and Contractor will have otherwise agreed in writing and so informed Engineer.

3. Owner will have the right to exclude Contractor from any part of the Work which Engineer has so certified to be substantially complete, but Owner will allow Contractor reasonable access to complete or correct items on the punch list.

4. In lieu of the issuance of a certificate of Substantial Completion as to part of the Work, Owner may take over operation of a facility constituting part of the Work whether or not it is

Substantially Complete if such facility is functionally and separately usable; provided that prior to any such takeover, Owner and Contractor have agreed as to the division of responsibilities between Owner and Contractor for security, operation, safety, maintenance, correction period, heat, utilities and insurance with respect to such facility.

14.09 FINAL INSPECTION

A. Upon written notice from Contractor that the Work is complete, Engineer will 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 is incomplete or defective. Contractor will immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.10 FINAL APPLICATION FOR PAYMENT

A. After Contractor has completed all corrections to the satisfaction of Engineer and delivered all maintenance and operating instructions, schedules, guarantees, Bonds, certificates of inspection, marked up record documents and other documents (all as required by the Contract Documents), and after Engineer has indicated that the Work is acceptable, subject to the provisions of paragraph 14.13, Contractor may make application for final payment following the procedure for progress payments.

B. The final Application for Payment will be accompanied by all documentation called for in the Contract Documents and such other data and schedules as Engineer may reasonably require, consent of Surety, if any, to final payment, together with complete and legally effective releases or waivers, satisfactory to Owner, of all Liens arising out of or filed in connection with the Work.

C. In lieu of the releases or waivers of Lien, if approved by Owner, Contractor may furnish receipts or releases in full; an affidavit of Contractor that the releases and receipts include all labor, services, material and equipment for which a Lien could be filed, and that all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner or Owner's property might in any way be responsible, have been paid or otherwise satisfied.

D. If any Subcontractor, manufacturer, fabricator, Supplier or distributor fails to furnish a release or receipt in full, Contractor may furnish a Bond or other collateral satisfactory to Owner to indemnify Owner against any Claim or Lien.

14.11 FINAL PAYMENT AND ACCEPTANCE

A. 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 (all as required by the Contract Documents), Engineer is satisfied that to the best of Engineer’s knowledge, information and belief as a design professional that the Work has been completed and Contractor has fulfilled all of Contractor's obligations under the Contract Documents, Engineer will, within 10 days after receipt of the final Application for Payment, indicate in writing Engineer’s Certificate for Payment and present the application to Owner for payment. At that time Engineer will give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of paragraph 14.13.

B. Otherwise, Engineer will return the Application to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor will make the necessary corrections and resubmit the Application.

C. If the Application and accompanying documentation are appropriate as to form and substance, Owner will, within 45 days (or within the time period required by any applicable statute, rule or regulation) after receipt thereof pay Contractor the amount recommended by Engineer less any amounts of Owner claimed set-offs allowed under the Contract Documents, including but not limited to any applicable liquidated damages as determined by Owner. If Owner rejects the Application, Owner will do so in writing stating the appropriate sections of the Contract Documents upon which the rejection is based. Contractor may take the necessary remedial actions and resubmit the Application.

14.12 FINAL COMPLETION DELAYED

A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner will, upon receipt of Contractor's final Application for Payment and recommendation of Engineer, and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if Bonds have been furnished as required in paragraph 5.01, the written consent of the Surety to the payment of the balance due for that portion of the Work fully completed and accepted will be submitted by Contractor to Engineer with the Application for such payment. Such payment will be made under the terms and conditions governing final payment, except that it will not constitute a waiver of Claims.

14.13 WAIVER OF CLAIMS

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to paragraph 14.09, or from failure to comply with the Contract Documents or the terms of any special guarantees specified therein; and will not constitute a waiver by Owner of any rights in respect of Contractor's existing or continuing obligations under the Contract Documents; and,

2. a waiver of all Claims by Contractor against Owner other than those previously made in writing and still pending in accordance with Article 16.

14.14 LATE PAYMENTS

A. Monies not paid when due hereunder, except monies involving Federal and/or State Loans, Grants, or other sources which are delinquent because of no fault of Owner, will bear interest at the maximum rate allowed by law at the time and place of the Project.

ARTICLE 15 SUSPENSION OF WORK AND TERMINATION

15.01 OWNER MAY SUSPEND WORK

A. Owner may, at any time and without cause, suspend the Work or any portion thereof for a period as Owner may deem necessary by notice in writing to Contractor and Engineer. If it should become necessary to stop work for an indefinite period, Contractor will store all materials in such manner that they will not become an obstruction, nor become damaged in any way, and Contractor will take every precaution to prevent damage or deterioration of the Work performed; provide suitable drainage by opening ditches and drains, and erect temporary structures where necessary. Contractor may request an increase in the Contract Price or an

extension of the Contract Time, or both, directly attributable to any suspension if Contractor makes a Claim therefor as provided in paragraph 11.01.

15.02 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 commences a voluntary case under any chapter of the Bankruptcy Code (Title 11, United States Code), as now or hereafter in effect, or if Contractor takes any equivalent or similar action by filing a petition or otherwise under any other federal or state law in effect at such time;

2. a petition is filed against Contractor under any chapter of the Bankruptcy Code as now or hereinafter in effect at the time of filing, or if a petition is filed seeking any such equivalent or similar relief against Contractor under any other federal or state law in effect at the time relating to bankruptcy or insolvency;

3. Contractor makes a general assignment for the benefit of creditors;

4. a trustee, receiver, custodian or agent of Contractor is appointed under applicable law or under contract, whose appointment or authority to take charge of property of Contractor is for the purpose of enforcing a Lien against such property or for the purpose of general administration of such property for the benefit of Contractor's creditors;

5. Contractor admits in writing an inability to pay its debts generally as they become due;

6. Contractor persistently fails 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 established under paragraph 2.05 as revised from time to time);

7. Contractor disregards Laws and Regulations of any public body having jurisdiction;

8. Contractor disregards the authority of Engineer or Owner; or,

9. Contractor otherwise violates any provisions of the Contract Documents.

B. Owner may, after giving Contractor (and the Surety, if there be one) 7 days' written notice, and to the extent permitted by Laws and Regulations, terminate the services of Contractor, exclude Contractor from the Site, take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the site and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion), incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, finish the Work as Owner may deem expedient, and/or enforce the rights available to Owner under any applicable Performance Bond.

C. In such case, Contractor will not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, damages and expenses sustained by Owner arising out of or resulting from completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, damages and expenses exceed such unpaid balance, Contractor will pay the difference to Owner. Such claims, costs, losses, damages and expenses incurred by Owner will be reviewed as to reasonableness by Engineer

and when so approved, incorporated in a Change Order, but when exercising any rights or remedies under this paragraph, Owner will not be required to obtain the lowest price for the Work performed.

D. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor or its Surety then existing or which may thereafter accrue. Any retention or payment of monies due Contractor by Owner will not release Contractor from liability.

15.03 TERMINATION 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, elect to terminate the Agreement. In such case, Contractor will be paid (without duplication of any items):

1. for completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination;

2. for actual 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; and

3. for reasonable expenses directly attributable to protecting work as a result of termination.

B. Contractor will not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

C. Upon such termination, Contractor will:

1. Immediately discontinue Work on the date and to the extent specified in the notice except to the extent necessary to protect Work in place;

2. Place no further orders for materials, services, or facilities, other than as may be necessary or required for completion of such portion of Work under the Contract that is not terminated;

3. Promptly make every reasonable effort to obtain cancellation upon terms reasonably satisfactory to Owner of all purchase orders and subcontracts to the extent they relate to the performance of Work terminated or assign to Owner those orders and subcontracts and revoke agreements specified in such notice;

4. Reasonably assist Owner, as specifically requested in writing, in the maintenance, protection and disposition of property acquired by Owner under the Contract Documents, as may be necessary;

5. Complete performance of any Work which is not terminated; and

6. Deliver to Owner an affidavit regarding the identity of potential unpaid Subcontractors or Suppliers and the amounts due to each.

15.04 CONTRACTOR MAY STOP WORK OR TERMINATE

A. If Owner has failed to pay Contractor any sum finally determined to be due in accordance with the time limits specified in paragraph 14.05, Contractor may upon 7 days’ written notice to Owner and Engineer, stop the Work until payment of all amounts then due.

B. If through no act or fault of Contractor, the Work is suspended for a period of more than 90 days by Owner, or under an order of court or other public authority, then Contractor may, upon 7 days written notice to Owner and Engineer and provided Owner or Engineer does not remedy such suspension or failure within that time, terminate the Agreement and recover from Owner payment on the same terms as provided in paragraph 15.03.

C. The provisions of this paragraph 15.04 will not relieve Contractor of Contractor's obligations under paragraph 6.22 to carry on the Work in accordance with the Progress Schedule and without delay during disputes and disagreements with Owner.

ARTICLE 16 FINAL RESOLUTION OF DISPUTES

16.01 METHODS AND PROCEDURES

A. Disputes Subject to Final Resolution: The following disputed matters are subject to final resolution under the provisions of this Article:

1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full; and

2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents and arising after final payment has been made.

B. Final Resolution of Disputes: For any dispute subject to resolution under this Article, Owner or Contractor may:

1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions; or

2. agree with the other party to submit the dispute to another dispute resolution process; or

3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, the following dispute resolution process will be followed:

a. The parties will submit the dispute to mediation under the mediation procedures outlined in the Construction Industry Arbitration Rules and Mediation Procedures of the American Arbitration Rules.

b. If the dispute is not resolved by mediation, the parties will proceed to resolve the dispute by arbitration in accordance with the Construction Industry Arbitration Rules and Mediation Procedures of the American Arbitration Association. The decision of the arbitrator(s) will be final and binding and is enforceable in a court of competent jurisdiction.

ARTICLE 17 MISCELLANEOUS

17.01 GIVING NOTICE

A. Whenever any provision of the Contract Documents 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 to the individual or to a member of the firm or to an officer of the corporation for whom it is intended;

2. by registered or certified mail postage prepaid to, the last business address known to the giver of the notice;

3. or delivered in person to such person by a commercial courier service or otherwise to the recipient's place of business; or

4. by secure file transfer with receipt documentation or other document control software.

17.02 COMPUTATION OF TIME

A. When any period of time is referred to in the Contract Documents 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.

17.03 GENERAL

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 will not 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 Law or Regulation, by special warranty or guarantee, or by other provisions of the Contract Documents. 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.

B. All representations, warranties and guarantees made in the Contract Documents will survive final payment and termination or completion of this Agreement.

17.04 PROFESSIONAL FEES AND COURT COSTS INCLUDED

A. Whenever reference is made to "claims, costs, losses, damages and expenses," it will include in each case, but not be limited to, all fees and charges of engineers, architects, attorneys and other professionals and all court or arbitration or other dispute resolution costs.

17.05 NONDISCRIMINATION OF EMPLOYMENT

A. Contractor will agree not to discriminate against any employee or applicant for employment, to be employed in the performance of this Contract, with respect to Contractor's hire, tenure, terms, conditions or privileges of employment, or any matter directly or indirectly related to employment, because of race, color, sex, age, religion, national origin or ancestry, height, weight, or marital status, or any other classification protected by law, and to require a similar covenant on the part of any Subcontractor employed in the performance of the Contract.

17.06 POST COMPLETION DATE ENGINEERING AND INSPECTION COSTS

A. All engineering and inspection costs incurred after the specified completion date will be paid by Contractor to Owner prior to final payment authorization. However, Contractor will not be charged with any post completion date engineering and inspection costs when the delay in completion of the Work is due to the following and Contractor has promptly given written notice of such delay to Owner or Engineer:

1. to any preference, priority or allocation order duly issued by Owner;

2. to unforeseeable causes beyond the control and without the fault or negligence of Contractor, including but not restricted to, acts of God, or of the public enemy, acts of

Owner, acts of another contractor in the performance of a Contract with Owner, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and abnormal and unforeseeable weather; and,

3. to any delays of Subcontractors or Suppliers occasioned by any of the causes specified in this Article.

B. Charges after the specified completion date will be made at such times and in such amounts as Engineer will invoice Owner, provided, however said charges will be in accordance with Engineer's current rate schedule at the time the costs are incurred. Engineering and inspection costs so incurred will be deducted from Contractor's progress payments.

17.07 WAIVER OF CONSEQUENTIAL DAMAGES

A. Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract or the Work. This mutual waiver includes but is not limited to:

1. damages incurred by Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

2. damages incurred by Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit in connection with any other project or anticipated project.

B. This mutual waiver is applicable, without limitation, to all consequential damages due to either party’s termination or default. Nothing contained in this Section will be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents. Contractor also waives any Claim for consequential damages against Engineer where such Claims arise out of or relate in any way to the Project or the Contract Documents.

17.08 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.

17.09 CONTROLLING LAW

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

17.10 HEADINGS

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

END OF SECTION

SECTION 00 73 00 - SUPPLEMENTARY CONDITIONS

PART 1 GENERAL

1.01 SUMMARY

A. These Supplementary Conditions amend and supplement Section 00 72 00 - General Conditions and other provisions of Contract Documents as indicated below. Provisions that are not so amended or supplemented remain in full force and effect.

B. The terms used in these Supplementary Conditions that are defined and have the meanings assigned to them in Section 00 72 00 - General Conditions.

1.02 MODIFICATIONS TO GENERAL CONDITIONS

A. **SGC-1.01 Defined Terms**

1. The definition for "As-Built Drawings" in Section 00 72 00 - General Conditions will be added as follows:

   Record Drawings -- Clean, finalized sets of drawings compiled by the Engineer using the Contractor’s as-built drawings and they incorporate all approved changes into the original design documents and represent the project’s final state as documented; these drawings may not be based on field verification.

B. **SGC-5.03 Additional Insured**

1. Add the following language as a new Article 5.03.A.9 of Section 00 72 00 - General Conditions:

   Blair Township and Wade Trim Associates, Inc., and any other person or entity required to be named as an additional insured under the Contract Documents, including each of the aforementioned’s respective parent companies, affiliates, subsidiaries, officers, directors, employees, and agents, are required to be designated as additional insureds on all policies of insurance required by Article 5.03 of the Section 00 72 00 - General Conditions and elsewhere in the Contract Documents (except for Worker’s Compensation insurance and Professional Liability insurance, unless otherwise specifically required by the Contract Documents).

C. **SGC-5.04 Limits of Liability**

1. The required limits of liability for insurance coverages requested in Article 5.03 of Section 00 72 00 - General Conditions will be not less than the following:

   SGC-5.04.A Worker’s Compensation

   Coverage A – Compensation: Statutory

   Coverage B – Employer’s Liability

   Each Accident: $100,000

   Disease – Policy Limit: $100,000

   Disease – Each Employee: $100,000

SGC-5.04.B Comprehensive General Liability

General Aggregate: $1,000,000

Products – Com/Ops Aggregate: $1,000,000

Personal and Advertising Injury: $500,000

Each Occurrence: $500,000

Fire Damage (any one fire): $50,000

Medical Expense (any one person): $5,000

SGC-5.04.C Comprehensive Automobile Liability

Bodily Injury: $500,000

Property Damage: $200,000

or combined single limit: $1,000,000

SGC-5.04.D Owner's Protective

General Aggregate:$1,000,000

Each Occurrence: $1,000,000

SGC-5.04.E Builder's Risk-Installation Floater

Cost to Replace at Time of Loss

SGC-5.04.F Umbrella or Excess Liability: $2,000,000

D. **SGC- 12.04 Lump Sum Work**

1. Add the following new paragraph after Article 12.03 of Section 00 72 00 - General Conditions, which is to read as follows:

12.04 LUMP SUM WORK

a. When additional work or deletion of work, which is covered by a lump sum item, is required due to a modification, not a normal overrun or underrun in estimated quantities, payment or credit for the work will be based upon apparent unit prices which will be derived by dividing the lump sum price by the estimated plan quantities.

b. Renumber subsequent paragraphs accordingly.

E. **SGC-18 Liquidated Damages**

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

ARTICLE 18 LIQUIDATED DAMAGES

a. If the Contractor fails to Substantially Complete the Work within the Contract Time, or extension of time granted by the Owner, then the Contractor will pay to the Owner the amount for liquidated damages as specified in the Agreement for each calendar day that the Contractor will be in default after the time stipulated in the Contract

Documents. The liquidated damages charged will be deducted from the Contractor's progress payments.

b. Contractor will not be charged with liquidated damages or any excess cost when the delay in Substantial Completion of the Work is due to the following and the Contractor has given written notice of such delay within seven (7) calendar days to Owner or Engineer.

c. To any preference, priority or allocation order duly issued by the Owner.

d. To unforeseeable causes beyond the control and without the fault or negligence of the Contractor, including but not restricted to, acts of God, or of the public enemy, acts of the Owner, acts of another Contractor in the performance of a Contract with the Owner, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and abnormal and unforeseeable weather; and

e. To any delays of subcontractors occasioned by any of the causes specified in paragraph "a" and "b" of this Article.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 11 00 - SUMMARY OF WORK

PART 1 GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

A. This project includes installation of approximately 1,200 linear feet of 8-inch and 12-inch water main, associated valves, fittings, and a hydrant, PVC conduit, retention basin expansion, replacement of 12-inch discharge piping, fencing, restoration, and other work..

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 33 00 - Submittal Procedures

B. Section 01 50 00 - Temporary Facilities and Controls

1.03 WORK BY OTHERS

A. Work on the Blair Water Treatment Improvements and Wells Project will be ongoing during this project. Contractor will coordinate with the contractor for the Blair Water Treatment and Wells Project to ensure the orderly completion of the work and the timely completion of the Contract.

1.04 RIGHT-OF-WAY JURISDICTION/PERMITS

A. Soil erosion and sedimentation control is under the jurisdiction of the Grand Traverse County Health Department.

B. The Owner will secure the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Act 399 Permit.

C. The Contractor will be responsible for securing any other permits, if applicable, by the agency having jurisdiction.

1.05 COORDINATION

A. A shutoff notice will be delivered by the Contractor to all affected residences and businesses a minimum of two days before any water main is shut off for construction.

B. Whenever an existing gate valve must be opened or closed, the Blair Township Department of Public Works will be notified. Valves will be opened or closed only by the Blair Township Department of Public Works.

C. While both existing and new fire hydrants are in place, the Contractor will clearly mark those hydrants not in service and notify the Blair Township Fire Department of hydrants not in service.

D. It will be the responsibility of the Contractor to coordinate Contractor's operations and those of the Contractor's subcontractors in such a manner so as to avoid interference and delays in the areas of common construction activities.

1.06 CONTRACTOR’S USE OF PREMISES

A. Contractor will maintain construction operations within the presently existing road rights-of-way and easements throughout the Project area. In the event that the Contractor deems it necessary or advisable to operate beyond the limits of the existing rights-of-way or easements,

Contractor will be responsible for making special written agreements with the property owners and will furnish such copies of agreement to the Owner.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 22 00 - UNIT PRICES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section describes the method of measurement and basis of payment for items of Work included in the Contract and specified in Section 00 42 43 - Proposal. Contractor will provide labor, material, tools, equipment and services required to complete the Work specified herein and indicated on the Plans.

B. The scope and quantity of Work estimated in the Proposal is the best estimate of the Engineer. It is anticipated that the quantity of Work to be completed will vary from the estimated quantities in Section 00 42 43 - Proposal.

C. Owner will make no allowances for items not included in Section 00 42 43 - Proposal.

1.02 ITEMS OF THE PROPOSAL

Item 1

Mobilization will be paid for at the Contract Unit Price on a Lump Sum basis. Price paid will be payment in full for labor, material, and equipment necessary for preparatory work and operations, including, but not limited to, those necessary for the movement of personnel, equipment, supplies, and incidentals to the project site; other facilities necessary to undertake the work on the project; and for other work and operations which must be performed, or for expenses incurred, prior to beginning work on the various contract items on the project site. It will also include preconstruction costs, including insurance and bonds, exclusive of bidding costs, which are necessary direct costs to the project and are of a general nature rather than directly attributable to other pay items under the contract. Payment for mobilization will be based upon the following schedule:

Partial Payment Schedule	
Percentage of Original Contract Amount Earned	Percentage of Bid Price for Mobilization Allowed
5	50
10	75
25	100

Item 2

Steel Discharge Pipe, Remove of the size specified will be paid for at the Contract Unit Price on a per Linear Foot (LFT) basis. Price paid will be payment in full for labor, material and equipment necessary for removal of steel discharge pipe, and will include, but is not limited to, excavation, sheeting, shoring, bracing and dewatering, protection of existing improvements, removal and disposal of unsuitable material and debris, removal and disposal of end sections and piping, backfill, backfilling, maintaining drainage, and other items necessary to complete the job, whether specifically mentioned or implied.

Removing steel discharge pipe will be determined by field measure of linear feet removed.

Item 3

Fence, Remove will be paid for at the Contract Unit Price per Linear Foot (LFT). Price paid will be payment in full for labor, material, and equipment required for the removal and disposal of the fencing, as shown on the Plans, or as determined by Engineer, and will include, but is not limited to, removal of fencing, gates, and posts, the removal of attached parts and connections, removal and disposal of unsuitable materials, removal and disposal of fence post foundations, disposal of fence materials, furnishing, placing and compacting backfill, protection of existing improvements, barricading, and other items necessary to complete the job, whether specifically mentioned or implied.

Measurement for removal of fence will be determined by field measure of fence removed.

Item 4

Site Grading will be paid for at the Contract Unit Price per Lump Sum. Price paid will be payment in full for labor, material, and equipment necessary to grade the site to the lines, grades and cross sections shown on the plans, and will include, but is not limited to, the removal and disposal of unsuitable material, the excavation and stockpiling of topsoil, grading, shaping, excavating, filling, and compacting the site, the removal and disposal of excess or unsuitable material, the providing of earth and topsoil necessary to conform to the cross sections shown on the Plans, spreading and grading topsoil, removal and disposal of miscellaneous items, and for other items necessary to complete the work, whether specifically mentioned or implied.

Item 5

Rip-Rap of the type specified will be paid for at the Contract Unit Price per Cubic Yard (CYD). Price paid will be payment in full for labor, material and equipment necessary for furnishing and installing riprap, and will include, but is not limited to, necessary sub-grade preparation, removal and disposal of excess and unsuitable material, placing riprap, geotextile filter fabric, and other items necessary to complete the Work, whether specifically mentioned or implied.

Measurement for riprap will be in square yards determined by field measure of rip-rap in place.

Item 6

Bituminous Pavement, Remove and Replace of the type and thickness specified will be paid for at the Contract Unit Price per Square Yard (SYD). Price paid will be payment in full for labor, material, and equipment required for removal of the existing pavement and replacement with bituminous pavement as shown on the plans or specified and will include, but is not limited to, sawcutting, excavation, removal and disposal of existing pavement and unsuitable material, furnishing, placing, and compacting backfill, protection of existing improvements, additional aggregate base to supplement the removal of unsuitable material, barricading, furnishing and applying prime and bond coats, furnishing, placing, rolling, and compacting the bituminous base course and wearing coarse, restoration, and other items necessary to complete the job, whether specifically mentioned or implied.

Measurement for removal and replacement of bituminous pavement will be by square yards field measured in place.

Item 7

Fence of the type and height specified, will be paid for at the Contract Unit Price per Linear Foot (LFT). Price paid will be payment in full for labor, material, and equipment necessary for fencing and will include, but is not limited to, fittings and hardware, excavation, concrete foundations, line posts, end posts, corner posts, angle posts, intersection and intermediate braced posts, rails, tension wire, bracing, post caps, post extensions, barbed wire, fence fabric, gate posts, gates, gate hardware, pickets, stretcher bars, tie wire, fasteners, connection to existing fencing, backfilling, restoration, cleanup and other items necessary to complete the job, whether specifically mentioned or implied.

Measurement for fence will be by linear feet determined by field measurement taken from end to end along the bottom of the installed fencing with no deduction for gate openings.

Item 8

Water Main, Open Cut of the type, diameter, and class specified, will be paid for at the Contract Unit Price per Linear Foot (LFT). Price paid will be payment in full for labor, material, and equipment necessary for furnishing and installing water main and will include, but is not limited to, specials and fittings, excavation, sheeting and bracing, shoring, draining, dewatering, laying, jointing, bedding, testing, disinfecting, backfilling (including backfill with special materials where specified), disposal of excess excavated material, temporary blow-offs, thrust blocks, encasement, barricading, restoration, final cleanup, and other items necessary to complete the job, whether specifically mentioned or implied.

Measurement for water main will be in linear feet along the centerline of the pipe taken from end-to-end with no reduction for fittings and valves except for special structures, sections or connections for which either Lump Sum or Unit Prices have been taken will be deducted from the total length of water main and will be paid for at the prices bid therefore.

Item 9-10

Gate Valve and Valve Box of the size specified will be paid for at the Contract Unit Price per Each. Price paid will be payment in full for labor, material, and equipment necessary for furnishing and installing valve and valve box, and will include, but is not limited to, valve box, necessary excavation, sheeting and bracing, shoring, dewatering, connection to water main, backfilling, restraints, disposal of excess excavated material, thrust blocks, restoration, cleanup, and other items necessary to complete the job, whether specifically mentioned or implied.

Valves and valve boxes will be measured as units installed.

Item 11

Fire Hydrant Assembly will be paid for at the Contract Unit Price per Each. Price paid will be payment in full for labor, material, and equipment necessary for furnishing and installing fire hydrant assemblies, and will include, but is not limited to, valves, valve boxes, connecting piping and fittings, necessary excavation, sheeting and bracing, shoring, dewatering, backfilling, disposal of excess excavated material, miscellaneous pipe connecting hydrant to water main, valves and fittings, thrust blocks, restoration, cleanup, and other items necessary to complete the job, whether specifically mentioned or implied.

Hydrants will be measured as units installed.

Item 12

Connection to Existing Water Main will be paid for at the Contract Unit Price per Each. Price paid will be payment in full for labor, material, and equipment necessary for connecting new water main to existing water main and will include, but is not limited to, water main pipe, fittings, adapters, necessary excavation, sheeting and bracing, shoring, draining, dewatering, laying, jointing, bedding, testing, disinfecting, filling, backfilling (including backfill with special materials where specified), disposal of excess backfill and fill material, connection to new water main, capping old water main, thrust blocks, restoration, cleanup, and other items necessary to complete the job, whether specifically mentioned or implied.

Connection to existing water main will be measured per connection made. Connection to existing water main is not paid for separately where a tapping sleeve, valve and well/valve box is being paid for.

Item 13

Discharge Pipe, Open-Cut of the type and diameter specified on the Plans, in open cut trench will be paid for at the Contract Unit Price per Linear Foot (LFT). Price paid will be payment in full for labor, material, and equipment necessary for discharge pipe in open cut trench and will include but is not limited to, excavation, sheeting, shoring, bracing, and dewatering, construction, protection of existing improvements, sand backfill, sand, stone or concrete pipe bedding, placing and removing of stoppers and bulkheads, cleaning, barricading, restoration, cleanup and other items necessary to complete the job, whether specifically mentioned or implied.

Measurement for discharge pipe in open cut trench, will be in place, by length in linear feet, from end to end.

Item 14

End Section of the type and size specified will be paid for at the Contract Unit Price per Each. Price paid will be payment in full for labor, material, and equipment required for furnishing and installing end sections and will include, but is not limited to, excavation, sheeting, shoring and bracing, construction, dewatering, preparation, protection of existing improvements, stone pipe bedding, sand backfill, connection to existing culvert or sewer, backfilling, barricading, restoration, and other items necessary to complete the job, whether specifically mentioned or implied.

Item 15

Discharge Pipe, Connection to Existing Manhole will be paid for at the Contract Unit Price per Each. Price paid will be payment in full for labor, material, and equipment required for connecting the new discharge pipe to an existing manhole, and will include, but is not limited to, excavation, sheeting, shoring, bracing and dewatering, disposal of excess excavated material, coring, tapping existing structure, connection to structure, sand backfill, removal and disposal of unsuitable material, removal of existing flow channel and construction of new flow channel, cleanout of structure, protection of existing improvements, placing and removing stoppers, bulkheads and flumes, pumping and

bypassing flow, removal and disposal of debris, and other items necessary to complete the job, whether specifically mentioned or implied.

Measurement for connection to existing manhole will be per each.

Item 16

Electrical Conduit of the type and size specified will be paid for at the Contract Unit Price on a Lump Sum basis. Price paid will be payment in full for labor, material and equipment necessary to furnish and electrical conduit, and will include, but is not limited to, necessary conduit, trenching, backfilling, compacting, boring, barricading, and other items necessary to complete the Work, whether specifically mentioned or implied will also be included.

Item 17

Restoration will be paid for at the Contract Unit Price on a Lump Sum basis. Price paid will be payment in full for labor, materials, equipment, and supplies necessary for site restoration, including but not limited to backfilling, rough and final grading, topsoil, seeding, select sidewalk placement, select curb and gutter construction, final cleanup and debris removal, other restoration that may be directed by Engineer, any restoration work not included in other pay items, as well as photos during and after restoration, and other items necessary to complete the job, whether specifically mentioned or implied.

PART 2 PRODUCTS (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 the delivery of materials or the start of any construction, the Contractor will request a Preconstruction Meeting from the Engineer. A minimum three (3) working days' notification to meeting participants will be required.

B. Schedule:

1. Engineer will establish the meeting place, time and date, distribute agenda, notify participants, and administer the meeting. Contractor will notify major Subcontractors.

C. Attendance:

1. Owner
2. Engineer
3. Contractor
    a. Major Subcontractors
4. Safety Representatives
5. Governmental Agencies

D. Agenda:

1. Distribution by the Contractor and discussion, review and acceptance 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 preliminary progress schedules.
    d. Preliminary schedule of Shop Drawings and Sample submittals.
    e. Estimated monthly payment schedule and schedule of values
2. Critical Work sequencing.
3. Major equipment deliveries and priorities.
4. Project coordination.
5. Responsibilities of Owner, Engineer, Contractor and other agencies.
6. Procedures and processing of:
    a. Field decisions.
    b. Proposal requests.
    c. Submittals.

d. Change Orders.

e. Applications for Payment.

7. Adequacy of distribution of Contract Documents.
8. Procedures for maintaining Record Documents.
9. Use of premises.
10. Construction facilities, controls and construction aids.
11. Temporary utilities.
12. Safety and first aid procedures.
13. Security procedures.
14. Housekeeping procedures.
15. Testing

E. Minutes:

1. Engineer will prepare and distribute copies to participants within seven (7) days of meeting. Participants will 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. Schedule:

1. Engineer will establish the meeting place, time and date, distribute agenda, notify participants and administer the meeting. Contractor will notify major Subcontractors.

C. Attendance:

1. Engineer
2. Contractor
3. Subcontractor as appropriate to the agenda.
4. Suppliers as appropriate to the agenda.
5. Others

D. Agenda:

1. Review minutes of previous meeting.
2. Review of work progress since previous meeting.
3. Review field observations, problems, conflicts.
4. Review problems which impede Construction Schedules.
5. Review of off-site fabrication, 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. Minutes:

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

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

A. Contractor will submit Shop Drawings, product data, and samples, as required by the individual Specification sections, to the Engineer for review in accordance with the provisions of Section 00 72 00 - General Conditions.

1.02 PROGRESS SCHEDULES

A. Contractor will submit one (1) electronic copy in PDF format of Progress Schedules indicating the starting and completion dates of the various stages of the Work and estimated payments to the Engineer.

1. Submit proposed Progress Schedules to the Engineer prior to the Pre-Construction Meeting.

2. Distribute hard copies of the Progress Schedules to attendees during the Pre-Construction Meeting for discussion.

3. Update the Progress Schedule submit electronically (in PDF format) to the Engineer as a part of applications for progress payments, through completion of the Work. Failure to update Progress Schedule may be the basis for rejection of Applications for Progress Payments.

1.03 SHOP DRAWING SCHEDULE

A. Submit one (1) electronic copy in PDF format of the Shop Drawing Schedule indicating the individual items and submission dates to the Engineer.

1. Submit a preliminary Shop Drawing Schedule in accordance with the requirements in Section 00 72 00 prior to the Pre-Construction Meeting.

2. Distribute hard copies of the Shop Drawing Schedule during the Pre-Construction Meeting for discussion.

3. Submit a final electronic copy of the Shop Drawing Schedule (in PDF format) at least 10 calendar days prior to submitting the first Application for a Payment.

1.04 SCHEDULE OF VALUES

A. Submit one (1) electronic copy in PDF format Schedule of Values of the Work to the Engineer.

1. Submit a preliminary Schedule of Values prior to the Pre-Construction Meeting.

2. Distribute hard copies of the Schedule of Values during the Pre-Construction Meeting or discussion.

3. Prepare a final Schedule of Values (in PDF format) in accordance with the Section 00 72 00 in sufficient detail to serve as the basis for payments during construction. Submit the Schedule of Values to the Engineer for review at least 10 calendar days prior to submitting the first Application for Payment.

1.05 STAKING SCHEDULE

A. Submit one (1) electronic copy in PDF format of the Staking Schedule, in accordance with Section 01 71 23 - Construction Layout prior to the start of construction.

1. Provide updated Staking Schedules to the Engineer through completion of the Work.

1.06 APPLICATIONS FOR PAYMENT

A. Submit one (1) electronic copy in PDF format Applications for Payment to the Engineer in accordance with the provisions of Article 14 of Section 00 72 00.

B. Applications for Payment will be made on forms provided by or approved by the Engineer.

1. Samples of the Contractor's Application for Payment, Payment Schedule and Engineer's Certificate for Payment forms are included in the Contract Documents and can be obtained in digital format from the Engineer.

2. Copies of these forms, with Project specific information completed by the Engineer, will be given to the Contractor at the preconstruction meeting or, if applicable, after approval of the final Schedule of Values.

C. Submit a completed Payment Schedule with an executed Contractor's Application for Payment and Contractor's Declaration to the Engineer not more than once per month.

D. Engineer will certify payments with the use of Engineer's Certificate for Payment.

1.07 SHOP DRAWINGS

A. Shop Drawings will be presented in a clear and thorough manner. Details will be identified by reference to plan sheet number, detail number if applicable, and specification Section number, and article number.

1.08 PRODUCT DATA

A. Present Product Data in a clear and thorough manner identified the same as the Shop Drawings. Included with the information will be performance characteristics and capacities depicting dimensions and clearances required.

B. Manufacturer's standard schematic drawings and diagrams will be modified to delete information which is not applicable to the Work. Manufacturer's standard information will be supplemented to provide information specifically applicable to the Work.

1.09 SAMPLES

A. Samples will be of sufficient size and quantity to clearly illustrate functional characteristics of the product with integrally related parts and attachment devices depicting full range of color, texture and pattern.

1.10 SUBMISSION REQUIREMENTS

A. Make Submittals in accordance with the approved Submittal Schedule, and in such sequence as to cause no delay in the Work or in the work of any other contractor. No damages will be awarded, or extension of time granted, due to the Shop Drawing and product data review process.

B. Submit an entire package of Shop Drawings and Product Data information for major items of Work so that the Engineer can review the package as a unit.

C. Submit one (1) electronic copy in PDF format of Shop Drawings and Product Data information containing the following information at a minimum:

1. Field dimensions clearly identified as such.

2. Relation to adjacent or critical features of the Work or materials.

3. Applicable standards, such as ASTM or Federal Specification Numbers.

4. Identification of deviations from Contract Documents.

5. Identification of revisions on resubmittals.

6. Project Title, Date of Submission, Date of Previous Submission, and Specification Section number.

D. Contractor must initial or sign Shop Drawings and Product Data submittals, certifying the Contractor's review and approval of Submittal per Section 00 72 00; verification of products, field measurements, field construction criteria, and coordination of the information within the submittal with requirements of the Work and of Contract Documents.

E. Engineer will initial or sign Shop Drawings and Product Data submittal and will indicate the status of the Submittal, or requirements for resubmittal. Engineer will return to the Contractor one (1) electronic copy of the Shop Drawing and/or Product Data submittal (in PDF format) for distribution or for resubmission.

1.11 ENGINEER'S REVIEW

A. Upon receipt of any Submittal defined above, the Engineer will:

1. Check each for completeness, clarity, correctness, cohesiveness, legibility, and reproducibility.

2. Review each only for general conformity with the Contract Documents as specified in Section 00 72 00.

3. Respond to the submittal within 15 calendar days of receipt from Contractor.

a. Contractor to allow for increased time for large or complex submittals; up to 30 calendar days may be required for major equipment and materials or Submittals which require review by more than one engineering discipline.

B. After review of any Submittal, the Engineer will appropriately affix a stamp, electronic notation box or other means, signifying the Submittal as having received full consideration and review.

C. The "status" of any such Submittal or portion thereof, as appropriate, will be evidenced by any one or more of the following notations clearly signified by a "X" or other similar mark placed in the box adjacent to the notation:

1. Notations for Engineer's Review:

a. Approved

b. Approved as Noted

c. Revise and Resubmit

d. Rejected - See Remarks

e. For Record Only

2. Notations for Response Required by Contractor:

a. None

b. Confirm

c. Resubmit

D. Notation Meanings:

1. Elements marked "Approved" indicate that the Contractor may commence with construction, fabrication or purchase of such items.

2. Elements marked "Approved as Noted" may require further action by the Contractor before commencing with construction, fabrication or purchase:

a. Contractor proceeds in strict accordance with the Engineer's notes and/or required corrections/deletions/additions indicated thereon;

b. Contractor provides an appropriate response as may be noted by the Engineer.

3. Elements marked "Revise and Resubmit" indicate that further comments or explanations have been affixed to the Submittal, which may require action(s) by the Contractor before Engineer will mark the Submittal "Approved" or "Approved as Noted."

4. Elements marked "Rejected - See Remarks" indicate that the Contractor must make the required corrections as shown or noted and resubmit such items to the Engineer for further review.

5. Elements marked "For Record Only" indicate that the Engineer has not reviewed the Submittal and will maintain the information submitted as part of the project record.

6. Elements marked "None" indicate that the Submittal requires no further action by the Contractor.

7. Elements marked "Confirm" requires the Contractor to provide affirmation to the Engineer regarding comments, notes, markings, etc. made by the Engineer, and to affirm that the Contractor will comply with the comments, notes, markings, etc.

8. Elements marked "Resubmit" indicate that the Contractor may not commence with construction, fabrication or purchase of such items, and that the Contractor must resubmit items for review that comply with the Contract Documents in the event that those originally submitted do not, or with any comments, notes, markings, etc. made by the Engineer.

1.12 RESUBMISSION REQUIREMENTS

A. Contractor will make corrections or changes in the Submittals required by Engineer and resubmit. Contractor will indicate any changes which have been made other than those requested by the Engineer.

1.13 MANUFACTURER'S OPERATION AND MAINTENANCE DATA

A. Submit one (1) electronic copy in PDF format and one (1) bound copy of all operation and maintenance data required per the various Specification sections.

1. Prior to 50% completion of the Project, Contractor will have submitted one (1) acceptable copy to the Engineer for review.

B. Final copies of the operation and maintenance data will be bound in a suitable number of 3-inch or 4-inch, 3-ring hard cover binders. Permanently imprinted on the cover will be the words "Manufacturer's Operation and Maintenance Data", Project title, location of the Project, and the date. A table of contents will be provided in the front of each binder to list the various sections in the manual.

C. The information to be provided in each section of the manual, for each piece of equipment and project component will include, but not be limited to, detailed equipment drawings; sections cut through all of the major equipment and sub-assemblies; installation and operational procedures; complete wiring and piping schematics; lubrication materials and procedures; maintenance procedures; and parts lists complete enough to permit identification of parts by nomenclature, manufacturer’s part number and use.

D. At the front of each section a maintenance schedule will be provided for each piece of equipment in the section.

1. The schedule will display the daily, weekly, monthly, semi-annual, annual or fraction thereof, lubrication and preventative maintenance required in order to meet warranty conditions and the manufacturer's recommendations for optimum performance and life of the unit.

2. A common schedule format is to be developed and used for all of the sections. Photocopies or reproductions of the manufacturer's literature will not be accepted.

1.14 AUDIO/VIDEO ROUTE SURVEY

A. When required in Section 00 42 43 - Proposal or Section 01 11 00 - Summary of Work, furnish the Engineer with an "Audio/Video Route Survey" record of the existing conditions prior to the start of construction. Contractor must enlist the services of a firm having a minimum of one (1) year experience in audio/video recording of construction projects.

B. Prior to beginning the audio/video recording, review with Engineer the Project requirements to ensure that the audio/video is adequate for its intended purpose. Owner will have the authority to designate areas for which coverage may be added or omitted. The audio/video recording will be done prior to placement of materials or equipment on the construction area and furnished one (1) week prior to the pre-construction meeting.

C. Format:

1. Audio/Video route survey will be submitted in the format(s) as specified in Section 01 11 00.

a. Audio/video route survey submission will be on USB media

b. Format: USB – Video

c. Video Encoding: Highest available bit rate (6-9 Megabit), 60 fields per second interlaced video

d. Audio Encoding: Uncompressed stereo wave or stereo Dolby Digital (256 kilobit or better)

e. Aspect Ratio: 4x3 (720x480 pixels)

f. No Macrovision or other copy protection encoding. No region code or region code 1.

D. Complete coverage will include 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 and will be supported by appropriate audio description made simultaneously with video coverage. Such coverage will include, but not be limited to, existing driveways, sidewalks, curbs, ditches, roadways, landscaping, trees, culvert, headwalls, retaining walls, and buildings located within such zone of influence. Video coverage will be clear enough to identify cracks, depressions, holes and other defects in existing surfaces.

E. Houses and buildings will be identified visually by house number, when visible, in such a manner that structures of the proposed system can be located by reference. In all instances, however, location will be identified by audio or visual means at intervals not-to-exceed 100 linear feet (30 m) in the general direction of travel.

F. When conventional wheeled vehicles are used, the distance from the camera lens to the ground will be not less than 12 feet (3.5 m) to ensure proper perspective. The rate of speed in the general direction of travel of the conveyance used during recording will not exceed 30 feet/minute (10 m/min). Panning rates and zoom-in, zoom-out rates will be controlled sufficiently such that stop action during play-back will produce clarity of detail of the object viewed.

G. Video recordings must, by electronic means, display continuously and simultaneously generated transparent digital information in the upper left hand third of the screen to include the date and time of recording, as well as the corresponding engineering stationing numbers as shown on the Contract Drawings.

1. The date information will contain the month, day, and year. For example, mm/dd/yy, and be placed directly below the time information.

2. The time information will consist of hours, minutes, and seconds, separated by colons. For example, hh:mm:ss.

H. Engineering stationing numbers must be continuous, accurate and correspond to the Project stationing and must include the standard engineering symbols. For example, Station 14+84.

I. Recording will be done during times of good visibility. No recording will be done during periods of visible precipitation, or when more than ten (10) percent of the ground area is covered with snow or standing water, unless otherwise authorized by the Owner.

J. In some instances, audio/video coverage may not be suitable for recording necessary details. In such instances, the Owner may specify still photographs to provide coverage. One (1) color photograph will be provided in accordance with this Section with a suitable description of the photograph’s location.

K. Any portion of the Audio/Video Route Survey of insufficient quality as determined by the Engineer will be redone by the Contractor at no additional cost to the Owner.

L. Each USB will be properly identified with the Project Title, location, time, and date in a manner acceptable to the Owner.

1.15 PHOTOGRAPHS

A. When required in Section 00 42 43 - Proposal or Section 01 11 00 - Summary of Work, furnish the Engineer with a total of 6 to 10 digital color photographs each month during construction of the Project, unless some other number and times is specified in Section 01 11 00 - Summary of Work.

B. Photos will be in digital format (i.e., JPEG, TIFF, GIF, PNG or PDF) and will have a minimum resolution of 300 dpi.

C. The following information will be placed on the photo itself or embedded in the digital file:

1. Project Title
2. Contract Number
3. Description of photo’s content
4. Date and Time of photo

D. Submit photographs monthly along with the Application for Payment as described in Article 14 of Section 00 72 00.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 45 00 - QUALITY CONTROL

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

A. Sampling of materials will be made by the Engineer in accordance with the methods designated by the Specifications. Contractor will furnish such facilities as the Engineer may require for collecting, storing, and forwarding samples to the Laboratory. Contractor will furnish the required samples to the Owner without charge.

1.02 TESTS OF MATERIALS

A. Materials in the Work will meet the requirements of the Contract Documents.

B. Tests of materials will be made as specified herein. Engineer will at all times have access to materials intended for use in the Work as well as to the plants where such materials are produced. Plant inspection may be made if the quantities are sufficient to warrant such inspection and if it is to the best interest of the Owner. In any case materials may be either inspected or tested when received on the Project.

C. Materials will not be used until approval has been received from the Engineer. Approval of materials at the producing plant does not constitute a waiver of the Engineer's right for re-examination at the Project site.

D. The standards for testing materials unless otherwise specified, will be as established by the American Society for Testing and Materials (ASTM). Tests of materials will be made in accordance with the methods described or designated in the Specifications.

E. The sampling and testing of all materials not specifically mentioned will be done by generally accepted methods, unless otherwise specified by the Engineer.

1.03 CERTIFICATION OF MATERIALS

A. At the request of the Engineer, the Contractor will provide the Engineer with certification that the various materials to be used conform to the standards referred to in the Contract Documents.

1.04 SOURCE QUALITY CONTROL

A. Testing identified in the Contract Documents for quality control, which is required to establish quality of materials, equipment or fabricated items, will be paid for by the Contractor unless otherwise noted.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SITE ACCESS AND PARKING

A. Contractor will locate roads, drives, walks and parking facilities to provide uninterrupted access to construction offices, mobilization, Work, storage areas, and other areas required for execution of the Contract. Access drives and parking areas will be hard surfaced unless otherwise approved by the Engineer.

B. Contractor will maintain driveways a minimum of 15 feet (5 meters) wide between and around combustible materials in storage and mobilization areas.

C. Contractor will maintain traffic areas as free as possible of excavated materials, construction equipment, products, snow, ice, and debris.

D. Contractor will not utilize existing parking facilities for construction personnel or for Contractor's vehicles or equipment, unless written permission from owner of parking facility is obtained.

1.02 EMERGENCY ACCESS

A. Contractor will at all times provide emergency access to property in the vicinity of the construction for police vehicles, fire equipment, ambulances or other emergency vehicles to protect life, health and property. Areas damaged by emergency vehicles will be restored by the Contractor at no additional cost to the Owner.

1.03 PRIVATE OR PUBLIC ROADS, SIDEWALKS, AND PARKING AREAS

A. Where public roads, driveways, parking areas and sidewalks are encountered throughout the community, the Contractor will maintain those portions affected by the construction operations in a passable condition until such time as final restoration of these improvements can be made as specified.

1. If, in the opinion of the Engineer, the public safety is in danger or the necessity exists for maintaining traffic, the Engineer may direct that backfilling be completed immediately.

2. In the event that the necessary backfill material and equipment are not available when direction is given for immediate backfill, the trench will be backfilled with native material to provide for the necessary maintenance of traffic and safety; however, the native material will be removed within 48 hours and the trench properly backfilled as specified.

B. Contractor will provide written notice to residences and businesses of driveway access interruption 72 hours in advance of interruptions.

1. Written notices require approval for distribution from the Engineer.

2. Contractor will provide the Engineer with copies of notices at least five (5) working days in advance of their distribution for review and approval.

C. Where private roads are encountered throughout the community, the Contractor will maintain those portions affected by its construction operations in a passable condition. These roads will be maintained by the use of 21A road maintenance gravel, stone or slag.

1. In the event the original subbase has been destroyed, the Contractor will furnish and install1-inch to 2-inch aggregate to stabilize the existing subbase.

D. Upon completion of the construction activities, the Contractor will shape and regrade these roads leaving them in a condition as good as or better then original, and adequate for normal travel.

1.04 ROAD CLOSING

A. No street, road or section thereof will be closed to through traffic unless otherwise provided for on the Plans, Specifications, or authorized by the agency with jurisdiction over the roads. Prior to closing a street, road, or section thereof, the Contractor will provide the Engineer with a copy of a detour plan approved by the agency having jurisdiction over the roads.

B. In the event roads or streets are to be closed, the Contractor will notify the local fire department, police department, local road authority, ambulance and emergency services, Department of Public Works, public transit authority and public school system daily as to what streets will be partly blocked or closed, the length of time the streets will be blocked or closed and when the streets will be reopened to traffic. Contractor will designate one responsible employee to carry out the requirements of this condition.

C. During the time that the road is closed, the Contractor will make provision for trash, leaf, and rubbish (garbage) pickup.

1.05 MAINTAINING TRAFFIC

A. Contractor will provide access for local traffic to property along the Project by means of temporary roads, drives, culverts or other means approved by the Engineer. Contractor will grade, add surfacing materials, and dust palliatives to such temporary roads and drives as necessary for the proper maintenance of traffic.

B. Where the shoulder is used to maintain traffic, the shoulder will be graded, surfaced, treated for dust, constructed, or reconstructed, as specified herein or as shown on the Plans.

C. If the construction work is suspended due to weather conditions, winter shut down or for any other reason, sufficient labor, materials and equipment will be ready for immediate use at all times for the proper maintenance of traffic. Surfacing materials and dust palliatives will be applied at such times and locations and in such amounts as necessary to safely maintain traffic and as determined by the Engineer.

D. Where shoulders are low, high, soft or rough, adequate provisions will be taken to inform and protect the traveling public by means such as construction warning signs, barricades, lighted devices, etc. Such shoulder hazards will be eliminated as soon as practicable.

E. Contractor will furnish, erect and maintain all signs, barricades, lights, and traffic regulators, in accordance with the requirements of the current "Michigan Manual of Uniform Traffic Control Devices".

1. Furnish all flagmen and watchmen as are necessary to maintain and safeguard traffic along the entire Project. Failure to comply with these requirements may be cause for the Owner to issue a stop Work order, which will remain in effect until all necessary devices are in place and operational. The issuance of a stop Work order will not be reason for granting additional compensation or an extension to the Contract Time.

2. Furnishing, installing, and maintaining traffic control devices will be incidental to the Project unless otherwise provided for in the Proposal.

1.06 EXISTING SIGNS

A. No stop sign, traffic control or warning device or sign will be taken down until the agency having jurisdiction over the roads has been notified and arrangements for the immediate reinstallation has been made. Contractor will provide temporary signs, traffic control devices, warning devices, or watchmen continuously from the time the item is removed until it is reinstalled. Signs removed will be replaced with signs meeting requirements of the agency having jurisdiction over the roads.

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 TRANSPORTATION AND HANDLING

A. Contractor will provide for expeditious transportation and delivery of materials and equipment to the Project site in an undamaged condition and on a schedule to avoid delay of the Work. Materials and equipment will be delivered in original containers or packaging with identifying labels intact and legible.

B. Contractor will provide equipment and personnel at the site to unload and handle materials and equipment in a manner to avoid damage. Materials and equipment must be handled only at designated lifting points by methods to prevent bending or overstressing.

1.02 STORAGE AND PROTECTION

A. Store materials and equipment immediately on delivery, and protect it until installed in the Work.

B. Store products subject to damage by elements in weather-tight enclosures with temperature and humidity ranges as required by manufacturer's instructions.

C. Store loose granular materials on solid surfaces to prevent mixing with foreign matter.

D. Locate the place of storage so as to minimize interference with traffic and to provide easy access for inspection. Do not store materials closer than 5 feet (1.5 meters) to the edge of pavement or traveled way open to the public.

E. Materials that have been stored are subject to retest and must meet the requirements of their respective specifications at the time they are to be used in the Work.

F. Provide protection of stored or installed materials and equipment as necessary to prevent damage from traffic and subsequent operations.

1.03 MANUFACTURER'S INSTRUCTIONS

A. Obtain and distribute copies of manufacturer's instructions when the Contract Documents require that installation of Work to comply with manufacturer's instructions. Distribute copies of such instructions to parties involved in the installation, as well as at least 1 copy to the Engineer.

B. Handle, install, connect, clean, condition and adjust products in strict accord with such instructions and in conformity with specified requirements. Should project conditions or specified requirements conflict with manufacturer's instructions, consult with Engineer for further instructions.

1.04 PRODUCTS LIST

A. Submit a complete list of major products to be used within 4 days, if requested by Engineer. The list will include the name of the manufacturer and the installing subcontractor, if applicable.

1.05 CONTRACTOR'S PRODUCT OPTIONS

A. Select any product meeting the standard for products specified only by reference standard.

B. For products specified by naming several products or manufacturer's, select any one of the products or manufacturers named, which complies with the specifications.

C. For products specified by naming one or more products or manufacturers and "or equal," tsubmit a Substitution Request Form for any product or manufacturer not specifically named, in accordance with Section 00 72 00 - General Conditions.

D. For products specified by naming only one product and manufacturer, there is no option.

1.06 EQUIPMENT STARTUP AND TESTING

A. Perform a comprehensive startup and demonstration of equipment performance and compliance with the design requirements. When there is more than one mode of operation, the equipment will be operated in every mode to verify proper operation.

B. When equipment is to operate in conjunction with other equipment as a system, each piece of equipment will be operated both by itself and automatically as a system to verify its proper operation.

C. Contractor is to provide to the Engineer, in advance of startup, a schedule and listing of startup and testing procedures for review by the Engineer. Checklists and diagrams may be required to ensure adequate startup and testing. Engineer may recommend changes to the startup procedure as necessary.

D. Equipment is to be inspected prior to operation for debris or other obstructions. Equipment is to be properly lubricated and calibrated prior to operation. Contractor will make adjustments necessary to ensure correct operation. When required, equipment installation and operation is to be witnessed and checked by manufacturer.

E. When required, the Contractor will train the Owner’s operation and maintenance personnel in the proper operation and maintenance of each piece of equipment and the system as a whole.

F. Equipment startup is to be witnessed by the Owner and the Engineer.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 71 23 - CONSTRUCTION LAYOUT

PART 1 GENERAL

1.01 RESPONSIBILITY FOR STAKING

A. Owner will set stakes and markers showing the locations on the surface of various parts of the Work as outlined herein. Additional stakes will be provided at the expense of the Contractor. Contractor will furnish such labor and assistance as the Owner may require in setting the same.

B. It will be the responsibility of the Contractor to transfer surface line and grade to the bottom of any tunnel or to the bottom of any other subsurface operations where ordinary surface line and grade is not feasible.

C. Contractor will utilize lasers, or surveying instruments run by qualified competent personnel to control the construction installation Work. If the method being used by the Contractor fails to give proper alignment and grade control to the Work, the Owner will be empowered to order the Contractor to use such other method(s) as will provide adequate control.

D. Engineer may require the Contractor, at the Contractor's expense, to provide such masts, scaffolds, batter-boards, straightedges, templates, or other devices as may be necessary to facilitate laying out, observing and constructing the Work.

E. In the event the Contractor presumes a staking inconsistency, the Contractor will notify the Engineer immediately to assist in resolving the concern.

1.02 STAKING SCHEDULE

A. Contractor will submit a completed staking schedule on the form provided by the Engineer showing the order in which the Contractor proposes to conduct the construction operation prior to the preconstruction meeting. The schedule will be submitted to the Engineer a minimum of three (3) working days prior to the start of construction.

B. During construction, the Contractor will to the extent possible, limit unnecessary staking requests and coordinate the construction schedule to provide for the efficient and effective use of the survey crew and eliminate excessive survey crew trips to the site.

1.03 LINE AND GRADE

A. Contractor will request, three (3) working days in advance, from the Engineer additional line and grade stakes as the Contractor may reasonably protect and preserve. Such request by the Contractor will be on a staking request form.

1.04 RELOCATION AND RE-ESTABLISHMENT

A. Construction Stakes:

1. Where change of location of stakes has been requested by the Contractor, or where the Contractor fails to properly preserve construction survey stakes, such resetting or relocations of stakes will be done by the Engineer and paid for by the Contractor on the basis of time and materials for such re-staking.

B. Survey Control Points:

1. Contractor will bear all expense involved in re-establishing and/or resetting any survey control point, land survey point or monument lost or disturbed during Contractor's construction operation. Such Work will be done under the direct supervision of a licensed land surveyor. Such survey control points will be marked and flagged by the Engineer prior to construction.

1.05 STAKING PIPELINES NOT LAID TO GRADE

A. One (1) staking: Line points at each structure with 100-foot intermediate line points.

1.06 STAKING EARTH WORK

A. Parks, Parking Lots, or Site Improvement:

1. First staking: Line points at 300-foot intervals for clearing and grubbing.

2. Second staking: Final grade points on 100-foot grid and grade changes.

B. Ponds:

1. First staking: Line points at 300-foot intervals for clearing and grubbing.

2. Second staking: Perimeter dike or bank alignment points offset at corners with two (2) benchmarks on site.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

Appendix A

BLAIR TOWNSHIP TECHNICAL SPECIFICATIONS 2025

BLAIR TOWNSHIP
TECHNICAL SPECIFICATIONS
2025

Revised June 2025

TECHNICAL
SPECIFICATIONS FOR
SANITARY SEWER AND

WATER MAIN CONSTRUCTION IN THE
TOWNSHIP OF BLAIR, GRAND TRAVERSE COUNTY

INDEX

SECTION 1 GENERAL SPECIFICATIONS

1.01 PROJECT DESCRIPTION

Work includes the following major items:

1.02 DEFINITIONS

The intent of this section is to identify certain persons involved in the project.

DPW	The agency performing the system operations and maintenance typically identified as a Department of Public Works.
Township Engineer	Engineer whose services are procured by the Township to review sanitary sewage and/or water system plans and installation methods. When the Township is the owner, the engineer will function as the owner's engineer.
Design or Owner's Engineer	Engineer who provided the sanitary sewage and/or water system design, plans and specifications for the owner.
Owner	Project developer or Township who is having sanitary sewage and/or water facilities installed.
Contractor	Contractor is prime Contractor who is so identified by the Owner and is responsible for the sanitary sewage and/or water system facilities installation.
Contractor	The governing Township of Blair that the work is being performed in.
Township Resident Project Representatiive	The person identified by the Township to provide on-site construction observation or inspection for construction projects to ensure work is done in accordance with the plans, contract documents, and Township Standards.

A. The Township Engineer, as selected and approved by the Township Board, shall do all inspections for the installation and connection of all water and/or sewer mains which will become the property of Blair Township.

1.03 PRECONSTRUCTION CONFERENCE

Prior to commencement of any construction activities involving the sanitary sewer system and/or water system, a principal member representing the Owner, the Contractor, the Design Engineer, the Township Engineer and the Township Water Department shall meet at a pre-determined location and time to discuss the project. It shall be the responsibility of the Owner or his/her Design Engineer to organize this meeting. At that time, the Contractor schedule, as well as the Township Engineer's requirements, will be discussed to obtain a mutual understanding of the project and the Township's inspection process.

1.04 LINES AND GRADES FOR CONSTRUCTION

The Owner (his Contractor and/or Engineer) shall provide adequate lines and grades for construction of the sanitary sewer and/or watermain prior to installing the utilities. The Township Engineer shall be given 48 hours notice for review of these lines and grades prior to the start of construction.

1.05 PROGRESS SCHEDULE

The Owner shall, as soon as practical, prepare and submit to the Township Engineer three (3) copies of the Progress Schedule regarding sanitary sewer and/or watermain construction. This schedule shall show in a clear, graphical manner the proposed date for commencement, progress and completion of the work.

1.06 INTERFERENCE WITH EXISTING SEWAGE TREATMENT WORKS

No bypassing of untreated sewage will be allowed during the construction of this project other than that which normally takes place due to stormwater overflows, etc. The Contractor shall provide a plan of work to the Township Engineer for approval before starting work on any phases of the project which might involve existing sewage facilities.

1.07 RELATIONS TO OTHER CONTRACTORS AND UTILITY FORCES

The Contractor shall so conduct his operations as not to interfere with or injure the work of other contractors or adjacent force account work, and he shall promptly make good any injury or damage which may be done to such work by him or his employees or agents.

The Contractor shall grant to other contractors and forces necessary means of access to their work.

1.08 PERMITTING AGENCIES

The Contractor shall perform all work in accordance with any and all applicable permit requirements. The Owner or his Design Engineer shall present the

Township Engineer with a copy of all documentation and calculations for the permit process. The Township, with the assistance of the Township Engineer, will obtain the necessary permit for construction/installation prior to commencement of any work.

1.09 ACCESS TO WORK

The Township Engineer or Township Resident Project Representative shall have access maintained to all sanitary sewer or watermain work at all times. Proper notification (48 hours) shall be given to the Township Engineer prior to the start of any construction or testing.

1.10 SHOP DRAWINGS

Shop drawings of all equipment shall be issued to the Design Engineer during the shop drawing review stage for his approval. The Design Engineer shall forward these to the Township Engineer for his review regarding compliance with the Township requirements. The Township Engineer will not perform a technical review. That shall remain the responsibility of the Design Engineer. The Contractor should supply copies of all equipment shop drawings to the Design Engineer. Final record shop drawings shall be issued to the Township Engineer as part of the close-out procedure in accordance with the close-out section of these specifications. Digital or hard copies are acceptable, as coordinated with the Design/Township Engineer.

1.11 STREAM CROSSINGS

Stream crossings shall be performed in accordance with all permit requirements of the regulatory agencies (P.A. 346 or 98 requirements). Casings shall be provided for all sanitary sewer crossings under streams.

1.12 DUST AND NOISE REDUCTION

The Contractor shall keep dust and noise from construction operations to a minimum. A dust palliative shall be used on disturbed road sections prior to surfacing if so determined by the Township Engineer.

1.13 MATERIAL CERTIFICATION

Manufacturer's certification slips shall be submitted to the Township Engineer for all pipe, manholes, fittings, etc. used in the installation of sanitary sewer or watermains prior to installation. This is to verify that the product meets applicable standard specifications required. Township Engineer or Resident Project Representative will make the determination of approval for any materials submitted as an approved equal where allowed in the Technical Specifications.

1.14 MAINTENANCE BOND REQUIREMENTS

The Contractor shall supply the Owner and Township with a maintenance bond for 50% of the cost of the installation of the sanitary sewer and/or water system that is to be turned over to the Township. The maintenance bond shall be effective from the date of Township acceptance for a period of two (2) years.

1.15 INSURANCE REQUIREMENTS

Where the contract involves construction in a public right-of-way, the Contractor shall provide proof of insurance in the type and amounts required by the Township prior to start of the construction. In addition to the Township, the Grand Traverse County DPW and Township Engineer shall be named as additional insured.

1.16 ESCROW FOR TELEMETRY REQUIREMENTS

When telemetry equipment is required, the owner of the project will be required to provide an account above and beyond the construction contract price in the amount of $10,500.00 for standard telemetry equipment. This equipment will be integrated into the Blair Township DPW network of monitoring systems. The types of units this may apply to include submersible lift stations, well houses, water booster stations, and pressure reducing valve vaults.

SECTION 2 STANDARDS AND REGULATIONS

2.01 REFERENCE STANDARDS

A. Throughout these specifications, reference is made to various standard specifications. Such reference gives the serial designation. The latest revised specification shall apply in all cases. These standard specifications, where applicable, shall be binding on all construction activities.

B. The following specifications and standards form part of this specification to the extent indicated by reference thereto or for quality of workmanship and materials required under the contract.

American Society of Testing Materials	(ASTM)
American Water Works Association	(AWWA)
American National Standards Institute, Inc.	(ANSI)
Michigan Department of Transportation	(MDOT)
American Concrete Institute	(ACI)
National Concrete Masonry Association	(NCMA)
Truss Plate Institute	(TPI)
National Electrical Code	(NEC)
Michigan Department of Environmental Quality	(MDEQ)

2.02 REGULATORY REQUIREMENTS

A. All construction work, alterations, repairs or mechanical installations and appliances connected herewith shall comply with all the State Rules and Regulations and local ordinances and such other statutory provisions pertaining to this class of work. Such Rules and Regulations and local ordinances are to be considered a part of these specifications by reference.

B. All electrical work shall be in accordance with the latest edition of the National Electrical Code, the National Electrical Safety Code and applicable state and local codes. This shall not be construed to permit a lower grade of construction where the plans and specifications require workmanship or materials in excess of code requirements. All electrical equipment, wiring, cable, pre-assembled electrical panels, and materials shall be listed by Underwriters Laboratories, Inc.

SECTION 3 PROJECT CLOSE OUT

3.01 CLEANUP

Before final acceptance of the sanitary sewer system or watermain system work, the Contractor shall remove all false work, excavated or useless materials, and rubbish, and restore to presentable condition per the restoration specifications and satisfactory to the Township Engineer, all property, both public and private, which may have been used or damaged during the installation of the sanitary sewer or water system work.

3.02 OPERATING AND MAINTENANCE DATA

The Contractor shall furnish written instructions for the operation and maintenance of the equipment furnished at the time of submittal of shop drawings. The instructions shall be short, easy to understand, with directions specifically written for this project, describing the various possible methods of operating the equipment. The instructions shall include procedures for tests required, adjustments to be made and safety precautions to be taken with the equipment. Maintenance instructions shall include test and calibration charts, exploded views of assembled components and spare parts lists. At least two (2) instruction booklets and one digital copy shall be furnished for each separate piece of equipment.

These shall be transmitted to the Township Engineer as part of the close out of the project. Record drawings (1 set of paper copy (24” x 36”) and one (1) digital copy in AutoCad and .pdf format) shall be submitted to the Township along with hydrant and valve reports, water service lead reports, and sanitary sewer lead reports, as applicable to the project.

A. Pumps

Include the manufacturer’s technical specification of the pump along with the application for the pump, the manufacturer’s warranty certificate, installation instructions, serial numbers for all pumps, pump performance curve, pump trouble shooting guide and the pump efficiency rating.

B. Control Panel Operation and Maintenance Manual

Include the electrical panel legend, bill of material report, catalog cut sheets indicating make and model of all general accessories, installation instructions for the control panel, recommended spare parts, installation instructions for general accessories and a maintenance frequency chart.

C. Electrical Wiring

A color coded drawing of the as-installed electrical schematic shall be submitted for all electrical work performed as part of the project.

3.03 GUARANTEE

The Contractor shall guarantee all materials and equipment furnished and work performed for a period of one (1) year from the date of Township Acceptance. The Contractor shall warrant and guarantee for a period of one (1) year from the date of Township Acceptance of the system that the completed system is free from all defects due to faulty materials or workmanship. The Contractor shall promptly make such corrections, as may be necessary including the repairs of any damage to other parts of the system resulting from such defects. The Owner or Township, if they have taken over the system, will give notice of observed defects with reasonable promptness. In the event that the Contractor should fail to make such repairs, adjustments or other work that may be made necessary by such defects, the Owner or Township may do so and charge the Contractor the cost thereby incurred. Refer to form Letter of Guarantee to be included with final close-out documents.

The Contractor shall supply a two (2) year maintenance bond per the "General" section of these specifications.

3.04 FINAL COMPLETION/ACCEPTANCE OF PROJECT BY TOWNSHIP

A. Township Projects

Final payment will not be made to the Contractor until all close out documents have been received and approved by the Township Engineer. These items are listed below:

1. Final inspection and punch list items satisfactorily completed.
2. Maintenance bond.
3. Letter of guarantee (format provided by Township).
4. Affidavit of completion/consent of surety.

B. Private Projects

The Township will not accept the facility or allow connections to or use of the facilities until the following items have been received by the Township:

1. Final inspection and punch list items satisfactorily completed.
2. Maintenance bond. (Valid for a period of two years from the date of Township acceptance of the system).
3. Letter of guarantee (format provided by Township).
4. Easement descriptions.

5. Descriptions of the facilities for a bill of sale.

6. Certification by the Engineer reviewing the installation.

7. Sanitary Sewer Lead Reports (as applicable).

8. Water Service Lead Reports (as applicable).

9. Water Valve Reports (as applicable).

10. Hydrant Reports (as applicable).

11. Operation and Maintenance Manuals

12. Record Drawings

    a. Record Drawings (as-constructed) must include two (2) paper copies (24” x 36”) and a digital copy (formats listed below) including a .pdf copy of each sheet.

       Digital Submittal Format Requirements: The developer shall submit to the Township a digital copy of the Record Drawings (as described in Section 3.04.B Item 12B of the Technical Specifications) in one of the following formats:

       - Drawing Interchange File (.DXF)
       - AutoCAD (.DWG) release 2000 or higher
       - ArcView GIS format (.SHP)

    b. Record Drawings: Record drawings shall consist of plan and profile.

       Sanitary sewer leads and water service leads shall be re-drawn in the new location along with the mainline structures and piping.

       Hydrant, valve and manhole numbering sequences shall be obtained from the Township Engineer. Each structure installed, such as manholes, water service leads, hydrants, valves, sewer leads, bends, tees, or other structures placed shall have 3 physical measurements from structures which are shown on the plans along with with gps or survey coordinates. Lead measurements are to be placed on the individual reports. Sanitary sewer profiles shall include manhole number, rim and invert elevations, distances between structures, size and type of pipe. Watermain

profiles shall include hydrant and valve numbers, all fittings, horizontal/vertical, and the accurate depth of placement. All profiles shall show conflict with existing utilities. Sanitary sewer lead and water service lead information shall be placed in a table format on the record drawings. Each plan sheet shall have a separate table for the type of lead shown on that sheet. See Table 3.1 and Table 3.2 for examples.

Table 3.1

SEWER LEAD NUMBER	DISTANCE FROM DOWNSTREAM MANHOLE	DISTANCE FROM SEWER TO END OF LEAD AT PROPERTY LINE OR EASEMENT LINE	DEPTH BELOW GRADE

Table 3.2

WATER SERVICE LEAD NUMBER	DISTANCE FROM GATE VALVE OR FIREHYDRANT. INCLUDE VALVE OR HYDRANT NUMBERS	DISTANCE FROM WATER MAIN TO END OF LEAD AT PROPERTY LINE OR EASEMENT LINE

SECTION 4 EXCAVATION, TRENCHING AND BACKFILLING

4.01 SCOPE OF WORK

The work covered by this section shall consist of furnishing all materials, equipment and labor for the excavating, trenching, backfilling, and bore and jack required to install or repair sanitary sewers, watermains and other structures as shown on the plans and referred to in these specifications.

4.02 MATERIALS

A. Backfill Material

All backfill material shall be free from cinders, ashes, refuse, sod, frozen lumps, vegetable or organic material, boulders, rocks or stones or other material which, in the opinion of the Design Engineer, is unsuitable.

However, from one foot above the top of the pipe to the subgrade of the pavement, material containing stones up to three (3) inches in their greatest dimension may be used.

Where the type of backfill material is not specified, the Contractor may backfill with the excavated material provided that such material meets the requirements described above. Where excavated material is to be used for backfill and there is a deficiency due to a rejection of part thereof, the Contractor shall furnish the required amount of sand, gravel or other approved material at no additional cost.

B. Bore and Jack Materials

1. Steel Pipe

Jacked in place steel pipe shall meet the requirements of either ASTM A53, Type E or S, Grade B or ASTM A139, Grade B.

The ends of all steel pipe to be jacked shall be prepared for field welding at joints.

The nominal outside diameter and minimum wall thicknesses of steel pipe to be jacked in place shall be as shown below. Minimum wall thickness for railroad crossings may be reduced by 0.063 inch if cathodic protection is provided per railroad specifications.

Nominal Size	Nominal Outside Diameter (inches)	Minimum Wall Thickness Required (inches)	
		M.D.O.T.	Railroads
2"	2.375	0.154	0.251
4"	4.500	0.188	0.251
6"	6.625	0.188	0.251
8"	8.625	0.188	0.251
10"	10.750	0.188	0.251
12"	12.750	0.188	0.251
14"	14.000	0.250	0.282
16"	16.000	0.250	0.282
18"	18.000	0.250	0.313
20"	20.000	0.250	0.344
22"	22.000	0.250	0.375
24"	24.000	0.250	0.407
26"	26.000	0.312	0.438
28"	28.000	0.312	0.469
30"	30.000	0.312	0.469
34"	34.000	0.312	0.532

2. Grout:

Grout shall consist of a mixture of Portland cement and sand in any proportion which does not have more than 50 percent sand by volume.

4.03 EXECUTION

A. Excavation

Excavation includes clearing the site of the proposed work and removal of all materials to a depth which is sufficient to permit the construction of the structure or utility in accordance with the plans. Excavated materials may be temporarily stored along the trench in a manner that will not cause damage to trees, shrubbery, or other properties and that will not endanger the banks of the trench by imposing too great a load thereon.

B. Length and Width of Trench

Not more than 200 feet of open trench will be permitted at a time without approval from the Design Engineer and Township Engineer, unless pedestrian bridges are maintained at 200-foot intervals and vehicular crossings of at least one lane are maintained at 300 foot intervals. Streets shall not be completely blocked without written permission from the Design Engineer and roadway officials. All fire alarm boxes and fire hydrants must be kept clear and accessible at all times.

The width of the trench shall be ample to permit the pipe to be laid and joined properly and the backfill to be placed and compacted as specified. In order to limit excessive loads on the pipe, the maximum width of trench shall not be more than two feet greater than the nominal inside diameter of the pipe. This limitation shall apply to the width of the trench at the top of the pipe. Trenches shall be of such extra width, when required, as will permit the convenient placing of timber supports, sheeting and bracing and handling of special conditions.

C. Bracing, Sheeting and Shoring

Open cut trenches shall be sheeted and braced as required by any governing federal or state laws and municipal ordinances and as may be necessary to protect life, property or the work. When close sheeting is required, it shall be so driven as to prevent adjacent soil from entering the trench either below or through such sheeting. Where sheeting and bracing are used, the trench width shall be increased accordingly. An approved pipe laying trench box may be used in lieu of sheeting where safety of the workmen and/or protection of the work is the sole consideration, if allowed by governing authorities.

Sheeting and bracing left in place must be removed for a depth of three (3) feet below the established finish grade or the existing surface, whichever is lower.

Trench bracing, except that which must be left in place, may be removed when the backfilling has reached the respective levels of such bracing.

Sheeting, except that which has been ordered left in place, shall be removed as the backfilling progresses.

D. Dewatering

The Contractor shall provide and maintain adequate pumping and draining facilities for removal and disposal of water from trenches or other excavations. He shall provide pumping and draining facilities for bulkheaded sewer sections and shall operate same until bulkheads have been removed or construction is completed, if bulkheads are to be left in place. The drainage system must be maintained until the pipe has been

covered with sufficient backfill material to prevent floating of the installed pipe sections.

Where work is in ground containing an excessive amount of water, the Contractor shall provide, install and maintain a suitable dewatering system and shall so operate it to insure proper construction of the work. The determination of whether an excessive groundwater condition exists, that is, or might be detrimental to the sewer or watermain construction will be made by the Design Engineer. Proper disposal of the dewatering discharge (necessary easements, permits, erosion control, etc.) shall be the responsibility of the Contractor. Contractor shall not discharge or allow any groundwater to enter existing sanitary sewage system. Any water which does enter the existing sewage system shall be the Contractor's responsibility and he will pay any and all transporting and treatment costs involved with this water according to the local municipal authority. Cost of dewatering shall be incidental to and included in the price of the pipe or structure placed in the excavation.

Contractor is to provide proposed dewatering plan to owner prior to implementation. Contractor is responsible to obtain any permits required for the dewatering process.

E. Excavation to Grade

The trench shall be excavated to the depth required so as to provide a uniform and continuous bearing and support for the pipe barrel. The Contractor shall excavate the last four inches of depth to grade using hand tools.

Any part of the bottom of the trench excavated below the specified grade shall be refilled with approved materials and thoroughly compacted to a minimum of 95% of the maximum dry density as determined by ASTM D698 or the Michigan Cone Method. The finished subgrade shall be prepared accurately by means of hand tools. Blocking to bring the pipe to grade will not be permitted. Bell holes in the subgrade must be provided to allow for continuous support of the pipe barrel when bell type pipe is used.

If, in the opinion of the Design Engineer (with concurrence of the Township Engineer), subgrade pipe support conditions at some locations are found to be unsatisfactory, he shall have the authority to order subgrade preparation at these locations in accordance with the provisions for special foundations in clay, rock or poor soils.

F. Special Foundation in Clay or Rock

Subgrade consisting of clay or rock shall be excavated to at least four inches and not more than six (6) inches below the specified grade. Before the pipe is laid, the subgrade shall be prepared by backfilling with an

approved granular material in three inch compacted layers. The layers shall be thoroughly tamped as directed by the Design Engineer so as to provide a uniform and continuous bearing and support for the pipe barrel with a minimum compaction of 95% of the herein defined maximum dry density. The Contractor will not be allowed extra compensation for this work.

G. Special Foundations in Poor Soil

Where the bottom of the trench at subgrade is found to consist of unstable material which will, in the opinion of the Design Engineer, not provide adequate pipe support, the Design Engineer shall have authority to require either the removal of the unstable material and replacement with approved materials or require the Contractor to construct a foundation for the pipe consisting of piling timber or other materials in accordance with plans prepared by the Design Engineer. The use of stone bedding by the Contractor to reduce dewatering requirements will not be paid as an extra.

H. Backfilling around Pipes

From the bottom of the trench to a depth of one (1) foot above the top of the pipe, the trench shall be backfilled by hand with sand or approved excavated materials and tamped to a minimum of 95% of the herein defined maximum dry density.

The Contractor shall use care in placing this portion of the backfill so as to make sure sufficient material has been worked under the pipe and also avoid injuring or moving the pipe. Backfilling around PVC pipe shall be done in accordance with ASTM D2321 "Standard Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe".

I. Backfilling to Natural Grade

From one (1) foot above the pipe to the grade shown on the drawing or specified herein, the trench shall be backfilled by mechanical methods approved by the Design Engineer. A minimum compaction of 85% of maximum unit weight is required, unless otherwise noted.

Provide 30 inches of cover above the top of the pipe before application of wheel loading and 48 inches before use of heavy compactors.

J. Backfill under Structures

Where the excavation is made through or under existing or proposed pavement, curb, shoulders, driveways or sidewalks or where such structures are undercut by the excavation or where noted on the plans, the entire backfill to the subgrade of the structure shall be made with granular material. The granular material backfill shall be placed in layers and

compacted to 95% of the herein defined maximum dry density throughout. This requirement shall apply to any trench that is within a one-on-three slope beneath the road from the shoulder point or back of curb line. Extra compensation will not be allowed for this work.

Granular material is defined as a material meeting granular material Class II as defined in M.D.O.T. Standard Specifications.

K. Special Backfilling Requirements

The Contractor will be required to comply with the regulations of the State Highway, Municipal or County Road Engineering Departments with regard to backfilling in their respective right-of-ways and beneath the roads, and shall be responsible for determining these regulations prior to bidding.

L. Compaction Testing

Compaction testing may be periodically performed by a source and method approved by the Township Engineer to insure that compaction requirements are being met. Compaction percentage is based on the maximum dry density as determined by ASTM D1557 or the Michigan Cone Method.

M. Boring and Jacking

The following provisions apply to the construction of sewers, forcemains, watermains and house leads which cross pavements under the control of the Michigan Department of Transportation, County Road Commission, or under railroads.

1. General

Steel pipes shall be jacked in place under highways as specified in the current standards published by the Michigan Department of Transportation. Pipe jacked in place under railroads shall meet the current standards established by the affected railroad. The Design Engineer shall incorporate bore and jack requirements into the contract documents. After the pipe has been installed in the steel casing pipe, the casing pipe shall be pressure grouted with an MDOT approved flowable fill or blown full of pea stone and the ends sealed with concrete.

2. Location of Jacking Pits:

a. State Highways

The minimum distance of the jacking pit to the edge of pavement will be specified by the M.D.O.T. and placed on the plans or contract documents by the Design Engineer.

b. County Roads

On all highways, a minimum distance of 15 feet shall be provided from edge of pavement to the face of boring pits. Any variances from these distances will require tight sheeting and if a traffic hazard, permanent guard rail will be required.

c. Railroads

The location of the jacking pit will be specified by the Railroad and/or the Design Engineer.

3. The boring machine shall be capable of assuring a crossing with no voids.

a. In solid clay soils the cutting head or the auger, if no head is used, may be allowed to within one inch of the front of the casing.

b. In sandy soils the cutting head or the auger, if no head is used, must be inside the casing at least 1/2 the diameter of the casing.

c. If the soil is both clay and sand, the same procedure as for sand shall apply.

d. In wet, sandy or gravelly type soils that have a tendency to move or run, the cutting head and/or auger shall be pulled back to at least three feet from the front of the casing.

e. When boring is used to facilitate jacking pipe in place, the minimum diameter of the lead auger section shall be 1/2 inch smaller than the inside diameter of the pipe being jacked.

f. Trenchless pipe placement - methods such as trenchless pneumatic piercing tools utilized to perform horizontal bores must be approved by the Township Engineer prior to its use.

SECTION 5 CONCRETE WORK

5.01 SCOPE OF WORK

The work under this section shall include all materials, labor and equipment necessary to achieve a finished product, including but not limited to the items in these specifications and those shown on the working drawings. Work includes, but is not limited to building footings, floor slabs, sidewalks, curb and gutter, driveways, etc.

All procedures and materials under this section, where not specifically stated, shall be in accordance with standards and recommendations of the American Concrete Institute's Building Code Requirements for reinforced concrete (ACI 318 - latest edition).

5.02 MATERIALS

A. Cement: Portland cement shall conform to "Standard Specifications for Portland Cement" (ASTM C150 - latest edition) and shall be Type I, IA, III or IIIA.

B. Aggregates: Concrete aggregates shall conform to "Standard Specifications for Concrete Aggregates" (ASTM C33 - latest edition). Maximum coarse aggregate size for all members less than eight (8) inches in thickness shall be 3/4 inch. For members with thicknesses greater than or equal to eight (8) inches, the maximum coarse aggregate size shall be 1-1/2 inches.

C. Mixing Water: All water used in concrete shall be from a potable water supply.

D. Admixtures: Air-entraining admixtures shall conform to "Standard Specifications for Air-Entrained Admixtures for Concrete" (ASTM C260 - latest edition).

E. Concrete Mix Proportions

F. ACI-318 shall be used for developing mixture portions. The Contractor shall furnish, for the Engineer's approval, all records to show compliance with ACI-318.

5.03 EXECUTION

A. Concrete Quality

All concrete shown on the working drawings or referred to in the specifications shall be from an approved batch plant and shall have a

minimum compressive strength of 4,000 psi and a maximum water-cement ratio of 0.64.

Air entrainment shall be 5%, more or less, 1% for concrete with maximum aggregate size of 1-1/2 inches and shall be 6%, more or less, 1% for concrete with a maximum aggregate size of 3/4 inch.

The concrete shall be of a consistency to work easily into corners, angles of forms and around reinforcement. The slump shall not exceed 4 inches.

B. Mixing And Placing Concrete

1. Preparation of Equipment and Place of Deposit:

a. Before placement, all equipment for mixing and transporting the concrete shall be cleaned and all debris and ice shall be removed from the places to be occupied by the concrete. Forms shall be thoroughly wetted (except in freezing weather) or oiled and masonry filler units that will be in contact with concrete shall be well drenched (except in freezing weather).

b. Water shall be removed from place of deposit before concrete is placed unless otherwise permitted by the Engineer. All latents and other unsound material shall be removed from hardened concrete before additional concrete is added.

c. Expansion joint material shall be placed at all locations where concrete is placed against a structure.

2. Mixing:

a. Ready mixed concrete shall be mixed and delivered in accordance with "Standard Specification for Ready Mixed Concrete (ASTM C94 - latest edition). Mixing and transporting equipment shall be capable of providing concrete which meets the ASTM C94 requirements for uniformity.

b. For job mixed concrete, the mixer shall be rotated at a speed recommended by the manufacturer. If mixer performance tests are not made, each batch of 1 cubic yard or less shall be mixed for at least 1 minute after all materials are in the mixer. The mixing time shall be increased 15 seconds for each additional cubic yard or fraction thereof. The entire batch shall be discharged before the mixer is recharged.

3. Conveying:

   a. Concrete shall be conveyed from the mixer to the place of final deposit by methods that will prevent separation or loss of materials.

   b. Equipment for chuting, pumping and pneumatically conveying concrete shall be of such size and design as to ensure a practically continuous flow of concrete at the delivery end without separation of materials.

4. Placing:

   a. Concrete shall be deposited, as nearly as practicable, in its final position to avoid segregation due to rehandling or flowing. Concrete shall be placed at such a rate that it is at all times plastic and flows readily. No concrete contaminated by foreign material shall be used nor shall retempered concrete be used unless approved by the Engineer.

   b. When placing is started, it shall be carried on as a continuous operation until placement is completed.

   c. All concrete shall be thoroughly consolidated during placement. It shall be thoroughly worked around embedded fixtures and into the corners of the forms.

5. Cold Weather Requirements:

   a. Adequate equipment shall be provided for heating concrete materials and protecting concrete during freezing or near-freezing weather. No frozen materials or materials containing snow or ice shall be used.

   b. All reinforcement, forms, fillers and ground with which the concrete is to come in contact shall be free from snow and ice.

   c. Construction during cold weather shall be performed in accordance with ACI 306, "Recommended Practice for Cold Weather Concreting", or as directed by the Engineer.

SECTION 6 SANITARY SEWER MAIN

6.01 SCOPE

The work covered by this section of the specifications consists of the furnishing of all plant, labor, materials, equipment and supervision and performing all operations involved in the construction of sanitary sewer mains in accordance with the provisions of the Plans and Specifications and subject to the terms and conditions of the Contract Documents.

Sanitary sewer leads and sewer appurtenances are covered under Section 7 of these specifications.

6.02 MATERIALS

A. Sewer Pipe

1. General

a. Sewer pipe, unless otherwise indicated on the plans or authorized in writing by the Township, shall be new, unused material of the size and type shown on the plans and shall conform to the requirements of these specifications.

b. Pipe, materials and accessories offered by the Contractor shall be the standard products of reputable manufacturers normally engaged in the manufacturing of the particular item in question. The Township Engineer shall have the final approval of a pipe manufacturer.

2. Sewer Pipe Selection

The sanitary sewer pipe used at a particular location shall be based on depth of bury as shown in Table 6-1.

If the depth of cover over the sewer changes during construction or is different than the depths shown on the approved project plans, it shall be the responsibility of the Design Engineer to ensure that the correct material is utilized.

TABLE 6-1 Determination of Sanitary Sewer Pipe Material

Depth of Bury	Sanitary Sewer Pipe Allowed
0’ to 16.00’	PVC SDR 35, Truss Pipe, Ductile Iron
16.01’ & over	Truss Pipe, Ductile Iron, PVC SDR 26

An entire sewer segment must be constructed of the same pipe material. If greater than 50% of the sewer pipe in a given segment has a depth of bury of 16.01' or greater, then the heavier pipe material shall be used.

3. PVC Sewer Pipe

PVC sanitary sewer pipe 15 inches in diameter and smaller shall meet the requirements of ASTM Designation D-3034 (latest edition), "Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings". The minimum wall thickness shall conform to SDR-35. Sewer lead pipe shall be Schedule 40 PVC.

PVC sanitary sewer pipe 18 inches to 27 inches in diameter shall meet the requirements of ASTM Designation F-679 (latest edition), "Standard Specification for Polyvinyl Chloride (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings". The minimum wall thickness shall conform to ASTM Designation T-1.

The use of PVC sewer pipe requires special attention to proper subgrade and backfilling procedures. Failure of the Contractor to provide proper construction will result in probable excessive deflection of the PVC pipe and require replacement by the Contractor at no additional cost to the Owner.

4. Ductile Iron Pipe

Ductile iron pipe shall meet the requirements of ANSI A21-50 A21-51, and AWWA C151, and shall be of the design thickness classification as indicated on the plans.

5. Composite Sewer Pipe (Truss Pipe)

Composite sanitary sewer pipe shall meet the requirements of ASTM Designation D 2680 (latest edition). The thermoplastic linings may be ABS or PVC.

B. Pipe Joints

1. For PVC Sewer Pipe: PVC sewer pipe joints may be either solvent cement or elastomeric gasket type, in accordance with ASTM D3212 (elastomeric gasket type) and/or in accordance with ASTM D2855 (for PVC pipe solvent cemented joints). Only chemical solvents approved by the pipe manufacturer shall be used.

2. For Ductile Iron Pipe: Ductile iron pipe joints shall conform to the following:

a. Flange joints shall meet ANSI B 16.1, Class 125.

b. Mechanical joints shall meet ANSI A21.11, and AWWA C111, or Federal Specification WW-P-421.

c. Rubber gasket joints shall be of a bell and spigot type "TYTON", "SUPER BELL-TITE" or equal.

3. For Composite Sewer Pipe (Truss Pipe): Composite Sewer Pipe (Truss Pipe) joints shall be bell and spigot type gasketed joints meeting ASTM D3212.

C. Pipe Fittings

Pipe fittings in sewer lines shall correspond in type, size, class, joints and all other respects with the type of pipe used as specified above including the applicable ASTM requirements. Where linings and coatings are specified for pipe, the fittings to be used in conjunction therewith shall have the same lining and coating.

Fittings shall be used in ductile iron pipe lines as required, whether specifically called for or not, according to the best practice in installation of these lines. A manhole water stop shall be provided at each manhole connection as shown in the standard details.

As approved by the Township Engineer, specifically designed adapters shall be used to connect pipes of different diameter or materials of construction. The adapters shall be constructed of flexible materials and clamped onto the pipe with stainless steel bands. Use mastic, solvent weld or rubber gasket seals and encase in concrete to prevent displacement.

6.03 EXECUTION

A. Excavation

As specified in "Excavation, Trenching and Backfilling".

B. Laying Sewer Main

Thermoplastic sewer pipe shall be installed per ASTM designation D 2321 (latest edition) unless otherwise indicated in these specifications. Rigid pipe types (DIP) shall conform to ASTM C12. Embedment material shall conform to ASTM D2321 standards unless otherwise indicated herein, or in the standard details.

Pipes located inside structures or above ground shall be rigidly supported as shown on the plans or as specified herein. The full length of each

section of underground pipe shall rest solidly upon the prepared bed of undisturbed earth or compacted backfill with recesses only to accommodate pipe bells and joints. Any pipe which has its grade, alignment or joints disturbed after laying shall be taken up and re-laid.

The interior of all pipe shall be thoroughly cleaned of all foreign matter before being lowered into the trench and shall be kept clean during laying operations.

The pipe shall not be laid in water or when trench or weather conditions are unsuitable for work. Water shall be kept out of the trench until the joints and backfilling are completed. When the work is not in progress, open ends of pipe and fittings shall be securely closed so that no water, earth or other foreign substances can enter the line.

All sanitary sewer main shall be laid using a pipe laser for alignment and grade. The Contractor shall be responsible for checking their work using the hubs, stakes, and/or benchmarks provided by the Owner and/or Design Engineer. Any sewer found to have a grade or alignment that varies by more than 10% from the plan grade or elevation will be considered deficient. Variations up to 10% will not be accepted if this variation results in a pipe that is below the minimum slope as defined for that pipe diameter in the latest version of Recommended Standards for Wastewater Facilities (Ten State Standards). The Design Engineer and

Township Engineer will determine if the deficiency is serious enough to affect the objective of the project. The Contractor shall remove and re-lay any deficient sewer, if directed by the Design Engineer or Township Engineer, at no additional cost to the Owner or Township.

Any section of pipe found to be defective, either before or after laying, shall be replaced with new pipe at the Contractor's expense. If repairs are necessary, Fernco adaptors will not be allowed for main line pipe. Similar material shall be utilized.

The Township Engineer shall be notified at least 48 hours prior to the start of laying sewer main.

C. Placement within Easements

Where sewer lines are shown crossing private property, the alignment of the sewers shall be as shown on the plans and as directed by the Engineer and extra care must be taken to ensure that the work is done within the construction easements. Prior to recording, easements will need to be adjusted so final sewer alignment is centered in the easement.

D. Handling

The sewer pipe shall be handled at all times in such a manner as to ensure delivery to the site and installation in a sound, undamaged condition. Any damaged or defective pipe or other materials will not be accepted. PVC pipe shall not be stored or handled in a manner which will permit exposure to sunlight for extended periods of time.

E. Horizontal and Vertical Separation

Sewers shall be laid at least 10 feet horizontally from any existing or proposed watermains or water service leads and meet the minimum required separation from all potable water wells. This distance shall be measured edge to edge. Should local conditions exist which do not allow for this separation, the Township Engineer and the Michigan Department of Environment, Great Lakes, and Energy, Drinking Water division, need to approve any special construction methods proposed (casing, sleeving, etc.).

Sewers crossing watermains shall be laid to provide a minimum vertical distance of 18 inches between the outside of the pipes. This shall be the case where the watermain is either above or below the sewer. The crossing shall be arranged so that one full length of sewer pipe shall be centered with respect to the water pipe. Where a watermain crosses a sewer, adequate structural support shall be provided to prevent damage. If the 18-inch isolation distance cannot be maintained due to site constraints, then approval from the EGLE Water Division will be required for the special construction method proposed (casing, sleeving, etc.)When it is impossible to obtain proper horizontal and vertical separation as stipulated above, the sewer shall be designed and constructed equal to water pipe and shall be pressure tested to assure watertightness prior to backfilling.

In all cases, state and local permit requirements shall be adhered to.

F. Placement of Sewer Pipe

The pipe shall be placed as soon as possible after the trench excavation has been made. The pipe shall be carefully laid to the required grade in a prepared trench, up-grade from structure to structure, with the bell or groove end of the pipe upgrade. Each section shall have a firm bearing throughout its length with recesses only to accommodate pipe bells and joints. Any pipe which has its alignment, grade or joints disturbed after laying shall be removed and re-laid. The joints and interior of all pipe shall be thoroughly cleaned of all foreign matter before being lowered into the trench and shall be kept clean during the laying operations. Starting sewer construction in the middle of a project must be approved in writing by the Township Engineer.

Water shall be kept out of the trench until the material of the joints has hardened and the trench partially backfilled to prevent floating of the pipe. When work is not in progress, open ends of pipe and fittings shall be securely closed so that no trench water, earth or other foreign substance can enter the line.

G. Joints

Joints shall be of the material specified and shall be placed in accordance with the manufacturer's specifications.

H. Backfilling

As specified in "Excavation, Trenching and Backfilling".

I. Cleaning Sewers

The sanitary sewer main must be clean at the time of acceptance. If, at any time, there is an accumulation of earth or silt in the pipe, the Contractor shall clean out and remove such deposits at their own expense.

J. Acceptance Tests

1. Air Testing

All new sewers shall be subjected to air, infiltration or exfiltration tests or a combination of same prior to acceptance by the Owner. All tests for acceptance of the sewer line shall be witnessed by the Township Engineer. All sewers where the groundwater level above the crown of the sewer at the upstream manhole is over seven (7) feet shall be subjected to air tests or infiltration tests. If an exfiltration test is performed, the maximum exfiltration rate shall be the same as that permitted from infiltration. For the purposes of exfiltration testing, the internal water level shall be equal to the external water level plus seven (7) feet as measured from the crown of the pipe at the upstream manhole.

No sewer lines will be accepted until testing has been satisfactorily completed and approved. Testing shall be completed within 30 days of laying operations.

Where groundwater conditions require dewatering operations in order to construct sewers, the Contractor may, at his option, perform preliminary air tests after backfilling and while the dewatering equipment is still operating. After dewatering operations have ceased and the groundwater has stabilized at its normal level

seven (7) feet or less above the sewer and if the preliminary air test was satisfactory, the preliminary air test may be accepted as final.

Maximum allowable infiltration shall not exceed 100 gallons per inch of diameter per mile of pipe per 24 hours for any individual run between manholes.

The procedure for air testing of rigid pipes such as DIP must conform to ASTM C828 (VCP) or ASTM C924 (concrete) as determined and approved by the engineer or as otherwise recommended by the pipe manufacturer.

The procedure for air testing of PVC (flexible/plastic pipe) sewers shall conform to ASTM F1417 and be as follows:

The sewer line shall be tested in increments between manholes. All leads and wyes shown on the plans must be in place prior to testing. The lines shall be cleaned and plugged at each manhole. Such plugs shall be designed to hold against the test pressure, be braced in place, and shall provide an air tight seal. There shall be no standing water in the pipe during testing operations. One of the plugs shall have an orifice through which air can be introduced into the sewer. An air supply line shall be connected to the orifice. The air supply line shall be fitted with suitable control valves and a pressure gauge for continually measuring the air pressure in the sewer. The pressure gauge shall have a minimum diameter of 3-1/2 inches and a range of 0-10 PSIG. The gauge shall have minimum divisions of 0.10 PSIG and an accuracy of ±0.04 PSIG.

The sewer shall be pressurized to 4 PSIG greater than the greatest back pressure caused by groundwater over the top of the sewer pipe. Greatest back pressure is determined by averaging groundwater depth over the top of the pipe averaged at each manhole and multiplying by 0.433 to obtain psi. At least two (2) minutes shall be allowed for the air pressure to stabilize between 3.5 and 4 PSIG. If necessary, air shall be added to the sewer to maintain a minimum pressure of 3.5 PSIG during the stabilization period.

After the stabilization period, the air supply control valve shall be closed so that no more air will enter the sewer. The sewer air pressure shall be noted and timing for the test begun. The test shall not begin if the air pressure is less than 3.5 PSIG or such other pressure as is necessary to compensate for groundwater level.

The air test shall be performed for the duration shown in Table 6-2. The air pressure shall not drop over 1.0 psi during this test period.

TABLE 6-2 Required Test Time for Air Pressure Testing

Pipe Diameter In Inches	Duration of Air Test in Minutes per 100 ft. of Sewer Pipe Length
6	3.0
8	4.0
10	5.0
12	5.5
15	7.5
18	8.5
21	10.5
24	11.5

If a sewer segment fails to pass the air pressure test, the Contractor shall determine the location of the deficiency, repair them and retest the sewer. The sewer will not be accepted until satisfactory results are obtained.

The actual groundwater level for sanitary sewers subject to air tests shall be determined by the Township Engineer or Resident Project Representative.

The air test pressure shall be adjusted to compensate for the maximum probable groundwater level above the top of the sewer pipe that is being tested.

The method of testing and measurement shall be approved by the Township Engineer. The Contractor shall provide the necessary equipment and labor for making tests and the cost of same shall be included in the unit price bid for completed sewer.

Chemical grouting will be considered an acceptable method of repairing leaking pipe joints. Before this type of repair is undertaken, the Contractor shall obtain approval of the Township Engineer to hire a pipe grouting firm for making such repairs.

Additionally, if chemical grouting of pipe joints is necessary, this operation must be performed under the observation of the Township Engineer and a complete report of all grouting operations shall be furnished to the Township Engineer upon completion.

2. Deflection Testing of Thermoplastic Sewer Pipe

Thermoplastic sewer pipe shall be tested for vertical deflection. Deflection tests shall be performed on 100 percent of the total footage of PVC sewer.

Truss sewer pipe will also require testing for deflection.

This testing shall be carried out under the observation of the Township Engineer using a Go-No-Go device approved by the Township Engineer and furnished by the Contractor. The deflection testing shall be performed at least thirty (30) days after final backfill of the trench. The maximum allowable vertical deflection of the cross section of the pipe will be five percent (5%) of the actual internal pipe diameter. If the results show the deflection of any sewer to be in excess of allowable, then the Contractor shall make repairs by re-excavation and compaction or replacement prior to acceptance.

The deflection testing must be satisfactorily completed prior to final acceptance of the sewer. There will be no additional payment for deflection testing performed while the sanitary sewer is in service if the Township executes their right to utilize the sewer upon Substantial Completion. The Township Engineer shall be notified at least 24 hours prior to testing of the sewer.

3. Television Inspection

All new sewers shall be inspected after installation by means of closed circuit television. Video equipment shall have a running footage indication for aiding in locating all wyes, defects, etc. which is displayed and permanently recorded on the video of the section being filmed. The complete system shall be permanently recorded using video along with written documentation indicating all information such as wye location, defects, infiltration, and cleanliness. Immediately upon completion of the filming, the finished video shall be turned over to the Township Engineer in digital format. Wyes and laterals shall be in place prior to the television inspection. This television inspection work will be done under the direction and observation of the Township Engineer. The Contractor shall notify the Township Engineer at least 24 hours prior to the television inspection. Township shall have the option to flow water into the sewer prior to being televised to ensure flow passes adequately through sewer and to assist in identifying bellies and defects in slope.

The television inspection shall be completed prior to the final acceptance of the sewer section. The Township may exercise their

option to use the sewer upon substantial completion. No additional payment will be made for televising the sewer under live conditions.

Any defect in the sewer construction observed during the television inspection such as poor grade, cracked or leaking pipe sections or excessive amounts of debris shall be corrected by the Contractor immediately. Sections with defects will have to be retelevised after the repairs are made.

4. Visual Observation

Any observed defects in the sewer or groundwater flowing in the sewer shall be repaired by the Contractor prior to final acceptance.

K. Certification

The manufacturer of pipe and fittings shall furnish a certification statement that all pipe and fittings furnished to the project have been inspected and tested in accordance with the applicable specifications. Pipe will be subject to inspection and approval upon delivery and no cracked, broken, damaged or defective pipe or fitting shall be laid in the work. Any piece that is found to be defective after it has been laid shall be removed by the Contractor and replaced by a sound and perfect piece.

Material certifications must be received prior to final acceptance and/or final payment for the work.

SECTION 7 SANITARY SEWER APPURTENANCES

7.01 SCOPE OF WORK

The work covered in this section of the specifications consists in the furnishing of all plant, labor, materials, equipment and performing all operations involved in the construction of sewer appurtenances as shown on the Project Plans or Standard Details. This work includes, but is not limited to, the following items:

1. Sewer Manholes
2. Connection to Existing Sewers
3. Sewer Wyes and Leads

A. General

The following provisions apply to this section of the specifications:

1. All materials, unless otherwise indicated on the plans or authorized in writing by the Township Engineer, shall be new and unused materials of the size and type shown on the plans and standard details and shall conform to the requirements of the specifications.
2. All materials offered by the Contractor shall be the standard products of reputable manufacturers normally engaged in the manufacturing of such materials. Certifications shall be provided on all materials prior to final acceptances.
3. The foundations of all structures shall be rigidly supported by undisturbed earth or compacted backfill. The interiors of all appurtenances shall be thoroughly cleaned of all foreign materials.
4. Where appurtenances are shown to be constructed on private property, the location of the structure shall be as shown on the plans. All work done within private property shall have an easement provided to the Township by the Owner prior to turnover.

7.02 MATERIALS

A. Sanitary Sewer Manholes

Sanitary Sewer Manholes shall be constructed of pre-cast manhole units in accordance with ASTM C478. Unless otherwise indicated, all manholes shall be four (4) feet in diameter. Manholes shall be delivered to the

project in an un-damaged condition. Any manhole, which shows visible signs of damage, will not be accepted. Manholes shall be constructed to meet the dimensions shown on the Standard Details.

1. Manhole Waterstops: All manhole connections will be fitted with a waterstop assembly meeting ASTM C923. The waterstop shall be of a design acceptable to the Engineer and the pipe manufacturer. Waterstops shall be KOR-N-SEAL as manufactured by Trelleborg; PRESS WEDGE II as manufactured by the Press-Seal Gasket Corporation; RES-SEAL as manufactured by Scales Manufacturing Corporation or equal.

   The joint between the pipe and the manhole wall shall be flexible and water tight. Mortar and grout shall not be used to fill the space between the manhole wall and the pipe, except to form an adequate flow channel.

2. Manhole Waterproofing Material: All manholes shall be waterproofed on the interior or the exterior.

   a. Interior Manhole Waterproofing Material: The materials to be used for interior manhole waterproofing shall be "Drycon" as manufactured by IPA Systems, Inc., "Thoroseal" as manufactured by Standard Dry Wall Products Company or equal.

   b. Exterior Manhole Waterproofing Material: The material to be used for exterior manhole waterproofing shall be a heavy fibered type waterproofing mastic conforming to Federal Specification SS-C-153 Type 1 or CS-206. The mastic shall be A.C. Horn (Grace), Flink Kote 710-23 or equal.

3. Manhole Steps: Manhole steps shall be steel reinforced plastic with a minimum width of 12”. Steps shall not be aligned over the pipe.

   a. Plastic: Polypropylene plastic, steel reinforced, manholes steps may also be furnished, minimum width 12". They shall be #PS2 manhole steps as manufactured by M.A. Industries, Inc., of Peachtree City, Georgia or equal.

4. Cast Iron Frames and Covers: Manhole frames and covers shall be cast iron. Cast iron frames and covers for sanitary sewer manholes shall be a self-sealing lid with no holes extending all the way through the lid. The self-sealing lid shall fit into a precisely machined groove. A rubber gasket shall make contact with the frame to create a leak proof seal. The self-sealing lid shall include a concealed pickhole to facilitate the removal of the lid, but not allow any water to enter the manhole.

Manholes shall have a 24" opening similar to an EJIW#1040 with Type A solid cover or equal. Manholes located within existing or proposed pavement areas shall also be installed with a 3" metal adjusting ring between the frame and cover. Metal adjustment rings shall be tack welded in at least 6 locations inside and out to secure the ring to the frame.

B. Sewer Wyes and Sewer Leads

Sewer leads shall be Schedule 40 Polyvinyl Chloride (PVC) with solvent welded joints as defined in ASTM D-2672 or Extra Strength Solid Wall, SDR 23.5 ABS as defined in ASTM D-1788. Sewer wye fittings shall be of the same material as the pipe, unless otherwise approved by the Township Engineer.

The fitting between the SDR 35 wye and the SCH 40 PVC lead shall be a 35/40 adapter. SDR joint shall utilize a slip joint (no rigid glue joint will be allowed).

C. Clean-Outs

Clean-outs shall consist of pipe and fittings of the same type as the sewer main or service lead materials they connect to as required to provide a clean-out installation as shown in the standard details. The maximum distance between clean-outs is 75 lineal feet.

7.03 CONSTRUCTION METHODS

A. Excavation, Bedding and Backfilling

Excavation, bedding and backfilling for sewer manholes and clean-outs shall be in accordance with the Section 4, "Excavation, Trenching and Backfilling" of these specifications and applicable standard details.

B. Manholes and Pre-cast Structures

Manholes and precast structures shall be constructed only when the temperature is above 32 F. All work shall be protected against freezing.

Water shall be removed from the excavation during construction of the structure and during the time required for the concrete or mortar to develop sufficient strength to resist rupture by groundwater pressure.

Pre-cast O-ring sections shall be joined by first applying a lubricant as approved by the concrete manufacturer. The lubricant shall be placed on the O-ring and both faces of the sections to be joined. The pre-cast sections shall then be set evenly to provide a full seating of the O-ring

within the grooves in the concrete sections. After the pre-cast sections have been placed, the interior joint surface shall be grouted smooth.

Additional methods for joining two-barrel sections must be approved by the Engineer.

C. Manhole Flow Channels

Manhole flow channels shall be formed as shown on the Standard Detail Plans by laying pipe through and cutting out the top portion before completion of the base of the manholes. Cut edges of pipe laid through the manhole shall be fully covered by concrete when the manhole invert is complete. The finished invert shall be smooth and true to grade. No mortar or broken pieces of pipe shall be allowed to enter the sewers.

D. Drop Structures

All sanitary manholes with an invert drop in excess of 24 inches shall have a drop structure. The drop structure shall be built as shown on the Standard Detail Plans.

E. Manhole Waterstops

The joint between the pipe and the manhole wall shall be flexible. Mortar and grout shall not be used to fill the space between the manhole wall and the pipe, except to form an adequate flow channel.

F. Placing Castings

Castings with adjustment rings, if applicable, shall be set to the required elevation in full mortar beds. No more than nine inches (9") of adjusting concrete rings, or mortar shall be used on any manhole between the precast top section and the casting. Exterior sides of casting and rings shall be encased in cement mortar as shown on standard details.

G. Connection to Existing Sanitary Sewer Systems

Connection to existing sanitary sewer systems shall be made in such a manner as to minimize the interruption of flow in those systems. The connection to an existing manhole shall be made by coring and installing a waterstop.

When a new manhole is to be installed over an existing line, it shall be initially placed without damaging the existing pipe. The existing pipe shall not be damaged until the new lines are ready to be placed in operation and the new flow channel is ready to be formed to connect with the existing flow lines.

H. Sewer Wyes and Leads

The wyes and sewer leads shall be constructed as shown on the Sanitary Sewer Standard Details in the plans.

The sewer lead is defined as the sewer pipe between the wye installation and 5 feet outside the building limits or to the property/easement line as indicated on the Standard Details for sewers. The sewer lead shall be brought to the property/easement line at a grade and location established before construction commences, based on a location document (provided by the Design Engineer) or as staked in the field by the Design Engineer or Resident Project Representative. If the proposed location of a sewer lead is not identified, it is the Contractor's responsibility to obtain the information from the Design Engineer/Resident Project Representative prior to the installation. If the lead location is not as per directed by the Resident Project Representative, Design Engineer, or Township Engineer the relocation of the sewer lead shall be performed at the Contractor's expense.

After each sewer lead is installed, it shall be permanently marked in two locations at its termination (the property line or easement line) and at the plug (see the Standard Detail) with a treated wood post 0.40 penetration for underground purposes. The post at the 450 bend shall be 12 feet long ± 1/2 inch, installed vertically and cut and painted as directed by the Design Engineer after record elevations off the top of the post have been obtained. For the post at the end of the stub it must be installed from the bottom of the stub to 18” above grade and approximately 4 ½’ deep. For leads deeper then 12 feet, use wood post that provides an 18-inch (±) projection above ground. Should the post location fall in a driveway or other area where its above ground projection might cause problems, the Contractor shall pre-cut the 12-foot post to some convenient full foot dimension below grade level and attach 3-1/2" x 3-1/2" x 1/4" metal plate to the top of the post. The Contractor shall immediately report same to the Resident Project Representative. The Contractor shall allow the Resident Project Representative to obtain necessary record measurements on the lead installation prior to backfilling. If the sewer leads are backfilled without notification to a Resident Project Representative, the sewer lead shall be excavated, clearly showing the newly placed pipe, at the Contractor's expense. Sanitary sewer saddles shall be SDR-35 wye assembly with stainless steel straps and shall meet ASTM 3034 specifications. Use of saddles shall require approval by the Township prior to installation.

I. Sewer Cleanouts

Sewer cleanouts, if required, shall be constructed as shown on the Sanitary Sewer Standard Detail Sheet. Placement shall be as required by

site conditions and local plumbing codes. Sanitary sewer cleanouts for sewer leads shall be placed every 75 feet.

J. Cleaning

All manholes, sewer leads and cleanouts shall be kept thoroughly clean of silt, debris and foreign matter and shall be free from such accumulations at the time of final acceptance.

K. Sanitary Sewer Manhole Waterproofing

The Contractor shall apply a waterproofing system to the inside or outside of all manhole walls. The material to be used for this operation shall be as specified in these specifications.

The waterproofing system shall be applied and allowed to dry in accordance with the manufacturer's directions. All steps, lids, frames and castings and sewer pipe entering or leaving the manhole shall be protected during application to prevent their being coated.

1. Interior Waterproofing

If any leaks in the manhole walls are detected twenty-four (24) hours after application of the first coat of the waterproofing system, they shall be sealed by application of a quick-set sealer. This sealer shall be a mixture of Portland Cement - Type One and "Ipanex R", "Waterplug", “Preco” or equal. The quick-set sealer shall be applied in accordance with the manufacturer's directions. After the patched areas dry, they shall be covered with another coat of the waterproofing and allowed to dry. If any leaks are apparent after that time, the Contractor shall repatch them. The above steps shall be repeated until all leaks are sealed.

After all leaks are stopped and there are no leaks apparent after twenty four (24) hours upon application of the first coat of the waterproofing system or twelve (12) hours after application of a patch, the Contractor shall apply over the dry surface a finish coat.

2. Exterior Waterproofing

The Contractor may elect to provide an exterior rather than interior manhole waterproofing to the manhole sections before installation.

The exterior surfaces of all manholes shall be thoroughly covered with mastic at a rate of one (1) gallon per twenty-five (25) square feet. The exterior surfaces shall be thoroughly cleaned before application of the mastic. The mastic shall be as specified in these specifications.

Should the exterior waterproofing fail to provide an adequate seal then the Contractor shall seal the interior of the manhole as specified above.

L. Defective Manholes

Any manhole that is defective, due to manufacturer or realignment of the pipe openings, should be returned to the manufacturer.

M. Acceptance Tests

1. Sanitary sewer manholes shall be visually inspected for leaks prior to acceptance of the manhole. There shall be no visible leakage of groundwater into the manhole. Patching, if required, shall be accomplished via the methods indicated in 7.03K.

2. Sanitary sewer wyes and sewer leads shall be tested for leakage after completion of construction. The testing shall occur in conjunction with the overall main sewer testing. Should it be necessary to test sewer wyes and leads independently after the main sewer has been tested it shall be performed using air and following the procedure outlined in Section 6.03J of these specifications.

3. No air test will be performed when saddle connections are allowed for connection to an existing live sewer.

N. IPP Surveillance Manholes

IPP Surveillance Manholes shall be installed on all commercial services. IPP manholes shall be constructed as shown on standard details.

SECTION 8 FORCEMAINS

8.01 SCOPE OF WORK

The work covered by this section of the specifications consists in the furnishing of all plant, labor, materials, equipment and/or in performing all operations necessary for the installation of the forcemains, valves and fittings, complete, in accordance with these specifications and applicable drawings.

8.02 MATERIALS

A. Pipe Materials

1. Ductile Iron Pipe and Fittings shall be designed in accordance with the latest revision of ANSI specifications A 21.50 and A 21.51 and AWWA C151. The pipe shall be designed to withstand a minimum working pressure of 150 psi and a minimum hydrostatic test pressure of 300 psi. The pipe shall also be designed for a minimum laying depth of six feet.

   All ductile iron pipe and fittings shall be coated on the outside with a bituminous coating of either coal tar of asphalt base one mil thick at the point of manufacture in accordance with the specifications of the American Water Works Association. All ductile iron pipe shall be cement lined, standard thickness, in accordance with ANSI A 21.4. The spigot ends of all pipe lengths which have been cut in the field shall be ground to a smooth surface, tapered back about 1/8 inch at an angle of 300 with the pipe centerline, and painted with two coats of asphaltum metal protective paint.

   Ductile iron pipe shall conform to the dimensions set forth in the table below. Tolerances permitted in ANSI specifications listed above will apply. Pipe classes shown on the plans shall control.

Pipe Size Nominal Inside Diameter in Inches	Outside Diameter In Inches	Pipe Barrel Thickness in Inches	Thickness Class
4”	4.80	0.26	51
6”	6.90	0.25	50
8”	9.05	0.27	50
10”	11.10	0.29	50
12”	13.20	0.31	50
14”	15.30	0.36	51

Pipe Size Nominal Inside Diameter in Inches	Outside Diameter In Inches	Pipe Barrel Thickness in Inches	Thickness Class
16”	17.40	0.37	51
18”	19.50	0.41	52
20”	21.60	0.42	52

2. Polyvinyl chloride (PVC) pipe shall meet the requirements for Type 1, Grade 1 (PVC 1120) of ASTM Specification D-1784 and ASTM D-2241, Standard Specification for PVC pipe (SDR-PR). PVC pipe shall be a minimum rating of Class 200, SDR 21.

B. Pipe Joints

1. Flanged joints shall be made with flanges, bolts, nuts, washers and gaskets, conforming to ANSI Standard B 16.1, Class 125.

2. Mechanical joints for cast and ductile iron pipe shall conform to ANSI Standard A21.11 and AWWA C111 or to Federal Specifications WW-P-421.

3. Rubber gasket joints for cast and ductile iron pipe shall be of a bell and spigot type conforming to ANSI Standard A21.11. These joints shall be similar to "TYTON" as manufactured by the U.S. Pipe and Foundry Co., "SUPER BELL TITE" as manufactured by James B. Clow & Sons, Inc. or equal.

4. Rubber gasket joints for PVC pipe shall be of bell and spigot type meeting ASTM D3139 requirements. The pipe shall be jointed by the means of rubber ring, which shall be an integral and homogeneous part of the pipe barrel.

C. Valves and Appurtenances

1. Gate valves shall meet the requirements of AWWA C515 of the American Water Works Association. Valves shall be designed for not less than 150 psi working pressure and shall be tested for leakage and distortion under a hydraulic pressure of not less than 150 psi. Under such pressure, the valves shall show no leakage or distortion.

   All gate valves shall be ductile iron body, fully bronze mounted, bronze stem double disc gauge valves or resilient seated gate valves. Each valve shall have a clear waterway equivalent in area,

when open, to that of the connecting pipe. Valves shall be made to close when turned to the right or clockwise. All valves shall be operated by non-rising stems and shall have square wrench nuts, or hand-wheel operators with an opening arrow cast in the metal.

Valves shall be EJIW Flowmaster.

2. Plug valves shall be lubricated round port valves. Valves shall be 100% port area type with semi-steel body. Valve bodies shall be suitably marked to indicate whether the valve is open or closed.

   The seating surface of the rotating element shall be of material recommended by the manufacturer for sewage sludge service. Bearings at the top and bottom supporting the rotating element shall be permanently lubricated corrosion-resistant type, suitable for sewage plant service. Stem seals shall be O-ring type of the same material as the seating surface and designed so replacement can be accomplished without disassembly of the valve.

   All plug valves shall be designed to operate with a pressure of 150 psi on either side of the valve without leakage.

3. Check valves shall be designed for a minimum working pressure of 150 pounds per square inch or as indicated. Valves shall have a clear waterway equal to the full nominal diameter of the valve. Valves shall open to permit flow when inlet pressure is greater than the discharge pressure and shall close tightly to prevent return flow when discharge pressure exceeds inlet pressure. Distinctly cast on the body of each valve shall be the manufacturer's name or initials or trademark by which he can be readily identified and the size of the valve, working pressure and the direction of flow.

   Check valves larger than 2 inches shall be iron body, bronze mounted, shall have flanged ends and shall be the non-slam type. Flanges shall be the 125-pound type conforming to ANSI Standard B16.1. All check valves shall be supplied with an external lever and weight. Springs shall be applied to lever, if necessary, to create a non-slam condition.

4. Valve operators shall be provided for all sewage and sludge valves of a type as indicated on the plans. Valve operators shall be of sufficient size and strength to overcome expected maximum operating torque. Valve operators found to be inadequate strength will be replaced by the Contractor at no expense to the Owner or the Township.

   All valves 8 inches and larger are to have a crank, handwheel, chain wheel or square nut for buried service, totally enclosed,

weatherproof worm gear or traveling screw-type operators with indicators. For automatic (if required by the drawings) operation, cylinder, rotary or similar types of electric or pneumatic actuators may be used regardless of valve size. Various accessories shall be used, depending on the application, such as positioners, limit switches, solenoid valves, speed controls and failsafe assemblies.

5. Valve boxes shall be cast-iron, three piece, adjustable type with a 5-1/4 inch shaft. Covers shall be furnished with fingerholes and marked "SEWER". Valve boxes shall be similar to that as manufactured by the East Jordan Iron Works, Clow Corporation or equal.

6. Pipe supports, where required, shall be of the adjustable type made to support cast iron type pipe.

8.03 INSTALLATION OF PIPE AND FITTINGS FOR FORCEMAIN

All pipe and fittings shall be installed in strict accordance with the recommendations of the manufacturer. Piping and fittings for forcemains shall be of the types and materials hereinbefore specified. The pipe and accessories shall be new and unused.

The interior of the pipe and fittings shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operations by plugging the ends or other approved methods. When work is not in progress, open ends of pipe and fittings shall be securely closed so that no trench water, earth, animals or other substance will enter the pipes.

No pipe or fittings shall be laid in water or when the trench or weather conditions are unsuitable for work, except by permission of the Township Engineer.

The full length of each section of pipe shall rest solidly upon the pipe bed with recesses provided to accommodate the bells and joints. Deflections from a straight line or grade, as required by vertical curves, horizontal curves or offsets, shall not exceed one inch per lineal foot of pipe for pipe less than 10 inches in diameter between the centerlines extended of any two connecting pipes. If the alignment requires deflections in excess of these limitations, special bends or a sufficient number of shorter lengths of pipe shall be furnished to provide the angular deflection required.

When pipe is cut in the field, the outside of the cut end shall be tapered back about 1/8 inch at an angle of 30 with the centerline of pipe to remove any sharp, rough edges and painted with two coats of asphaltum metal protective paint.

Fittings at bends in the pipeline shall be firmly wedged against the undisturbed, vertical face of the trench to prevent the fittings from being blown off the lines

when under pressure. Concrete thrust blocks shall be installed at all deflections as shown on the drawings or as directed by the Township Engineer.

Where pipe ends are left for future connections, they shall be valved, plugged or capped as called for on the drawings. Where connections are made between new work and existing mains, the connections shall be made by using specials and fittings required to suit the actual conditions.

8.04 HYDROSTATIC TESTS FOR FORCEMAIN

The forcemain or sections thereof shall be tested by the Contractor in the presence of the Township Resident Project Representative and all leaks shall be made tight to meet the requirements below. The Contractor shall furnish all piping, bulkheads, pumps, gauges and other equipment required to carry out the testing.

The section of main to be tested shall be filled with water at least 24 hours prior to starting the test.

At the start of testing, the main shall be pumped up to a pressure of 150 psi and the test period shall start immediately thereafter. The line shall then be maintained under this test pressure for a continuous period of two hours by pumping water into the line at frequent intervals. The volume of water so added shall be measured and considered to represent the leakage from the line under test during the interval. In calculating leakage, the Township Engineer will make allowance for added joints in the line over the normal for unit lengths of pipe.

The leakage per hour under the conditions of test shall not exceed the values shown in the following table:

Size of Pipe	Maximum Leakage Gallons Per Hour Per 100 Joints
2”	0.34
3”	050
4”	0.67
6”	1.00
8”	1.35
10”	1.66
12”	2.00
14”	2.34
16”	2.65
18”	3.02
20”	3.32

In the event that the leakage exceeds the specified amount, the joints in the line shall be carefully inspected for leaks and repaired where necessary. Any pipes or special casting found to be cracked shall be removed and replaced by new pieces by the Contractor. After this work has been done, the test shall be repeated. Final acceptance of the lines will not be made until satisfactory tests have been passed.

8.05 MARKING PIPE

Each piece of cast iron pipe and each cast iron fitting shall have its weight and class designation conspicuously painted or cast on it. All other pipe materials shall have the class designation painted thereon. Where required, other designation marks shall be painted on the pipe or fittings to indicate correct location of the pipe section in conformity to a detailed layout plan.

8.06 PAINTING

All pipe, valves, bolts and any other portions of forcemain exposed inside manholes and other structures shall be painted per the table below. If necessary, heat shall be provided to maintain good drying conditions. All items to be painted shall be dry and clean before application of the paint. Any rust or scale shall be removed by wire brushing or scraping. All piping must be painted prior to operating the system.

1 Coat - "Kopper's Plug Primer" or
equal (350 S.F./Gal.)

2 Coats - "Kopper's Rustamor 500" or
equal (500 S.F./Gal.)

8.07 THRUST BLOCKS

Concrete thrust blocks shall be poured on hand excavated, undisturbed soil bearing surfaces, of a minimum size as shown on the Standard Details, or increased in size according to the actual bearing values of the soil in each location, or as directed by the Township Engineer.

Thrust blocks shall be made of 3,000 psi concrete, wet mix. Concrete thrust blocks shall be placed at all 22-1/2 degree bends or greater, dead ends, tees, reducers, hydrants, and crosses as required. Pre-cast thrust blocks may be utilized for certain applications if approved by the Township Engineer. Retainer glands shall be utilized on all mechanical joint fittings.

8.08 EXCAVATION, TRENCHING AND BACKFILLING

Excavation, trenching and backfilling shall conform to these specifications.

8.09 PIPE LOCATOR

A continuous, insulated 10-gauge wire shall be laid in the trench along with the plastic pipe. Contractor shall verify continuity of the locator wire prior to acceptance by the engineer. The 10 gauge wire shall be looped at 400’ intervals and installed within a tracer wire access box. This tracer wire box shall be made of cast iron with a permanently attached 3”x12” ABS tube with a flared end to secure it in the ground. It shall be tamper resistant, with a cast iron locking lid and stainless steel terminal connections on the bottom side to which the tracer wires are attached. Lid will open using a standard AWWA pentagon key. Tracer wire access box as distributed by USA Blue Book shall be utilized or equal.

Located at each tracer wire access box a flexible rebounding marking post must be installed. This marking post must be able to snap back to its normal position when hit. It must extend at least 3’ above ground for visibility and have a width of 4”. This flexible green rebounding marking post must have a permanent decal applied indicating “Warning Forcemain Pipeline”. This marker size and type must be approved by the Township Engineer.

A 2" wide metallic lined marking tape, which meets the latest APWA specifications, similar to Seton Detection Tape Type 2 SEW, is to be installed. The detection tape shall be buried for the full length of the forcemain at a depth prescribed by the manufacturer.

8.10 AIR RELEASE VALVES AND MANHOLES

Air release valves and manholes shall be constructed as detailed on the detail drawings.

8.11 FORCEMAIN CLEANOUTS

Forcemain cleanouts shall be constructed as shown on the detail drawings.

8.12 CERTIFICATION

The manufacturer of pipe and fittings shall furnish a certified statement that all pipe and fittings furnished by him have been inspected and tested in accordance with the applicable specifications. Pipe will be subject to inspection and approval upon delivery and no cracked, broken, damaged or defective pipe or fittings shall be laid in the work. Any piece that is found to be defective after it has been laid shall be removed by the Contractor and replaced by a sound and perfect piece at no additional cost to the Owner or Township.

SECTION 9 WATERMAINS AND APPURTENANCES

9.01 SCOPE OF WORK

The work covered by this section of the specifications consists of furnishing all plant, labor, materials, and equipment and in performing all operations for the installation of the watermains and appurtenances in strict accordance with these specifications and applicable contract drawings.

9.02 MATERIALS

A. Pipe Materials

1. PVC Pipe and Fittings: shall be designed in accordance with American Water Works Association (AWWA) Standards C900/C905 (latest edition). The pipe shall be pressure class 235 psi. Pipe shall be a minimum thickness of DR18. Joints shall be in accordance with ASTM D3139 (latest edition). PVC pipe must meet the requirements of NSF Standard 14 and NSF Standard 61 to be used for potable water systems.

   Fittings for PVC pipe shall be the same as for Ductile Iron Pipe.

2. Ductile Iron Pipe and Fittings shall be designed in accordance with American Water Works Association (AWWA) Standards C150 (latest edition) and C151/C153 (latest edition) also ANSI Standards A21.50 (latest edition) and A21.51 (latest edition). The pipe shall be designed to withstand a minimum working pressure of 200 psi and a minimum hydrostatic test pressure of 300 psi. The pipe shall also be designed for a laying depth of a minimum of six feet. All ductile iron pipe shall meet the requirements of NSF International (NSF) Standard 61.

   All ductile iron pipe and fittings shall be coated on the outside with an asphaltic coating of asphalt base one mil thick at the point of manufacture in accordance with the specifications of the AWWA Standard C151/C153 (latest edition) and ANSI Standard A21.51.02. Cement lining requirement shall conform to AWWA Standard C104 (latest edition) and ANSI Standard A21.4 (latest edition). The spigot ends of all pipe lengths which have been cut in the field shall be ground to a smooth surface, tapered back about 1/8 inch at an angle of 30° with the pipe centerline, and painted with two coats of asphaltum metal protective paint.

   Ductile iron pipe shall conform to the dimensions set forth in the table below (Design Engineer shall verify expected pressure range with Township Engineer during design phase).

Pipe Size Nominal Inside Diameter in Inches	Outside Diameter in Inches	Pipe Barrel Thickness in Inches	Thickness Class
6”	6.90	.31	52
8”	9.05	.33	52
10”	11.10	.35	52
12”	13.20	.37	52
16”	17.40	.40	52
20”	21.60	.42	52

3. High Density Polyethylene Pipe (HDPE) for river and wetland crossings or directional drilling shall be DR 11, Class 3408, and meet the following conditions:

Pipe Size Standard	Dimension Ratio (DR)	Working Pressure	Working Pressure + Surge Pressure
DIPS	11	200 psi	300 psi

All HDPE pipe shall be joined by heat fusion per manufacturer’s requirements. HDPE pipe must meet the requirements of NSF Standard 14 and NSF Standard 61 and AWWA C906 (latest edition). The exterior wall print line of all HDPE pipe proposed for installation and potable use must bear the NSF-PW identification. River crossing section shall be pressure tested independently of other watermain. See Section 9.07 of these specifications. This method and locations must be approved by the Township Engineer. Refer to standard details for the connection of ductile iron pipe to HDPE. This connection, a mechanical joint (gate or butterfly valve, and corporations on the ductile iron) shall be enclosed in a pre-cast concrete manhole. The size of the manhole will be determined by the Engineer and a standard EJIW 1040 shall be utilized for this structure and shown in the standard detail.

Refer to MDOT specification BJ-2D, Special Provisions for Directionally Bored Pipe.

HDPE pipe shall be inspected prior to installation by a qualified person or by the Township Engineer. If damage is found to be unacceptable according to the manufacturer, then suitable efforts

shall be made to repair the damaged pipe or the pipe shall be rejected from use.

The use of HDPE pipe shall be treated on a case-by-case basis and must be approved by the Township Engineer prior to permitting.

4. Fusible Polyvinylchloride (PVC) Pipe for directional drills shall conform to AWWA C900 or C905, ASTM D1784, and cell classification 12454. Pipe shall be in accordance with ASTM D2241 for IPS standard dimensions as indicated in these specifications. Compound formulation shall be in accordance with PPI TR-2/2006. Fusible PVC shall meet the same pressure class as specified in 9.02.A.1.

   Pipe shall be manufactured with 100% virgin resin.

   Fusible polyvinylchloride pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.

   Fusible polyvinylchloride pipe shall be manufactured in a standard 20', 30' or 40' nominal lengths.

   Fusible polyvinylchloride pipe shall be blue in color.

   Pipe shall be marked per AWWA C900 or AWWA C905, and shall include as a minimum:

   a. Nominal size

   b. Dimension Ratio, Standard Dimension Ratio or Schedule

   c. AWWA pressure class or rating

   d. AWWA Standard designation number

   e. All pipe shall be stamped to indicate compliance with NSF Standard pw.

   f. Extrusion production-record code

   g. Trademark or trade name

   h. Cell Classification 12454 and/or PVC material code 1120 may also be included.

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

The use of HDPE pipe shall be treated on a case-by-case basis and must be approved by the Township Engineer prior to permitting.

B. Joints for Watermain pipe shall conform to the following:

1. Flanged joints for ductile iron pipe shall be made with flanges, bolts, nuts, washers and gaskets conforming to AWWA Standard C110 (latest edition) and ANSI Standard A21.10 (latest edition).

2. Mechanical joints shall conform to AWWA Standards C110 (latest edition) and C111 (latest edition) along with ANSI Standards A21.10 (latest edition) and A21.11 (latest edition). Rubber gaskets shall conform to manufacturer's standards.

   a. Retainer glands shall be utilized on all mechanical joint fittings.

   b. Lead tip gaskets will not be allowed for providing metal to metal contact at joints.

3. Rubber gasket joints for ductile iron pipe shall be of a bell and spigot type which employs a single rubber gasket to effect the joint seal. These joints shall conform to AWWA Standard C111 (latest edition) and ANSI Standard A21.11 (latest edition). These joints shall be similar to "Tyton" as manufactured by U.S. Pipe and Foundry Co., "Bell-Tite" as manufactured by James B. Clow and Sons, Inc. or approved equal.

4. Bell joints shall be cast iron, mechanical, flexible joint tube designed to withstand a working pressure of 200 pounds and a hydrostatic test pressure of 300 pounds. Joints shall be similar to "Molox" as manufactured by the American Cast Iron Pipe Company, "Usiflex" as manufactured by U.S. Pipe and Foundry Co., "River Crossing Pipe" James B. Clow & Sons, Inc. or an approved equal.

5. Field-Loc gaskets/Fast-Grip or equal are accepted for the use of Tyton push on joints for fittings.

6. Ductile sleeves shall be dresser style only and have “cookie” piece inserted between two pipes if there is any separation between the two pipes.

7. PVC pipe specified in 9.02.A.1 may be used for directional drill pipe, with approval of engineer, using a Diamond Loc-21 or approved equal restraint joint.

C. Gate Valves

Gate valves shall meet the requirements of AWWA Standard C500 (latest edition) or C515 (latest edition). Valves shall be designed for not less than 150 psi working pressure and shall be tested for leakage and distortion under a hydraulic pressure of not less than 300 psi. Under such pressure, the valves shall show no leakage or distortion.

All gate valves shall be EJIW Flowmaster resilient wedge gate valves. The wedge casting shall be of a solid design and 100% encapsulated with nitrile rubber. Hollow wedges are not allowed and no epoxy coating is allowed in wedge. There shall be 3 stem seal o-rings; two in the seal plate which shall be replaceable with the valve in the full open position at rated working pressure, and one under the stem thrust collar. All gaskets shall be o-ring seals. O-rings set in a cartridge shall not be allowed. Each valve shall have a clear waterway equivalent in area, when open, to that of the connecting pipe. Valves shall be made to open left (counter-clockwise). All valves shall be connected to the pipeline by mechanical joints. All valves shall be operated by non-rising stems and shall have square wrench nuts.

All valves shall be furnished with a three piece adjustable valve box as specified herein unless the valve is housed in a manhole. Valves intended to be specifically used in fire line shall be designed and tested at minimum pressure of 200 psi.

The operating nut on all valves including hydrant valves will be located with five feet of the finished grade. If the valves operating nuts are greater than five feet below finished grade a fixed stationary rod shall be required in the valve box to allow the valve to be operated with a standard valve wrench.

D. Butterfly Valves

Butterfly valves, as called out on the plans, shall be so designed and fabricated that they will conform to AWWA Standard C504 (latest edition) for Class 150B valves. The rubber valve seat shall cover the entire interior surface of the valve body and the face of the body. The valve disc shall be streamlined, free of external ribs, keyed to the shaft, provided with suitable means for positioning and shall utilize wedge type closing against the rubber liner at a full close seating angle of 90° to the axis of the pipe.

Valves shall be as manufactured by Dresser Manufacturing Division, Keystone International, Inc. or an approved equal.

All Butterfly valves shall be installed in a manhole per the Standard Detail Sheet.

E. Valve Boxes

Valve boxes shall be cast iron, three-piece, adjustable type, with a 5-1/4 inch shaft. Covers shall be furnished with finger holes and marked "WATER". Valve boxes shall be similar to that as manufactured by the East Jordan Iron Works or an approved equal. Contractors shall be responsible for adjusting valve boxes to meet finish grades once finish grades are established.

F. Fire Hydrants

At the points indicated on the drawings, there shall be installed a hydrant assembly consisting of a hydrant, a six-inch gate valve, a cast iron valve box and all piping and fittings necessary for a complete job. Gate valves shall be as specified above. Valves shall be located three feet, plus or minus, from the hydrant as shown on typical hydrant setting on drawings.

1. Hydrant barrel inside dimension to be 8-inches I.D. from top to bottom.

2. Nozzles to be on a removable head so that they may be rotated by changing the position of the top flange without removing the barrel.

3. Hydrant to be fully bronze mounted including top of operating stem where it passes through the double "O" ring seal in the bronze packing gland. Operating stem in base and valve seat shall be made of bronze. No “V” type threads are allowed for the operating stem or nut.

4. The drain valve shall be plugged in all locations.

5. Hydrant nozzle shall be located 3’-0” to 3’-6” above breakaway flange.

Hydrants furnished for this work shall meet the requirements of AWWA Standard C502 (latest edition) and any revision thereof. They shall be East Jordan Iron Works Model 5BR250 Water Master. Hydrants shall be designed for installation with six feet of cover over the connection. The diameter of the valve port in the hydrant shall be at least five inches. The hydrant shall be equipped with two four (4) inch pumper connections. Threads shall conform to national standard threads. Hydrant stems shall be built to open left (counter clockwise).

Hydrants shall be of the "break flange" type. The hydrant shall be so designed that all working parts, including valve and drip mechanism, may be removed from the hydrant through the barrel without the necessity of excavation. The hydrant shall be designed for a working pressure of 150 psi. Operating nuts shall be pentagon 1½” size, as measured point to opposite flat.

G. Water Service Connections

Water service connections are the water line connections which extend from the watermain to the property line or easement line of water system customers. A water service connection shall consist of a corporation stop in the watermain, a small diameter water line to the property line, a curb stop at the property line and curb box and cover. The Contractor shall place the water service connections where directed by the Design Engineer. The service line piping and fittings shall be either 1" or 2" size as called out on the plans.

1. Service Line Pipe and Fittings

Pipe material shall be Type K Copper, annealed and soft temper ASTM B.88. Joints shall be flared or compression type. Must conform to AWWA Standard C800 (latest edition).

HDPE water service line may be used on the downstream side of the curb stop. HDPE service line must conform to AWWA C901-20, PE 4710, DR 9, and be copper equivalent size (CTS) per ASTM D2737.

All new service lines which are laid under a road, parking lot or driveway shall be covered in 2” Polystyrene Insulation a minimum of 24” in width centered over the top of the pipe and placed 12” above the top of pipe, and to run the full length of the service line where it is laying under the road, driveway or parking lot. New service lines which are to be installed under existing paved areas of road, parking lot driveway where a bore and jack method of installation is required is exempt from this requirement.

2. Corporation Stops

One-inch and two-inch corporation stops shall be Mueller series H-15000, Ford F600, McDonald 4701, Mueller P15008, Ford FB1000, Mcdonald 4701-22 or equal, for copper service pipe. Corporation stops shall be in the "open" position after the service connection is complete. Must conform to AWWA Standard C800 (latest edition).

3. Curb Stops

Curb stops shall be Mueller Oriseal curb valves series H-25204, Ford B22, McDonald 76100Q, Mueller P25209, Ford B44, McDonald 76100-22 or equal. Curb stops shall be of the quarter turn, positive shut-off type. Must conform to AWWA Standard C800 (latest edition). A solid copper disc, Mueller series H-15535, shall be installed on the outlet valve of any curb stop valves which will not be connected to a service line and active within 6 (six) months of the install. All curb stops to be set on concrete block or brick.

4. Curb Boxes

Curb boxes shall be adjustable in height to allow for variable grade elevations. Curb boxes shall be all cast iron construction and coated inside and out with tar base enamel. A cast iron lid shall be furnished with plug in center (with rod) and shall have "WATER" permanently stamped.

Curb boxes for one-inch services shall be furnished with a stationary operating rod inside the box and arch pattern base equal to Mueller series H-10334-02, Ford EA2, or McDonald 5602 w/R.

Curb boxes for one and a half inch and two-inch services shall be the arched pattern base with rod, equal to Mueller series H-10386. Must conform to AWWA Standard C800 (latest edition).

5. Tapping Saddles

Tapping saddles shall be required for all PVC or HDPE watermains and service connections to ductile iron watermain larger than 1”.

Materials shall be ASTM B62 Brass, with optional stainless steel double straps. Saddles shall be in accordance with AWWA C800 (latest edition).

Saddles shall be manufactured by Mueller BR2S or A.Y. McDonald.

All services larger than 2” shall be constructed in accordance with water main pipe and valve requirements, using a tapping valve and sleeve for connection to an existing main.

H. Tapping Sleeve and Valve

Where shown on the plans or where a tee and valve are to be installed on an existing main under pressure, a tapping sleeve and drilling machine shall be used. After installing the sleeve and prior to drilling, the sleeve shall be pressure tested at 150 psi for five minutes. The Township Resident Project Representative and the Township Water Department Operator shall be given 48 hours notice of all watermain live taps. Tapping

sleeve to be stainless steel (vega type). Tapping sleeve and valve shall be mechanical joint, class 250, as manufactured by East Jordan Iron Works, or an approved equal.

I. Watermain Stubs

At the end of a stub, the last three (3) pipe joints shall have Field-Loc gaskets/Fast-Grip gaskets or equal. No galvanized pipe materials shall be allowed. A corporation shall be placed for the use of flushing and sampling.

J. Tracer Wire Box

Tracer wire box shall have a cast iron cover conforming to ASTM-48 Class 25 or higher or a plastic lid with magnetic detection and a plastic standpipe made of acrylonitrile butadiene styrene (ABS) in accordance with ASTM D-1788.

9.03 INSTALLATION OF PIPE AND FITTINGS FOR WATERMAINS

All pipe and fittings shall be installed in strict accordance with the recommendations of the manufacturer and AWWA Standard C600, or AWWA C605 (latest edition). Piping and fittings for watermains shall be of the types and materials hereinbefore specified. The pipe and accessories shall be new and unused. Before installation, the pipe shall be inspected for defects and any section of pipe or fittings found to be defective, before or after laying, will be rejected and replaced with sound pipe without additional expense to the Owner.

All curb stop and boxes shall be placed a minimum of 5 feet from electrical, cable or other above ground boxes to allow the Township to locate curb stops. In no circumstances shall curb stop and boxes be placed in driveway areas.

All watermain shall be placed with a depth of bury, measured from the top of the pipe to final finished grade, with a minimum of six (6) feet of cover. Depth of cover greater than six (6) feet of cover may require additional easement width be granted to the Township and/or may require developer to assume some future restoration costs.

Watermain along private roads shall not be placed in the fore slope of ditches and shall be a minimum of 23 feet from the centerline of the road.

All watermain shall be laid with a 10 gauge tracer wire. Tracer wire shall be laid no more than six (6) inches above watermain. Tracer wire shall terminate in a tracer wire box. Tracer wire box shall be placed at each hydrant or approximately every four hundred (400) feet.

The interior of the pipe and fittings shall be thoroughly cleaned of foreign matter before being lowered into the trench with an approved method and shall be kept

clean during laying operations by plugging the ends or other approved methods. The plug shall be fitted with a means for venting. When work is not in progress, open ends of pipe and fittings shall be securely closed so that no trench water, earth, animals or other substance will enter the pipes. When practical, the plug shall remain in place until the trench is pumped completely dry. Care must be taken to prevent pipe floatation, if the trench fills with water. No pipe or fittings shall be laid in water or when the trench or weather conditions are unsuitable for work except by permission of the Township Engineer. Valves shall be installed in the closed position.

Ductile iron pipe and fittings used on ductile iron (except flanged pipe) shall be provided with three brass wedges at each joint, Fastite conductive (American Pipe) or equal, "Electro-bond" strips of "Cadweld" connectors or other means of providing metal-to-metal contact at the joint to allow an electric current to flow through the joint.

Trench widths shall meet all standards, such as OSHA and AWWA Standard C600 or AWWA C605 (latest edition). The full length of each section of pipe shall rest solidly upon the pipe bed with recesses provided to accommodate the bells and joints. Refer to AWWA Standard C600 or C605 (latest edition) for maximum allowable joint defection.

When pipe is cut in the field, the outside of the cut end shall be tapered back about ⅛ inch at an angle of 30° with the centerline of the pipe to remove any sharp, rough edges. Exposed edges shall be coated with two coats of asphaltum metal protective paint.

Fittings at bends in the pipe line shall be firmly wedged against the undisturbed vertical face of the trench to prevent the fittings from being blown off the lines when under pressure. Concrete thrust blocks shall be provided as shown in the standard details or directed by the Township Engineer.

Where pipe ends are left for future connections, they shall be valved, plugged, or capped as called for on the drawings. Where connections are made between new work and existing mains, the connections shall be made by using special pipes and fittings as required to suit the actual conditions.

All temporary and permanent watermain stubs shall be restrained with Field-Loc gaskets/Fast-Grip or equal for at least three (3) pipe joints prior to the stub end, including mechanical fittings. This will allow for a connection to the main without removing or reducing the existing water pressure. It is recommended that a gate valve be installed at the end of the stub.

9.04 SETTING HYDRANTS

Under each hydrant the ground shall be excavated to a depth of at least one (1) foot below the hydrant base and over an area approximately three (3) feet square. This excavation shall be filled up to the elevation of the hydrant base with

well compacted, clean, coarse gravel or crushed stone. Refer to the standard details.

The length of a hydrant lead shall not exceed one half (½) of the Road right of way width or twenty (20) feet if watermain is located within a private easement. Each hydrant shall be set truly plumb and held firmly braced in this position. The connection of the hydrant to the branch shall be made by mechanical joint as herein specified under jointing. After the joining has been made, a concrete thrust block shall be poured on the side opposite the branch connection, from the hydrant to the solid undisturbed earth of the excavation wall.

When the concrete has become sufficiently hard, an additional one foot depth of gravel shall be spread and tamped around the hydrant. When this has been done, the remaining backfill shall be placed and compacted, taking care at all times to avoid jarring the hydrant.

Wherever it is necessary to adjust the length of the barrel to meet variations in elevation of the ground surface over the watermain and at the hydrant location, suitable extensions shall be provided for the hydrant barrel and operating stem. In all cases, the break flange shall be located at grade.

Contractor shall remove all water from fire hydrants. Water left remaining in each fire hydrant assembly will be removed by pumping prior to acceptance by the Township. Thawing and/or repair of frozen hydrants shall be performed by the Contractor at no additional expenses to the Owner.

In addition to pumping any new hydrant prior to Township acceptance the Contractor shall winterize any new hydrant installed or existing hydrant used during construction, if work done between October 1 and March 31.

9.05 CONNECTING TO EXISTING WATERMAINS

Where connections are made between new work and existing watermains, the connections shall be made by using special pipes and fittings as required to suit the actual conditions. No connections to existing mains shall be made until the new main has been pressure tested and chlorinated and is ready to be placed into service. When making the connection, swab pipe and fittings with four percent chlorine solution. The Township Engineer shall witness all connections and shall be notified 48 hours prior to the connection of new pipe to existing pipe. Bacteriological samples shall be taken after connection to existing is completed

to provide a record for determining the procedures effectiveness per AWWA Standard C651 (latest edition). Conform to AWWA Standards C600 (latest edition) and C651 (latest edition).

9.06 DIRECTIONALLY DRILLED WATERMAIN

A. Description

This work shall consist of using the directional drilling method of placing pipe underground to serve as carrier pipe where specifically approved by the Township. Refer to Michigan Department of Environmental, Great Lakes, and Energy Water Division Procedure and Policy DWRP-03-009.

B. Depth of Bore

The minimum depth of drill using this method shall be six feet (6') of cover below existing grade, and a minimum depth of three feet (3') under any existing stream.

C. Materials

Plastic Pipe: Section 9.02 A.3. High Density Polyethylene Pipe or Section 9.02.A.4 Fusible Polyvinylchloride (PVC).

D. Construction Method

This method consists of auguring or jacking a steerable rod under the wetland; then pulling back a cone that expands the soil or a wing cutter, which cuts a hole big enough to obtain the desired diameter. The diameter of the reamer or wing cutter is not to exceed the diameter of the pipe being placed plus two inches (2").

A drilling fluid of water and bentonite may be used in all operations of a directional drill. The use of a polymer for lubrication in the drilling fluid is acceptable.

Connection to HDPE Pipe shall not be made immediately after the pipe has been installed. It is recommended to wait overnight so that the pipe can approach an equilibrium temperature with its surrounding environments. Linear dimensions will vary with temperature changes. A tracer wire adequate for future location of the pipe shall be installed with all HDPE projects.

9.07 ACCEPTANCE TESTING WATERMAIN

A. General

Prior to connecting the new watermain to an existing watermain, the new main shall be flushed, chlorinated, and pressure tested as outlined herein.

The Township Engineer shall be notified 48 hours prior to the start of a pressure test. All acceptance testing shall be witnessed by the Township Engineer or Township Resident Project Representative.

A physical gap of at least three (3) feet must be left between the existing and new watermain until all testing results are satisfactory. The testing sequence shall be: 1) flushing, 2) pressure test, and 3) chlorination.

Water for testing may be taken from a nearby hydrant or tee connection by using fittings to accommodate a standard fire hose connection. A reduced pressure principle backflow prevention assembly must be used on the 2-1/2 inch connection to the main being tested.

B. Flushing of Mains

The watermain shall be flushed clean of sand and debris. Flushing shall be done using the "poly-pig" method of flushing. The Contractor shall furnish the brand new, unused, foam "poly-pig" swabs to be used.

Contractor shall insert "poly-pig" swab in the end of the new main nearest the existing watermain (or where shown on the plans). The swab shall be passed through the new main using water pressure. The swab shall be recovered at the end of the main through the blow-off assembly.

C. Hydrostatic Testing

The watermain or sections thereof shall be tested by the Contractor in the presence of the Township Engineer and all leaks shall be made tight to meet the requirements below. The Contractor shall furnish all piping, bulkheads, pumps, gauges and other equipment required to carry out the test and shall obtain Township Engineer's approval of same prior to testing.

The section of main to be tested shall be slowly filled with water at least 24 hours prior to starting the test. Expel air through corporation stops installed at high points in line. All service curb stops shall be left exposed so they can be checked for leaks. Only after the curb stops have been check and any leaks made tight, the Contractor may backfill curb stops

and proceed with hydrostatic testing. The Contractor shall make arrangements with the operation/maintenance personnel for obtaining water for testing.

All water used shall be metered and quantities reported to the operation/maintenance personnel.

At the start of testing, the main shall be pumped up to a pressure of 150 psi and the test period shall start immediately thereafter. Test pressure shall not be less than 1.25 times the working pressure at the highest point along the test section. The line shall then be maintained under this test pressure for a continuous period of two hours by pumping water into the line at frequent intervals. The test pressure shall not vary by more than +5

psi for the duration of the test. The volume of water so added shall be measured and considered to represent the leakage from the line under test during the intervals. All water service leads shall be tested with the mainline pipe. Conform to AWWA standard C600 or C605 (latest edition).

Testing allowance. No pipe installation will be accepted if the amount of makeup water is greater than that determined by the following formula:

In inch-pound units,

Where:

$$Q = \frac{LDP^{0.5}}{148{,}000}$$

Q=Testing allowance (makeup water), in gallons per hour L=Length of pipe tested, in feet

D=Nominal diameter of the pipe, in inches

P=average test pressure during the hydrostatic test, in pounds per square inch (gauge)

Hydrostatic testing allowance per 1,000 ft of pipeline-gph Test Pressure 150 psi

Nominal Pipe diameter	Maximum Leakage Gallons Per Hour Per 1,000 Feet of Pipeline
6”	0.50
8”	0.66
10”	0.83
12”	0.99
14”	1.16
16”	1.32
18”	1.49
20”	1.66
24”	1.99

In the event that the leakage exceeds the specified amount, the joints in the line shall be carefully inspected for leaks and repaired where necessary. Any pipes or special casting found to be cracked shall be removed and replaced with new pieces by the Contractor. No repair clamps or bell clamps can be utilized for repairs on new construction.

After this work has been done, the tests shall be repeated. Final acceptance of the lines will not be made until satisfactory tests have been passed.

Water service leads installed with mainline pipe will be included in the watermain pressure test. Installed water service leads shall have a riser (extension of water service) placed at the downstream side of the curb box. For flushing, testing, and sampling, once all tests are completed, this riser must be removed or buried 6' below grade.

Not more than 2,500 LF of watermain shall be tested at one time. If the pipeline under test contains sections of various diameters, the testing allowance will be the sum of the testing allowance for each size.

Where there is a considerable elevation difference in the section of watermain being tested, the test pressure shall average 150 psi over the length of main, but shall be not less than 140 psi at the highest elevation.

All main line valves and hydrant lead valves within the test section shall remain open during the pressure test.

After completion of the two hour pressure test, each valve shall be checked against test pressure.

D. Disinfecting Watermains

After completion of pressure testing and flushing of the watermain, the disinfection of the watermain shall be carried out in accordance with AWWA Standard C651 (latest edition). All materials shall be compliant with NSF.

The method of chlorination chosen for disinfection shall be one of the four methods specified under Section 4.4 of AWWA Standard C651 (latest edition). This procedure is as follows:

1. After disinfecting, flush the system until the chlorine residual equals the source water and then allow the water to remain static for 24 hours before drawing the first sample. Submit the first sample which will then be tested using the Colilert procedure.

2. There are two sampling options: (1) Option A – Samples are taken 16 hours apart and (2) Option B – Samples are taken 15 minutes apart after a 16 hour rest period.

   Note: If the system is re-chlorinated or re-pigged the sampling procedure shall be started over as listed above in paragraphs a & b. When no growth occurs, approval will be given to activate the system.

3. The Contractor shall discuss his proposed disinfection procedure with the Township Engineer and have it approved prior to beginning the process.

4. The Contractor shall supply the chlorine, all necessary equipment and labor necessary for its application. The Contractor shall make suitable arrangements with the Township Engineer for bacteriological analysis and shall be responsible for all cost incurred from bacteriological testing. Bacteriological analysis shall conform to the requirements of the Michigan Safe Drinking Water Act and be performed by a State approved drinking water testing laboratory.

5. One sample shall be taken of the source water prior to connecting the new water main to the existing system.

6. Dechlorination: Contractor shall comply with AWWA C655 on proper dechlorination and disposal of heavily chlorinated water.

9.08 TRANSFER OF WATER SERVICES

Where water services are to be transferred from an existing watermain to a new watermain, as shown on the plans, Contractor shall provide corporation stop and necessary pipe and fittings. Work shall be scheduled in such manners that transfer of service to any residence or water customer will result in the least possible interruption of water supply service. All services are 1 inch unless otherwise shown on the plans.

9.09 TRANSFER OF EXISTING HYDRANTS

Where indicated, existing hydrants are to be transferred from an existing main to a new main, as shown on the plans. Contractor shall excavate and reset the hydrant, as shown on Hydrant Assembly Detail, provide new 6-inch hydrant gate valve, 6-inch hydrant lead to new main and all fittings required for a complete installation.

9.10 HANDLING PIPE

All pipes and special castings shall be unloaded and distributed along the line of work in such a manner and with such care as will effectively avoid the cracking of any pipe or casting. Dropping directly from the truck will not be permitted. Care must also be exercised on the inside of the pipe. Wherever the outside coating may be found to have rubbed off, the part shall be thoroughly cleaned by brushing and shall then be recoated with an approved asphaltic paint or as may be required by the nature of the pipe coating. The Contractor shall keep on hand a supply of paint for such purposes.

9.11 MARKING PIPE

Each cast iron fitting shall have its weight and class designation conspicuously painted or cast on it. All other pipe materials shall have the class designation painted thereon. Where required, other designation marks shall be painted on the pipe or fittings to indicate correct location in the pipe section in conformity to a detailed layout plan.

All PVC pipe shall be marked as required by AWWA C900 (latest edition) and shall be stamped to indicate compliance with NSF Standard pw.

9.12 PIPE TAPS

Pipe lines shall be tapped for corporation cocks where shown or required for testing of completed watermains. For ductile iron or steel pipe, cocks shall be threaded directly into the pipe.

9.13 BLOWOFF

All dead-end mains shall terminate with a valve and hydrant as shown on the standard detail plan. The valve shall be restrained back to the main a minimum of three joints with mega-lug or equivalent method.

9.14 THRUST BLOCKS

Concrete thrust blocks shall be poured on hand-excavated, undisturbed soil bearing surfaces of a minimum size as shown on the standard details or increased in size according to the actual bearing values of the soil in each location, in accordance with the instructions of the Design Engineer.

Thrust blocks shall be made of 3,000 psi concrete, wet mix. Concrete thrust blocks shall be placed at all 22-½ ° bends or greater, deadends, tees, reducers, hydrants and crosses, as required. Pre-cast thrust blocks may be utilized for certain applications, if approved by the Township Engineer. Retainer glands and/or mega lugs shall be utilized on all mechanical joint fittings.

9.15 PAINTING

All pipe, valves, bolts and any other portions of watermain exposed inside manholes and other structures shall be painted. If necessary, heat shall be provided to maintain good drying conditions. All items to be painted shall be dry and clean before application of the paint. Any rust or scale shall be removed by wire brushing or scraping.

9.16 FIRE HYDRANT SIGNS

The sign and its post shall be installed directly behind the hydrant. The sign shall be parallel to the street, and within the road right-of-way or easement. There shall be 2’ (two feet) distance from the center of the top nut of the hydrant to the front face of the sign. The finish elevation of the sign shall not be less than 5’

(five feet) to the top of the sign from grade at the base of the post and no more than 6’ (six feet) to the top of the sign from grade at the base of the post. The post shall extend into the ground a minimum of 2’ (two feet) below grade at the base of the post. Signs shall be constructed according to the Blair Township Fire Department Standards for Fire Hydrants. Signs and posts are available to be picked up at the Township Water Department for a nominal fee.

9.17 WATERMAIN VALVES

Contractor shall place a 4” wide fiberglass blue marking post at each main line valve. Marking posts shall be Rhino Fibercurve or approved equal. Valve marking post are available to be picked up at the Township Water Department for a nominal fee.

9.18 SHOP DRAWINGS

The Contractor shall furnish, as prescribed under Section "General Requirements" dimension and erection drawings and details of the watermain, valves, and other appurtenances furnished under this section. Complete details of all pipe deflections and ties to adjoining pipe shall be submitted to the Township Engineer for approval.

9.19 CERTIFICATION

The manufacturer of pipe and fittings shall furnish a certified statement that all pipe and fittings furnished by him have been inspected and tested in accordance with the applicable specifications. Pipe will be subject to inspection and approval upon delivery and no cracked, broken, damaged or defective pipe or fittings shall be laid in the work. Any piece that is found to be defective after it has been laid shall be removed by the Contractor and replaced by a sound and perfect piece.

SECTION 10 WATER WELL SUPPLY

10.01 SCOPE OF WORK

The work covered by this section of the specifications consists in furnishing all labor, equipment and material necessary to perform the installation of a Type I water supply well per these specifications, and most current Michigan Safe Drinking Water Act, 1976 PA 399, as amended, and the Administrative Rules promulgated thereunder (SDWA) and the Michigan Water Well Construction and Pump Installation Code, Part 127, of 1978 PA 368, as amended, and the Administrative Rules promulgated thereunder (Well Construction Code).

10.02 CONSTRUCTION OF NEW WELL

A. Construct new well(s) capable of producing gallons per minute at above ground discharge head of feet. The well(s) shall be constructed where shown on the plans. This shall be well number(s) . The well construction shall strictly adhere to the requirements of the Michigan Department of Environmental Quality for public water systems and shall be performed by a state certified well driller.

The well pump assembly proposed by the well driller to be installed shall first be approved by the Design Engineer (with concurrence of the Township Engineer). Contractor shall submit performance curves and other related technical information per specifications Section 1.10.

B. Well Casing

The well casing(s) shall consist of steel with a minimum inside diameter of inches and shall meet the requirements set forth in the most current Safe Drinking Water Act (P.A. 399) and the Well Construction Code. Pipe shall meet the standard thickness requirements according to the Great Lakes Upper Mississippi River Board of State Public Health and Environmental Managers Recommended Standards for Water Works as amended (Ten States Standards). The casing must meet the requirements of NSF International (NSF) Standard 61 and shall be new and watertight throughout its length and shall have welded or threaded joints in accordance with all applicable codes and standards.

C. Pitless Adapter

The pitless adapter(s) shall be new, shop fabricated from the point of connection with the well casing to the unit cap or cover, constructed of materials and weight equivalent and compatible with the casing, be of watertight construction, frost proof, threaded or welded to the casing and utilize a contamination-proof entrance connection for electrical supply and conform to SDWA and the Well Construction Code. For well casings up to and including 12-inches in diameter, the pitless adapter shall possess an

inside diameter equal to the inside diameter of the well casing. The pitless adapter shall be as manufactured by Baker, or approved equal.

D. Well construction shall be performed in accordance with the Michigan Water Well Construction and Pump Installation code utilizing rotary boring or other approved method. The required open annular space outside of the outer casing shall be completely sealed with a neat cement grout or by an equivalent method.

E. Grouting shall be neat cement weighing at least 15 pounds per gallon and shall be placed under pressure starting at the bottom of the casing. Grouting shall conform to the Department of Environmental Quality (DEQ) Water Division's (WD) Policy and Procedure DWRP-03-016, "Grouting of Community Water Supply Wells" and the Well Construction Code. Grouting shall be a continuous operation stopping only after the grout material flows from the ground at the top of the casing.

F. Well Screen: The well screen shall be new, stainless steel as manufactured by Johnson Screen or approved equal. The slot size and configuration shall be determined by a recognized well screen manufacturer from soil samples extracted during the well drilling operation. The screen manufacturer shall submit his recommendations to the Design Engineer for approval.

G. Disinfection: After the well has been completely constructed, it shall be thoroughly cleaned of all foreign substances, including tools, timbers, rope, debris of any kind, cement, oil, grease, joint dope and scum. The casing pipe shall be thoroughly swabbed using alkalis, if necessary, to remove oil, grease or joint dope. The well shall then be disinfected with a chlorine solution, and conform to the American Water Works Association (AWWA) Standard C645-97 and the Well Construction Code.

The chlorine solution used for disinfecting the well shall be of such volume and strength and shall be so applied that a concentration of at least 50 ppm of chlorine shall be obtained in all parts of the well. Chlorine solution shall be prepared and applied in accordance with the directions of, and to the satisfaction of the Township Engineer, but for at least two (2) hours.

In the event that the test pump is installed after the well has been disinfected, all exterior parts of the test pump coming in contact with the water shall be disinfected with chlorine solution.

After the contact period, the well shall be flushed until the chlorine residual is eliminated. Chlorinated water shall be disposed of in a manner that will

not damage vegetation, wildlife, or aquatic life. Under no circumstances shall chlorinated water be discharged into a natural waterway.

After flushing of the chlorine from the well is complete, the well shall be allowed to stand for 24 hours. Samples will then be drawn from the well sample tap for bacteriological analysis. The well shall be allowed to stand for an additional 24 hours at which time a second sample shall be analyzed. Bacteriological analysis shall be performed by a state approved drinking water testing laboratory. Two consecutive negative (clean) samples are required for acceptance.

H. Samples and Records: The Contractor shall keep an accurate record of the location of the top and bottom of each stratum penetrated. An accurate copy of the "Driller's Log" shall be submitted to the Township Engineer.

10.03 WELL TEST PUMPING FOR NEW WELL

A. Well Development: The test well shall be thoroughly developed to remove all appreciable amounts of loose material from the formation. Development shall be done by the use of a close fitting surge block mounted on a drilling tool or pipe heavy enough to cause the surge block to sink rapidly. This assembly shall be operated in an up-and-down drilling motion by means of the well drilling machine at the rate of 30 to 40 strokes per minute. The material pulled into the well shall be bailed out periodically. The development operation shall continue until only a negligible amount of sand is pulled into the well.

The Contractor shall establish, by trial, the maximum pumping rate possible at or below the required maximum value, which can be maintained throughout test period without breaking suction.

B. Test Pumping: Each proposed production well shall be test pumped separately for a period as outlined in 10.03C of these specifications. Test pumping shall conform to the DEQ WD's Policy and Procedure DWRP-03- 003, Rev. #1 – 06/2002, "Aquifer Test Requirements for Public Water Supply Wells." The test pump measurements shall be taken and recorded per 10.03G of these specifications. The test pump shall be capable of producing at least the maximum gallon-per-minute rate specified. The pump test must start at a full condition of rest in the system; to achieve this it is advisable not to pump for one day prior to the test. The withdrawal rate should be held constant throughout the test.

C. Duration of Pump Test: The duration of the pump test shall be twenty-four hours at a continuous and unvarying rate of flow unless otherwise specified. The pump test shall be monitored by the

Contractor with reports filed with the Design Engineer and Township Engineer.

D. Water Disposal: If the production formation has 10 feet of clay cover, there is no concern regarding water entering the well. If less than 10 feet, the waste water should be carried to the nearest body of open water, or to a distance of 350 feet from the well making use of any slope which will carry the water further from the well or its observation points. In all cases, water shall be disposed of in a manner so as to guard against damage to property.

E. Determination of Flow: The rate of flow during the test shall be measured by the use of a circular orifice weir. A glass tube will be used to determine the head in the discharge pipe.

Other methods for measuring the rate of flow can be used only on approval of the Township Engineer.

F. Procedure in Determining the Water Level in the Well: A water sensing electrode-type of water level indicator shall be used for this purpose.

G. Test Pump Measurement Intervals: During the pump test referenced in 10.03B and 10.03C of these specifications, simultaneous readings ofthe pump rate and drawdown measurements in the observation wells and production well, to the nearest 0.01 feet, shall be made and recorded at the following intervals:

ELAPSED TIME	FREQUENCY OF MEASUREMENT
0 to 10 minutes	1 per minute
10 to 20 minutes	Every 2 minutes
20 to 60 minutes	Every 5 minutes
60 to 180 minutes	Every 15 minutes
180 to 360 minutes	Every 30 minutes
360 to completion	Every 60 minutes

(Elapsed time shall be from the beginning of the test pumping)

During the recovery period, which shall be 1/3 as long as the pumping test period, water level reading shall be taken in each observation well and the production well according to the schedule above.

H. Remarks:

1. If there is a nearby lake or stream, hourly readings of its level should be made throughout the test.

2. Breakdowns – Water Table Conditions: If a breakdown occurs during the first hour of pumping, rest one hour before starting again. Continue to take water levels during down period. Breakdown during second hour: 5 minutes may be tolerated – third hour: 10 minutes – fourth hour: 15 minutes. Add 5 minutes for each hour of pumpage thereafter for a maximum of 30 minutes. For more than 30 minutes, start over.

3. Breakdowns – Artesian Conditions: Not over 5 minutes permissible during first 3 hours, nor more than 10 minutes for remainder of test.

I. Observation Well: At least two (2) observation wells are required per

P.A.399 requirements. A production well may be used as one of the observation wells during the pump testing of another well as approved by the Township Engineer. Sections 10.03F and 10.03G shall apply to the observation wells.

J. Water Samples: A one (1) gallon water sample shall be collected at six (6) hour intervals during the end of the pumping test (well efficiency test). These samples must be analyzed for organic and inorganic chemicals, including Phase II/V compounds (nitrates, nitrites, certain metals, organic chemicals, and radiochemicals), per MDEQ WD's requirements. The Contractor shall have a complete chemical analysis run on the last sample taken by a laboratory acceptable to both the Township Engineer and the Contractor. The remainder of the samples shall be retained by the Contractor for safekeeping.

10.04 NEW PUMP FOR EXISTING WELL

A. The pump in the existing__inch well shall be removed and a new well pump shall be installed. The new well pump shall be capable of producing

_____gallons per minute at above ground discharge head of_____feet. Depth of pump setting shall be at least_____feet as shown on the attached drawing.

B. Well driller shall submit data, performance curves, etc. on pump assembly he intends to install to the Design Engineer prior to proceeding.

The Design Engineer shall issue a set of this information to the Township Engineer for his review and approval.

C. Turbine pumps shall be utilized for wells with proposed production rates greater than 1,000 GPM. No submersible turbine pumps will be allowed for this condition.

10.05 TURNOVER PACKAGE FOR WELLS

Upon completion of production well test pumping, the Contractor shall submit to the Design Engineer the following items:

A. Water Well and Pump Record (Driller's Log) for each well.

B. Copies of shop drawings, including pump characteristic curves, for the production pump installed in each well.

C. Copies of the measurements recorded, to the nearest 0.01 feet, taken during the test pumping and recovery of each well (in tabular form).

D. Copies of the complete chemical analysis for each water sample tested.

E. Within thirty (30) days of receiving the Contractor's information, the Design Engineer shall submit to the Township Engineer for review the following information in a bound format:

1. Well Logs for the production well(s).

2. A drawdown vs. time plot of the test pumping data for each production well on semi-log paper including recovery.

3. A summary of aquifer analysis results based on the information from each observation well obtained during the pump test for each production well. This summary shall include computations for coefficient of storage along with the average of these for each production well.

4. A plot of the system head curve and pump curve for each production well.

5. A location map showing each production well and the well cross section based on the well driller's log.

6. Water quality analysis results from the requirements of Section 10.03J of these specifications.

7. An overall water system map for the piping system utilizing the production wells.

SECTION 11 WELL HOUSE EQUIPMENT

11.01 SCOPE OF WORK

The work covered by this section of the specifications consists of furnishing all plant, labor, materials and appliances and performing all operations for the installation of piping and equipment as shown on the drawings and hereinafter specified.

11.02 PIPING AND FITTINGS

This work consists of furnishing all plant, labor, equipment and materials in performing all operations necessary to install the piping within the well house building or room as shown on the plans. All work to be performed as shown on the drawings and specified.

A. National Electrical Code: All electrical work.

B. American Society for Testing Materials: A-72 Welded Wrought Iron Pipe.

A-120 Black and Hot-dipped Zinc-coated (Galvanized) Welded and Seamless Steel Pipe for Ordinary Uses.

C. Materials

The following items of materials installed within the well house or room shall be furnished by the Contractor and shall conform to the various requirements as hereinafter specified.

1. Ductile Iron Pipe: Conform to the requirements of ANSI/AWWA C150/A21.50 and ANSI/AWWA C151/A21.51, Class 150. Inside surfaces of pipe to be cement mortar lined per the requirements of ANSI/AWWA C104/A21.4. No exterior coating.

2. Ductile Iron Fittings: Standard fittings shall conform to the requirements of ANSI/AWWA C110/A21.10, Class 150. Compact or short body fittings shall conform to the requirements of ANSI/AWWA C153/A21.53, Class 150. All fittings to be cement mortar lined per ANSI/AWWA C104/A21.4. No exterior coatings.

3. Galvanized Steel Pipe: Conform to ASTM A538.

4. Gate Valves: Conform to AWWA C515, Class 150. All valves shall open right, or clockwise. All valves shall be equipped with hand wheel operators.

5. Butterfly Valves: Shall be so designed and fabricated that they will conform to AWWA Standard C504-00 for Class 150B valves. The rubber valve seat shall cover the entire interior surface of the valve body and the face of the body. The valve disc shall be streamlined, free of external ribs, keyed to the shaft, provided with suitable means for positioning and shall utilize wedge type closing against the rubber liner at a full close seating angle of 90° to the axis of the pipe. Valves shall be manufactured by Dresser Manufacturing Division Keystone International, Inc. or an approved equal.

6. Wafer Check Valves

   a. Valves 3" and larger shall have a cast iron body with a minimum non-shock W.O.G. working pressure of 150 psi. Seats shall be Buna-N mounted on the disc and shall provide leak-proof closing. The disc shall consist of one bronze disc which is springloaded to prevent slam, pivoting at a stainless steel hinge pin. The spring shall be 316 S.S.

   b. Valves shall be wafer type for mounting between ANSI 125 pound standard drill flat faced flanges unless otherwise specified or shown on the drawings.

7. Wall Castings and Sleeves shall be installed in all concrete work where pipes, wires, or other equipment pass through. Wall castings for 4-inch diameter or larger pipe shall be of cast iron having an anchor flange located in the center of the concrete wall or floor. Castings and sleeves shall be similar to those as manufactured by the East Jordan Iron Works or approved equal. Joint between pipe and sleeves shall be sealed with "Link-Seal" fittings or approved equal.

D. Installation of Piping Valves and Fittings

1. Cement Lined Ductile Iron Class 52 or Cast Iron Valves and Fittings shall be used for all piping 4-inch diameter and larger. Flanged piping, valves and fittings shall be used for all interior exposed piping unless otherwise approved by the Township Engineer. Pipe, valves and fittings shall be carefully laid to line and grade. Care shall be taken to keep the pipe clean and free from dirt and other foreign materials. “Victaulic” fittings shall be considered as an acceptable equivalent, subject to the approval of the Engineer.

   Piping laid in the ground shall have bearing over its entire length. Piping along floors, walls, or ceiling shall be adequately supported by saddles, posts, wall brackets, pipe hangers, or other approved devices. The exact location, number and design thereof shall be

subject to the approval of the Design Engineer. "Uni-Flange" type fittings shall be rodded.

2. Galvanized Steel Pipe shall be used for all interior piping less than 4 inches in diameter or as approved by the Township Engineer.

E. Pipe Taps

Wherever indicated or required, pipe or fittings shall be tapped to receive a small pipe or special fittings.

F. Disinfection

All piping and equipment shall be disinfected in accordance with AWWA C651, and Section 9.07 of these specifications.

11.03 PRESSURE TANKS

A. General

The Contractor shall furnish and install pressure tanks as shown on the plans and as hereinafter specified.

B. Pressurized Bladder Vessels

The Pressurized Bladder Vessels shall have a fiberglass-wound and epoxy resin sealed outer tank, one-piece high density polyethylene inner cell, heavy mil ethyl-vinyl-acetate (EVA) air cell, reinforced polypropylene upper and lower flanges, reinforced polypropylene base, stainless steel service steel, brass body, Schrader core assembly air valve, and high density polyethylene weather cap. The air cell shall be capable of being removed and replaced while the tank is installed.

C. Hydro-Pneumatic Tank

The hydro-pneumatic tank shall be designed and constructed in accordance with "A.S.M.E. Code for Unfired Pressure Vessels" for 150 psi working pressure. The tank shall be enclosed within the well house or as approved by the Township Engineer.

The tank shall be equipped with a water level sight gauge mounted on the end of the tank as shown on the plans.

The tank shall also be equipped with a pressure gauge, air pressure relief valve and air volume control mechanism and all tank couplings required to install these items.

The tank shall be coated on the inside with enamel application as appropriate for potable water systems. Outside of tank shall be coated with factory primer prior to delivery.

D. Air Volume Control

The air volume control mechanism for the pressure tank shall utilize an air compressor, mounted within the well house, liquid level probe and pressure switches for operation. This unit shall operate automatically and independently from the pumps and shall maintain a constant air charge in the tank. See Section 11.06 for coordination with pump operating sequence.

11.04 FLOW METER

A. Flow meter shall be a electromagnet flow meter (Mag-Meter) where Primary unit to be a minimum ANSI 150 carbon steel flange sized to match pipe diameter. Mag-Meter shall be supplied with two properly sized Hastalloy-C grounding rings.

1. Liner material shall be manufactured of Tefzel and to be compatible with Sodium Hypo Chlorite.

2. Electrodes shall be manufactured of Titanium and to be compatible with Sodium Hypo Chlorite.

3. Classification shall be non-hazardous NEMA 4X.

4. Primary shall be rated for temporary submergence for a minimum of 30 minutes if installed above grade, and total submergence if installed below grade.

5. Grounding rings shall be used on all applications and connected electrically to the Mag-Meter per manufactures specifications.

B. Flow meter converter shall be a remotely mounted unit with the following specifications.

1. Converter shall be type rated NEMA 4X die-cast Aluminum enclosure.

2. Converter shall be UL or FM listed

3. Converter shall operate on 120Volts AC 1Ø power.

4. Converter shall supply a minimum of 2 dry contact outputs rated at a minimum of 3 VA. One for scaleable pulsed flow output, one for reverse flow.

5. Converter shall supply one 4-20 ma signal output, scalable to current flow rate.

6. Meter shall have a scalable display where current flow and total flow can be displayed simultaneously.

7. Total flow display must be scalable so as to read in kgl while current flow can be read in gpm.

8. Meters under 12 inches in diameter shall have an accuracy of 0.25% of rate from 0.67 feet per second to 30 feet per second.

C. Meter shall be installed according to the manufactures specifications and in a direction so as to measure forward flow in the normal flow direction when water is moving through the line under normal flow conditions.

1. Converter shall be mounted in a location where meter production data can be easily accessed and seen.

2. Electrical connections shall be made in accordance with manufactures specifications.

3. Electrical connections shall be a minimum of NEMA 4 to the meter utilizing manufactures seals and compounds to form necessary water tight connections.

4. Supplier shall provide proper start up and calibration services.

5. Supplier shall provide a minimum of one year warranty on all parts and labor.

6. Supplier shall provide a minimum of 50 feet of manufactures meter cable or as specified on drawings where there shall be no splices between converter and primary unit. All cable shall be protected in conduit unless specified differently by manufacture.

D. Acceptable Manufacture:

ABB Part Number 10DX3111 with 50XM1000 converter or approved equal.

11.05 PRESSURE RELIEF VALVE/SURGE ANTICIPATOR

A. The valve shall be hydraulically operated, single diaphragm-actuated and globe or angle pattern, flanged. The valve shall consist of three major components: the body with seat installed, the cover with bearings installed and the diaphragm assembly.

1. Diaphragm Assembly: The diaphragm assembly shall be the only moving part and shall form a sealed chamber in the upper portion of the valve separating operating pressure from line pressure. Packing glands and/or stuffing boxes are not permitted and there shall be no pistons operating the main valve or pilot controls.

2. Main Valve Body: No separate chambers shall be allowed between the main valve cover and body. Valve body and cover shall be ductile iron. The valve shall contain a resilient, synthetic rubber disc, with a rectangular cross-section contained on three and onehalf sides by a disc retainer, forming a tight seal against a single removable seat insert. The main valve seat and the stem bearing in the valve cover shall be removable.

3. Pilot Control System: The pressure relief pilot shall be an adjustable, spring-loaded, normally closed diaphragm control designed to permit flow when upstream pressure exceeds the control setting. The low-pressure pilot shall be an adjustable, spring-loaded, normally open diaphragm control designed to open when the sensed pressure falls below the control setting and close when pressures are normal. The pilot system shall contain an adjustable hydraulic limiter to limit valve travel during low-pressure opening without affecting high-pressure relief valve travel. The contractor shall connect the sensing/pilot supply connection to the main discharge header with minimum 3/4” pipe or tubing.

4. Products: Subject to compliance with requirements, provide from the following manufacturer:

   a. Cla-Val Model No. 52-03

11.06 PUMP OPERATIONAL CONTROLS

A. General

The Contractor shall furnish and install pressure switches, complete, as outlined herein. Pressure switches shall be mounted in the well house to operate the well pump based on the water pressure. The pressure switches shall be adjustable from_to____psi. The operation of the well pump(s) shall be controlled based on the pressure within the system and, in the case of a hydro-pneumatic tank, the water level within the tank. The operating sequence shall be as follows:

USING A PRESSURIZED BLADDER VESSEL

The lead pump shall operate until the pressure at the well house reaches PSIG. Should the pressure continue to drop with the lead pump operating,

and the pressure reaches PSIG, the lag pump shall engage. Both pumps shall operate until the pressure at the well house reaches PSIG.

USING A HYDRO-PNEUMATIC TANK

The lead pump shall operate until one of two (2) conditions are met:

1. The pressure at the well house reaches PSIG.

2. The tank water level reaches the high water probe.

   If the tank water reaches the high water probe prior to achieving a pressure of PSIG, the compressor will engage and operate until the pressure increases to PSIG and the

   pressure switch is reset.

   Should the pressure continue to drop with the lead pump operating, and the pressure fall to PSIG, the lag pump shall engage. Both pumps shall operate until one of the two (2) conditions listed above are met.

   The alternating sequence shall be accomplished by means of an alternator in the electrical circuitry at the well house. A selector switch shall be located at the well house pump panel to allow manual selection of the pumps to be included in the alternating sequence.

   All pumps shall be capable of being operated manually as well as automatically by lever selection of a hand-off-automatic switch at the well house. If one (1) pump is switched off for repairs, the other pump(s) shall be able to operate normally in an automatic mode.

   Each pump shall have its own completely independent control system so that the failure of any components in one (1) pump will not affect the automatic or manual operation of the other pump(s).

   Each well pump shall be equipped with an hour run meter mounted in the pump control panel.

11.07 EQUIPMENT INSTALLATIONS AND START UP

A. General

All equipment shall be installed in a neat, workmanlike manner, acceptable to the Design Engineer with concurrence of the Township Engineer and in conformance with all applicable Local, State and Federal codes and requirements.

B. Factory Trained Start-Up Personnel

The Contractor shall furnish the services of an experienced factory trained field representative to start up all equipment. He shall be employed by the Contractor in such capacity to interpret the manufacturer's installation guide and instructions, to supervise the installation and start-up of such equipment and to instruct the operating and maintenance personnel for a reasonable period of time. (A minimum of four (4) hours of instruction.)

The representative of the equipment supplier shall be responsible to insure that all equipment, controls, alarms, wiring, flow meter and all associated components are properly installed and functioning properly.

C. Systems Start Up

It shall be the Contractor's responsibility to coordinate work between his subcontractors, equipment suppliers and utility companies to insure that all components of the system function properly as described herein.

When the system or a major component of the system is entirely installed and ready for testing, the Contractor shall notify the Township Engineer and operation/maintenance personnel, in writing, of the time and date the start-up testing will be done. The Contractor, subcontractor, and equipment supplier's representatives shall be present for final start-up testing. During the start-up test, the Contractor shall operate all equipment in such a manner to demonstrate that all components are functioning properly.

If the equipment fails to perform, it will be the responsibility of the Contractor to arrange for repair or replacement of the defective parts and scheduling of a new start-up session.

Should the equipment pass its initial start-up testing but fails during the one-year guarantee period, the Contractor shall coordinate the necessary repairs or replacements with the subcontractors and suppliers.

11.08 SHOP DRAWINGS

The Contractor shall submit, as prescribed under "General Requirements" section, complete shop drawings and details of all equipment to be furnished under this section. These shop drawings shall be submitted and approved by the Design Engineer with concurrence of the Township Engineer prior to installation.

11.09 RECORD DRAWINGS

Any changes that are made in equipment, controls, wiring, etc. from that shown in the plans and specifications shall be made only by approved shop drawings. After such changes are made, the Contractor shall submit to the Design Engineer

and Township Engineer, record drawings which show these changes in equipment installation. Contractor shall supply "record" electrical schematic drawing to Design Engineer to be included in final close-out package delivered to the Township.

11.10 GUARANTEE

The Contractor shall furnish a manufacturer's guarantee covering all material and equipment that he furnishes. He shall guarantee his workmanship and material for a period of one year from the date of acceptance. Such guarantee shall provide for the replacement of defective workmanship, together with the restoration of any related materials or workmanship that are disturbed as a result of such imperfections in the work. All such replacements or repairs shall be done without expense to the Owner. All guarantees shall be in written form and submitted to the Owner in triplicate.

11.11 PAINTING

All pipes, valves, flow meters, and any other portions of watermain or ferrous metals exposed inside of the well house shall be painted. If installed, the hydropneumatic tank shall be painted. If necessary, heat shall be provided to maintain good drying conditions. All items to be painted shall be dry and clean before application of the paint. Any rust or scale shall be removed by wire brushing or scraping. Painting system shall be:

coat (350 sf/g) Pug Primer

coats (500 sf/g) Rustamor 500

11.12 TELEMETRY

A dry contact strip shall be supplied within the wellhouse with the following inputs:

A. Well Pump No. 1 on.*

B. Well Pump No. 2 on.*

C. Low pressure.

D. High pressure.

E. Security.

F. Flow meter.

*Additional contacts shall be installed for additional wells.

SECTION 12 SUBMERSIBLE SEWAGE PUMPING STATION

12.01 SCOPE OF WORK

The work covered by this section of the specifications consists of furnishing all parts, labor, materials and appliances and performing all operations for the installation of_____submersible sewage pumping station(s), the details of which are shown on the Standard Plans.

12.02 GENERAL

The Contractor shall furnish a duplex heavy duty submersible non-clog sewage pumping system as manufactured by Hydr-O-Matic, Flygt, or an approved equal. The principal items of equipment shall include submersible, motor driven, nonclog sewage pumps, valves, internal piping, central control panels with circuit breakers, motor starters, liquid level control with explosion proof relays, all internal and external wiring, alarm controls, concrete wet well, concrete pad and electric service as hereinafter specified. All pumping stations furnished shall be of the same manufacturer. Backfilling around pumping stations shall be in accordance with these specifications.

12.03 SUBMERSIBLE SEWAGE PUMPS

Each pump shall be motor driven, heavy duty, ball bearing, non-clog sewage and trash pump. All openings must be large enough to permit the passage of a sphere of three inches in diameter.

Pumps furnished shall be so designed to accommodate a larger impeller in order to meet the future pumping condition indicated. Two pump impellers shall be furnished, one shall enable the pump to meet the initial condition and one to meet the future pumping condition. The pump casing, pump and motor shaft, conduit, wiring and controls shall be sized to meet the future condition. The pump motors shall be designed to be non-overloading throughout the entire pump range for the future pumping condition.

Each pump shall have the necessary characteristics and be properly selected to perform under the following conditions:

Initial Condition	Pump Station #
Pump Capacity (GPM)	_____
Total Dynamic Head (Ft.)	_____
Pump Speed (RPM)	_____
Minimum Pump	_____
Efficiency (%)	_____

Future Condition

Pump Capacity (GPM)	_____
Total Dynamic Head (Ft.)	_____
Pump Speed (RPM)	_____
Minimum Pump	_____
Efficiency (%)	_____
Minimum Horsepower	_____
Maximum Horsepower	_____
Motor Voltage	____V____/

Note: If the pump horsepower proposed by Contractor is greater than the maximum specified, then the cost to increase the electrical system of the pump station shall be borne by the Contractor.

A. Impeller

The impeller is to be corrosion resistant and of the enclosed type. The impeller is to be made of close-grained cast iron and be dynamically and hydraulically balanced before assembling in the pump. A wear ring shall be installed at the inlet of the pump to provide protection against wear to the impeller.

B. Casing

The casing shall be made of high strength cast iron and shall be large enough at all points to pass any size of solid which can pass through the impeller. Wear rings shall be installed.

C. Shaft

The pump shaft shall be constructed of solid 31655 or 17-4 PH (high grade stainless steel). Shaft sleeves are not acceptable.

D. Seals

Each pump shall be provided with a tandem double mechanical seal. The seals shall require neither maintenance nor adjustment and shall be easily replaceable. The lower mechanical seal shall be protected by a minimal shaft over-hang and pressure reducing vanes on the back of the impeller.

E. Base

The volute casing shall have feet to support the impeller entrance the proper distance above the bottom of the wet well unless otherwise approved by the Design Engineer.

F. Finish

The pump shall have a painted or enamel finish as standard with the manufacturer.

G. Nameplates

Each pump shall have a standard nameplate securely affixed thereto in a conspicuous place and also mounted in the electrical panel showing the serial number and the name of the manufacturer. In addition, the nameplate for each pump shall show the model or figure number, the capacity in gallons per minute at rates of speed in revolutions per minute and total dynamic head in feet. Care shall be taken to be legible at all times.

H. Guiding Rail Connection System

A guiding bracket shall be an integral part of the pump itself. This bracket will slide along a guide rail(s). The guide rails will be furnished and shall be of standard weight Sch 40 stainless steel pipe. The pump shall have a machined connecting flange which will connect to a discharge flange mounted on the wet well floor. Sealing of the connecting flange to the discharge flange is to be accomplished by a guided downward motion, without the use of nuts or bolts. Guiding rail connection system shall allow pump removal and replacement without personnel entering or dewatering the wet well or disconnecting any piping in the wet well. Individual pump and motor removal shall not interfere with continued operation of remaining pump(s).

I. Motor

The pump motor shall be housed in an oil or air filled, watertight casing and shall have Class F insulated squirrel cage windings. Pump motors shall have a cooling system capable to allow for continuous operation in even non-submerged condition. The pump should be able to run dry under full load continuously for extended periods of time without damage.

The motor cable shall be properly sealed at its entry into the motor so as to allow no moisture into the motor housing. The pump motor shall be capable of at least 10 starts per hour on the average. The pump motor shall be supplied with a moisture sensing device capable of relaying its signal to the control panel. The pump motors and power supply must be explosion proof and suitable for use in NEC—Class 1, Division 1, Group D locations.

J. Tools

For the pumps, special tools necessary for maintenance and repair of pumps shall be furnished by the Contractor.

K. Pump Characteristic Curves

Pump characteristic curves shall be furnished showing capacities, heads, efficiencies, and brake horsepower throughout the entire range of pumping. These shall be submitted as part of the shop drawing submitted to the Design Engineer.

L. Spare Pump and Motor

The Contractor shall supply one pump and one motor in addition to the two supplied for the installation into the wet well for each pumping station.

The pump and motor shall be the same make, model, and size as those supplied for installation into the wet well for each pumping station.

12.04 WET WELL

A. General

A concrete wet well shall be built in conjunction with each pump station as shown on the plans.

B. Pre-cast Concrete Units

The wet well structure shall be made of pre-cast reinforced concrete pipe of the size shown on the plans and shall conform to ASTM C-76, Class 2. Joints shall be of the rubber "O-Ring" design and provide integral (one piece) pre-cast bottom section.

C. Sanitary Sewer Wetwell Waterproofing

The Contractor shall apply a waterproofing system to the inside and outside of the concrete wet well. The material to be used for this operation shall be as specified in these specifications.

The waterproofing system shall be applied and allowed to dry in accordance with the manufacturer's directions. All steps, lids, frames and castings and sewer pipe entering or leaving the wet well shall be protected during application to prevent their being coated.

1. Interior Waterproofing

If any leaks in the wet well walls are detected twenty-four (24) hours after application of the first coat of the waterproofing system,

they shall be sealed by application of a quick-set sealer. This sealer shall be a mixture of Portland Cement - Type One and "Ipanex R", "Waterplug" or equal.

The quick-set sealer shall be applied in accordance with the manufacturer's directions. After the patched areas dry, they shall be covered with another coat of the waterproofing and allowed to dry. If any leaks are apparent after that time, the Contractor shall repatch them. The above steps shall be repeated until all leaks are sealed.

After all leaks are stopped and there are no leaks apparent after twenty- four (24) hours upon application of the first coat of the waterproofing system or twelve (12) hours after application of a patch, the Contractor shall apply over the dry surface a finish coat.

2. Exterior Waterproofing

The exterior surfaces of the wet well shall be thoroughly covered with mastic at a rate of one (1) gallon per twenty-five (25) square feet. The exterior surfaces shall be thoroughly cleaned before application of the mastic. The mastic shall be as specified in Section 7.02 A2 of these specifications.

D. Waterstops

A waterstop shall be installed in the wall of the wet well for all piping connections. This includes inlet sewer piping and outlet discharge piping. The waterstops shall be a Kor-N-Seal as manufactured by National Pollution Control Systems or equal.

E. Vents

The intake and outlet vents shall be cast iron or ductile iron pipe constructed as detailed on the plans.

F. Electrical

The electrical components of the wet well level control and alarm system shall be 24 volts, corrosion proof, water proof and explosion proof.

G. Hatch

1. Material: Aluminum

2. Nominal dimensions as indicated on plans.

3. Suitable for H-20 highway loading.

4. Lockable with safety cage

5. Torsion bar assist

6. Positive lock at 90 degree opening

12.05 PUMPING STATION PIPING, VALVES AND FITTINGS

A. The piping shall conform to the sizes and configurations shown on the plans and the following materials specifications.

1. Cast Iron Fittings

   Cast iron fittings shall be designed in accordance with the standards set forth in ASA Specifications A21.2, A21.6, A21.8 or to Federal Specification WW-P-421.a. The pipe shall be designed to withstand a minimum working pressure of 150 psi and a minimum hydrostatic test pressure of 300 psi. The pipe shall also be designed for a laying depth of six feet.

2. Ductile Iron Pipe and Fittings

   Ductile iron pipe shall be in accordance with the latest revision of ASA Specifications A21.50 and A21.51. The pipe and fittings shall be designed to withstand a minimum working pressure of 150 psi and a minimum hydrostatic test pressure of 300 psi.

3. Galvanized Steel Pipe

   Galvanized steel pipe shall meet the requirements of ASTM Specification A120. Standard weight galvanized pipe and standard weight malleable iron fittings or American Standard 125 pound cast iron fittings shall be furnished unless otherwise specified.

4. Valves

   The specification for gate valves, knife valves, plug valves, ball valves, butterfly valves, pinch valves and standard check valves is located under Section 8, Forcemains.

5. Valve Operators and Valve Boxes

   The specification for valve operators and boxes is located under Section 8, Forcemains.

6. Pipe Supports

Pipe supports shall be used to support all piping and valves. Pipe supports shall be of the adjustable type designed to support cast iron pipe.

7. Pressure Gauges

Pressure gauges shall be installed in the discharge line of each pump within the valve chamber. The gauges shall be 3-inch diameter (minimum) and read pump discharge pressure in “feet of water”. Liquid filled gauges shall incorporate a flexible diaphragm seal between the sewage discharge line and the pressure gauge. The diaphragm seal shall be either the inline-saddle type design with a minimum diaphragm surface of 5 square inches or the complete flow-thru type design with flange connection. Inline saddle diaphragms and housing parts exposed to the sewage shall be 316 ss. The flexible cylinder protecting the sensing liquid on the flow-thru design shall be Buna N and the flanges shall be 316 ss. The inside diameter of the flow-thru assembly shall be the same as the adjacent discharge piping. Use Model R or RP by Ametek, Model Iso-Spool (flanged) or Iso-Ring (wafer) by Ronninger-Peter or equal. Gauge shall be mounted on a tap equipped with a valve to allow complete isolation and removal of the gauge without station shut down.

B. Installation of Piping, Valves and Fittings

1. Cast Iron or Ductile Iron Piping, Valves and Fittings

Cast iron or ductile iron piping, valves and fittings shall be used for all piping larger than 4-inch diameter from the pumps until the pipe exits the valve chamber. Cast iron flanged piping, valves, and fittings shall be used for all interior exposed piping unless otherwise approved by the Engineer. Pipe, valves and fittings shall be carefully laid to line and grade. Care shall be taken to keep the pipe clean and free from dirt and other foreign materials. Piping laid in the ground shall have bearing over its entire length. Piping along floors, walls or ceilings shall be adequately supported by saddles, posts, wall brackets, pipe hangars or other approved devices. The exact location, number and design thereof shall be subject to the approval of the Engineer.

2. Galvanized or Wrought Iron Piping

Galvanized steel pipe fittings shall be used for all interior piping less than 4 inches in diameter.

3. Pipe Taps

Wherever indicated or required, pipe or fittings shall be tapped to receive small pipe or special fittings.

12.06 SEWAGE FLOW METER

A. Scope of Work

The Contractor shall furnish and install where shown on the plans and in accordance with these specifications, an ultrasonic flow measuring device complete with flow transmitter, indicating, recording and totalizing capable of 4-20 milliamp output. The flow meter must be suitable for use in NEC, Class 1, and Division 1 locations. The ultrasonic level measuring device flow meter shall be installed through the top of the wet well. The ultrasonic level measuring device shall be capable of providing pump on/off signals to the control panel and be manufactured by Milltronics.

12.07 ELECTRICAL WORK

A. Factory Wiring and Equipment

1. General

The pumping station control panel shall be completely wired at the factory except for the power feeder lines in accordance with National Electrical Code and carry an Underwriters Laboratory certification upon delivery. It shall be adjusted and ready for operation. All wiring in the station shall be color coded and numbered as indicated on the wiring diagram portion of the shop drawings. All wiring outside the panel shall be in rigid conduit. It is the Contractor’s responsibility to ensure that electrical equipment complies with all federal, state, and local requirements. (A large, clear, color coded and numbered wiring diagram shall be provided in triplicate with each unit. Wiring diagram shall comply with the latest Township requirements).

All conduit ends are to be sealed to eliminate water and/or gases moving from one section of the pump station system to another; i.e., wet well to pump control panel.

2. Pump Motors

Pump motors shall be supplied with the pump by the pump manufacturer as an integral part of the pump assembly. The horsepower shall be such that the motor will be non-overloading throughout the entire pump range. The motors shall have squirrel cage windings and rated at 240 volts, 60 cycle, 3 phase and shall be NEMA Code "G" design or better. Motors shall be as manufactured by U.S. Motors, General Electric, Westinghouse or

equal. Each motor shall have a nameplate showing the motor serial and identification numbers, manufacturer's name, horsepower, voltage, etc.

3. Pump Controls and Alarms

a. Control Panel

The electrical control equipment shall be mounted within a NEMA 4 dead front enclosure.

The control panel shall include a circuit breaker and magnetic starter for each pump motor actuated by the

ultrasonic level control system. The magnetic starters shall be Square "D" and have thermal overload protection on all three phases. The control assembly shall provide a convenient means to operate each pump manually or automatically. When operated in the automatic mode, the control assembly shall automatically alternate the position of the "lead" and "lag" pumps after each pumping cycle.

Control panel shall be equipped with a step-down transformer to supply 120/240 volts for control and auxiliary circuits. Primary side of auxiliary power transformers shall be protected by a thermal/magnetic air circuit breaker specifically sized to meet power requirements of the transformer. A 120-volt, 20-amp, duplex receptacle shall be provided with ground fault circuit interruption.

Pump run indicator lights shall be mounted on the control panel.

The control panel shall also incorporate an hour meter to register the elapsed running time for each pump. Meters shall be resettable and utilize a digital readout.

A time delay relay shall be provided for the pump motor controls to insure that both motors will not start at the same time.

Controls for the pump motors shall be designed to protect the electric motors from low line voltage, single phase startup and phase reversal. A phase sequence and under voltage relay shall be installed in the control panel. The unit shall be connected to the pump station alarm circuitry to provide a 0.5 second time delay to prevent nuisance

tripping of the relay caused by a momentary transient drop in the line voltage. Upon resumption of normal line conditions, the unit shall automatically restore the motors to a running condition.

b. Wet Well Level Control and Alarm System

Controls for pump operation for wet well level control and alarm system shall be furnished and installed to perform as described herein. The Wet Well Level Control and Alarm System is required to meet Class 1, Division 1, Group D requirements.

At the normal High Water Level, one of the two pumps will start. Pumping will continue until the fluid level has lowered to the normal Low Water Level when the pumps will stop.

When the fluid level has again reached the normal High Water Level, the other pump will start and complete its cycle in the same manner as the first pump. In the case of suction, lift stations pump alteration shall be conducted automatically on a daily cycle not every pump cycle.

If the fluid level continues to rise above the normal High Water Level and reaches the Standby Pump On Level, the second or standby pump will start and both pumps will continue to run until the fluid level descends to the normal Low Water Level. If the fluid level continues to rise above the Standby Pump On Level, a High Water Alarm Level will indicate an abnormal condition. High Water Level, Low Water Level, and Standby Pump On Level shall utilize the ultrasonic level control system. The High Water Alarm Level shall utilize the ultrasonic level control system with a backup signal actuated by a mercury float type switch.

Conversely, if the pumps should continue to run so as to drop the fluid level below the Low Water Level, the Low Water Alarm Level will indicate the abnormal condition and the operating pump(s) will stop. The pump controls will automatically be restored to normal operation if the fluid level again rises. The Low Water Alarm Level shall utilize the ultrasonic level control system with a backup signal actuated by a mercury float type switch.

The mercury float type switches shall consist of suspended plastic watertight casings, each containing a mercury switch, so arranged that the buoyancy of the rising fluid causes

them to lie on their sides thus activating the mercury switch. All level control circuits in the wet well shall be 24 volt and in explosion-proof housings.

4. Alarm Contacts for Rapid Telemetry (or Alarm Monitoring) and Exterior Alarm Light

The pump station shall be provided with alarm contacts terminal board control panel by the pump station manufacturer for energizing of the telemetering and alarm light relays.

a. Telemetering (dry) contacts shall be provided for the following conditions:

High Water Alarm Level
Low Water Alarm Level
Water in the Pump
Motor Power Failure

Sewage Pump No. 1
On Sewage Pump
No. 2 On Security

b. Exterior alarm light and horn contacts shall be provided and the light and horn energized for the following conditions:

High Water Alarm
Level Low Water
Alarm Level

5. Electric Heater

A single-phase electric strip heater shall be provided in the pump panel with an adjustable thermostat.

6. Telemetry Equipment

Telemetry equipment will be supplied and installed by the agency performing operation and maintenance for the facility. Battery back-up must be included.

B. Site Electrical Requirements

1. General

The Contractor shall supply and install all site electrical wiring and equipment necessary to operate the facilities of the sewage pumping station in accordance with all federal, state, and local

requirements and as described in these specifications and shown on the plans.

2. Contractor Responsibility

It shall be the Contractor's responsibility to have utility installations and hookups for electrical service.

3. Exterior Station Alarm

An exterior station alarm shall be supplied to provide a visual alarm indication activated by contacts in the lift station control panel. It shall be mounted within the exterior electrical enclosure. A vapor tight, 100-watt light fixture with red globe and guard shall be mounted on the top of the exterior electrical enclosure to indicate visually when an alarm condition exists.

12.08 FACTORY TESTS

The submersible sewage pumps shall be given running tests to check for proper motor and pump operation, correct shaft and impeller rotation and watertightness. Pump shall be run submerged for 30 minutes, simulating actual service conditions after which the motor housing will be checked for moisture either visually if plugs are present, or through the use of a moisture probe, if plugs are not present.

A certificate of factory testing shall be provided to the Design Engineer and Township Engineer.

12.09 SHOP DRAWINGS

The Contractor shall submit, as prescribed under Section "General Requirements", six (6) copies of complete shop drawings including the shop drawing for the control panel and color coded electrical schematic drawings (ladder diagrams) for all electrical components and details of all equipment to be furnished under this section. These shop drawings shall be submitted and approved by concurrence of Township Engineer before installation of these items.

12.10 OPERATION AND MAINTENANCE INSTRUCTIONS

Written instructions for the operation and maintenance of the pump station equipment shall be furnished in quadruplicate for each piece of equipment In this section. The instructions shall be easy to understand with directions specifically written for this project describing the various possible methods of operating the equipment.

The instructions shall include procedures for tests required, pump curves, adjustments to be made, and trouble and safety precautions to be taken with the equipment.

Maintenance instructions shall include test and calibration charts, exploded views of assembled components, spare parts lists and wiring diagrams.

These instructions shall be submitted to the Design Engineer and Township Engineer for approval at the same time the shop drawings are submitted.

12.11 RECORD DRAWINGS

Any changes that are made in equipment, controls, wiring, etc. from that shown in the plans and specifications shall be made only by approved shop drawings. After such changes are made, the Contractor shall submit to the Township Engineer record drawings which show these changes in equipment installation.

12.12 AS-BUILT WIRING DIAGRAM

A large, clear, color coded and numbered wiring diagram shall be prepared showing the as-built wiring of the complete pump station installation including all control and alarm wiring. Provide four (4) copies for each pump station.

12.13 EQUIPMENT INSTALLATION AND START UP FOR SEWAGE PUMP STATIONS

A. General

All equipment shall be installed in a neat, workmanlike manner, acceptable to the Design Engineer with concurrence of the Township Engineer and in conformance with all applicable local, State and Federal codes and requirements.

B. Factory Trained Start-Up Personnel

The Contractor shall furnish the services of an experienced factory trained field engineer representing the pump station supplier to start up all equipment. He shall be employed by the Contractor in such capacity to interpret the manufacturer's installation guide and instructions, to supervise the installation and start-up of such equipment and to instruct the operating and maintenance personnel for a reasonable period of time. (A minimum of four (4) hours of instruction per pump station.) The representative of the pump station supplier shall be responsible to insure that all pumps, motors, equipment, controls, alarms, wiring, flow meter and all associated components are properly installed and functioning properly.

C. Systems Start Up

It shall be the Contractor's responsibility to coordinate work between his subcontractors, equipment suppliers and utility companies to insure that all components of the system function properly as described herein.

When the system or a major component of the system is entirely installed and ready for testing, the Contractor shall notify the Township Engineer and operating/maintenance personnel, in writing, of the time and date the start-up testing will be done. The Contractor, subcontractor, and equipment supplier's representatives shall be present for final start-up testing. During the start-up test, the Contractor shall operate all equipment in such a manner to demonstrate that all components are functioning properly.

If the equipment fails to perform, it will be the responsibility of the Contractor to arrange for repair or replacement of the defective parts and scheduling of a new start-up session.

Should the equipment pass its initial start-up testing but fails during the one year guarantee period, the Contractor shall coordinate the necessary repairs or replacements with the subcontractors and suppliers.

12.14 GUARANTEE

In addition to the Contractor's guarantee, the Contractor shall also furnish the manufacturer's guarantee(s) covering all material and equipment furnished.

Such guarantees shall be in written form and furnished to the Owner. The guarantees shall be for a one year period commencing on the date of acceptance of the completed sewage pumping station(s) as determined by the Design Engineer with concurrence of the Township Engineer. The guarantee(s) shall cover the structure and all equipment, materials and workmanship of the pump station and all associated components as specified herein. The guarantee shall provide for the replacement of defective materials and/or workmanship, together with the restoration of any related materials or workmanship that are disturbed as a result of such imperfections in the work. All guarantees shall be submitted in triplicate.

SECTION 13 REPLACEMENT AND CLEANUP

13.01 SCOPE OF WORK

Under this item, the Contractor will restore all lawns, trees, gardens, landscape plantings, sidewalks, ramps, trails, fences, commercial signs, water courses and sand, gravel, dirt, asphalt and concrete roads, catch basins, storm sewers, building sewers, water services, water valve boxes, meter vaults, property markers (such as concrete monuments, irons, stakes, pipes, etc.), mailboxes and other items which may be damaged during the course of construction. All replacement and cleanup work will be incidental to the project except those items of work that are delineated in the bid proposal.

All restoration work shall attempt to return the existing facilities to their original condition. Substitutions, such as gravel instead of grass, will not be allowable.

The Contractor shall pay special attention to the requirements of Act 347, "Soil Erosion and Sedimentation Control". In all construction work the Contractor shall take all precautions necessary to prevent erosion and to conform to the requirements of Act 347. Should erosion occur within the guarantee period, the Contractor shall regrade and reseed the disturbed area at no additional cost to the Owner.

Replacement and cleanup operations shall follow immediately behind the construction work. The Contractor shall make every effort to keep the job site clean and free of trash and miscellaneous building materials. The Contractor shall pay special attention in order to restore commercial signs, fences, etc. and to patch and repair pavement, driveways and sidewalks immediately after the construction work. In the event that replacement and cleanup work does not proceed in a satisfactory manner, the Owner may withhold periodic payments or close the construction area until such time as the replacement and cleanup is satisfactory. An exception may be made if there are physical limitations which do not allow for immediate replacement and cleanup.

13.02 PAVEMENT RESTORATION

A. General

All permanent pavement restoration shall be done over compacted backfill and a minimum six (6) inches thick compacted M.D.O.T. 22A gravel base. The gravel base shall be placed and maintained in accordance with the

M.D.O.T. Standard Specifications. All patches shall have square, neat, saw cut edges regardless of the final surfacing method planned for that section of the pavement restoration.

No patching work shall be started until the subgrade has been properly prepared. Prior to laying the bituminous patch, the adjacent road surfaces

shall be swept clean of all foreign materials and the patch area and pavement primed with Michigan Department of Transportation's approved prime coat.

A bituminous bond coat shall be placed between successive lifts of the bituminous patch and bituminous surfacing. Each lift shall be thoroughly compacted before adding the next lift. This includes running the compaction roller longitudinally along the entire length of the joints between the patch and the existing pavement.

The bituminous mixture to be furnished under these specifications shall be delivered to the paver at a temperature no lower than 285 F. Any mixture that has a temperature below 285 F at the time of "laying" shall be rejected and hauled from the project.

Temporary road patches shall be gravel or bituminous cold patch. The patches shall be maintained in a smooth condition until final repairs are made.

The Design Engineer, Township Engineer and the County Road Commission shall be notified at least two (2) working days prior to the placement of any and all final pavement overlays.

Aggregate for mixes shall conform to Grand Traverse County Road Commission/Leelanau County Road Commission current standards where applicable.

B. Bituminous Patching

Existing asphalt roads and driveways shall be patched using the current Road Commission standards. All patches shall be placed in two lifts of 165 pounds per square yard for the first course and 110 pounds per square yard for the second course or match existing thickness. A bituminous prime coat of 0.25 gallons per square yard and a tack coat of 0.10 gallons per square yard shall be used for all bituminous patches. Shoulders shall be restored to their original width and depth in accordance with M.D.O.T. Standard Specifications using M.D.O.T. 23A gravel.

C. Gravel Roads, Driveways and Shoulders

All gravel roads shall be restored in accordance with M.D.O.T. Standard Specifications using six (6) inches of M.D.O.T. 22A gravel. Shoulders shall be restored to their original width and depth in accordance with 1984 M.D.O.T. Standard Specification 3.09 using M.D.O.T. 23A gravel.

Shoulders shall be raised on the side opposite of sewer construction to match new pavement surfaces.

D. Concrete Pavement, Sidewalk and Driveways

Concrete for restoring pavement, sidewalks, and driveways shall attain a 28-day strength of 3,500 pounds per square inch. Neat edges of patch areas shall be obtained by the use of a concrete saw. Concrete mixing aggregates and curing methods shall conform to Concrete section.

Concrete patches shall match the original width and depth and in no case, a depth less than four (4) inches. Sidewalks shall have contraction jointsa distance apart equal to the width of the slab.

13.03 GRASS AREA

Grass areas shall be considered as two types: A) Type 1, areas which had lawns before construction, and B) Type 2, open fields or ditches not adjacent to established lawns. The plans may specifically call for Type 1 mixtures in which case the plans will govern. If there is a question as to which mixture to use, the Design Engineer shall make the final decision.

Terraces, lawns, ditches, open fields and other grassy areas shall be topsoiled, fertilized, seeded and mulched in such a manner that a grass approximately equal in type and density of the original is obtained. Slopes between 1:3 and 1:2 shall be sodded and staked or receive seed with mulch blankets.

A. Topsoil

Topsoil furnished shall consist of dark brown or black loam, clay loam, silt loam, or sandy loam surface of fertile, friable humus soil of mineral organics, not including peat or muck. Soil shall be screened topsoil, free of stones, roots, sticks and any other extraneous materials. All topsoil furnished shall be approved by the Design Engineer. Type 1 areas shall be topsoiled to a depth of four (4) inches and Type 2 areas to a depth of two (2) inches.

B. Seeding and Fertilizing

Areas to be seeded and fertilized shall be carefully raked to even surfaces and all stones, sticks and other debris removed.

The area to be seeded shall be fertilized with agricultural fertilizer 12-12-12 analysis, Davco or Agrico or equal, applied on the prepared surface at the rate of 20 pounds per 1,000 square feet. Fertilizer shall be harrowed or raked into the soil to a depth of not less than one (1) inch.

Seeds shall be furnished in durable bags. On each bag of seed, the vendor shall attach a tag giving name, lot number, net weight of contents, purity and germination. All seed shall be thoroughly mixed and sown in a method which will ensure uniform distribution. Seeding during high winds

or inclement weather will not be permitted. All seed is to be raked in and compacted. The seed shall be sown at the rate of five (5) pounds per 1,000 feet. The seeding mixtures shall be composed of certified seed of the purity, germination and proportions by weight as specified in the following table:

	SEEDS		MIXTURES	
Kind	Minimum Purity	Minimum Germination	Type I	Type 2
Perennial Rye Grass	98%	90%	20%	50%
Kentucky Blue Grass	90%	75%	60%	15%
Creeping Red Fescue	98%	80%	20%	35%

C. Mulching

Immediately after seeding all seeded areas, Type 1 and Type 2 shall be mulched with unweathered small grain straw or hay spread uniformly at a rate of 100 pounds per 100 square feet (two tons per acre). Hydroseeding method with similar application rate will be allowed.

D. Mulching Anchoring

All mulch shall be anchored using one of the following methods. The Contractor may use either method unless otherwise shown on the plans.

1. Method "A": The straw mulch shall be anchored by applying one of the following asphalt products at the rate shown. The asphalt may be blown on with the mulch or sprayed on immediately after the mulch is spread.

Asphalt Product	Application Rate
Liquid Asphalt	
R.C. 1, 2 or 3; M.C. 2 or 3	0.10 gal. per S.Y.
Emulsified Asphalt	
R.S. 1 or 2; M.S. 2; or S.S. 1	0.04 gal. per S.Y.

2. Method "B": A "Terra-Tak" mulch binder may be used in lieu of asphalt. Mixing and application shall be done in accordance with the manufacturer's recommendations.

3. Method "C": In areas with slopes greater than 10% or where shown on the plans, the Contractor shall place mulch netting or excelsior blanket mulch.

a. Mulch Netting: Mulch shall be anchored by the use of mulch netting. The light weight fibrous netting shall be properly placed over the mulch and secured to the ground using wire staples, spaced per manufacturer's recommendations.

b. Excelsior Blanket Mulch: An excelsior blanket shall be used in lieu of other mulch. The excelsior blanket shall be a consistent thickness of evenly distributed wood excelsior fibers, 80% of which are six (6) inches or more in length. The top side of the blanket shall be covered with a coarse net of twisted Kraft paper or biodegradable extruded plastic mesh. Ends and sides shall be securely butted and stapled with U-shaped wire staples of a size and length suited to the soil conditions.

13.04 DITCHES

Ditches which have been grassed and maintained by the abutting property owner shall be restored to the current Grand Traverse County/Leelanau County (where applicable) specifications.

Ditches in which culverts or drain tile have been installed shall have the same tile replaced, if in good condition, or a tile satisfactory to the Design Engineer installed in its place at the original line and grade.

Catch basins shall be reconstructed, if removed or damaged.

13.05 FENCE REPLACEMENT

A. Chain Link Fence shall be replaced according to M.D.O.T. specifications.

B. Other Fences shall be replaced equal to and of the same type as existing.

C. Salvaged material, if approved by the Engineer, may be used for replacement.

13.06 COMMERCIAL SIGNS

Commercial signs, which must be removed by the Contractor in order for work to proceed, shall be replaced and reconstructed to original condition. It is very important that replacement follow immediately behind the construction work.

13.07 BUILDING SEWERS

Building sewers shall include any and all parts of private residential, commercial or industrial sewage disposal system such as sewer pipe, septic tanks, drainfield,

etc. Whenever the service of any such facility is interrupted because of the Contractor's operations, he shall provide such interim methods of sewage disposal as are required to maintain a safe, nuisance free, non-polluting construction operation.

13.08 OTHER DEBRIS

The Contractor shall remove, at his own expense from the site, any and all broken pipe, bricks, blocks, lumps of concrete, broken machinery, cans, containers, and other trash and debris.

13.09 TREES

The Contractor shall endeavor to save as many trees as possible. Cut trees, including stumps, shall be disposed of by the Contractor. Any elm tree which is removed must be burned. Tree branches which become broken shall be removed by cutting off flush with trunk and the cut on the trunk shall be painted with an approved tree paint. Where removal of a stump would result in damage to existing utilities, the stump may be removed by chipping to a depth of at least one foot below the finished ground surface.

Trees removed by the Contractor and where approved by the Engineer shall be replaced with a reasonably sized tree of the same variety. Trees along the State Highways and County Roads that fall on the property line or in the road right-of-way shall be replaced at a new location off the right-of-way.

Replacement trees of the deciduous or hardwood type shall be furnished from nursery stock, at least 2 to 2½ inches in diameter, and shall have the roots contained in a ball of soil and wrapped in burlap.

Replacement trees of the evergreen type may be furnished from either nursery or native stock, at least 8-10 feet in height, and shall have roots contained in a ball of soil and wrapped in burlap.

SECTION 14 PRESSURE REDUCING VALVE STATION EQUIPMENT

14.01 SCOPE

The work covered by this section of the Specifications consists of furnishing all plant, labor, material and appliances and performing all operations for the installation of piping and equipment as shown on the drawings and hereinafter specified.

14.02 PIPING AND FITTINGS:

This work consists in furnishing all plant, labor, equipment and materials and in performing all operations necessary to install the piping within the pressure reducing valve chamber as shown on the plans. All work to be performed as shown on the drawings and specifications.

A. Applicable Specifications

The following specifications and standards of the latest issue form a part of this specification to the extent indicated by reference thereto:

1. American Water Works Association Standards:

AWWA C-505 Resilient wedge gate valves.

2. American Standards Association Standards:

A21.2 Cast iron pit cast pipe for water and other liquids.

A21.4 Cement-mortar lining for cast iron pipe and fittings for water.

A21.6 Cast iron pipe centrifugally cast in metal molds for water and other liquids.

A21.8 Cast iron pipe centrifugally cast in sand-lined molds for water and other liquids.

A21.10 Short body, cast iron fittings, 3 inch to 48 inch for 250 psi.

A21.11 Rubber gasket joints for cast iron pressure pipe and fittings.

A21.12 Cast iron pipe, 2 inch and 2-1/4 inch centrifugally cast for water and other liquids.

A21.50 Thickness design for ductile iron pipe.

A21.51 Ductile iron pipe, centrifugally cast in metal molds or sand-lined molds for water or other liquids.

B16.1 Cast iron pipe flange and flanged fittings, Class 125.

3. National Electrical Code:

All electrical work.

4. American Society for Testing Materials:

A-72 Welded wrought iron pipe.

A-120 Black and hot-dipped zinc-coated (galvanized) welded and seamless steel pipe for ordinary uses.

B. Materials

The following items of material installed within the well house or room shall be furnished by the Contractor and shall conform to the various requirements as hereinafter specified.

1. Ductile Iron Pipe

Shall be used for all interior pressure reducing valve station piping 4-inch diameter and larger. Ductile iron pipe shall be designed in accordance with the latest revision of ASA specifications A21.50 and A21.51. The pipe shall be designed to withstand a minimum working pressure of 200 psi and a minimum hydrostatic test pressure of 300 psi.

2. Interior Joints

Interior joints within the pressure reducing valve station shall be flanged and constructed with flanges, bolts, nuts, washers and gaskets conforming to AWWA standard C110 and ANSI Standard B16.1. Uni-flange joints will be accepted if rodded.

3. Gate Valves:

a) Valves 2-1/2" through 12" within the pressure reducing valve station shall have a cast or ductile iron body and bonnet with a minimum non-shock W.O.G. working pressure of 200 psi.

Gate valves shall be resilient wedge gate valves and shall meet the requirements of AWWA C-505. Gate valves within

the pressure reducing valve station shall be flanged and have handwheel operators.

b) Valves 2" and smaller shall have a bronze body and union bonnet with a minimum non-shock W.O.G. working pressure of 200 psi. Seats shall be integral with the valve body and shall be machined for leakproof shut-off with the disc. The disc shall be a solid bronze wedge. The stem shall be bronze and shall be packed with TFE impregnated asbestos packing. Valves shall have screwed ends and handwheel operators unless otherwise specified or shown on the drawings.

4. Wall Castings and Sleeves shall be installed in all concrete work where pipes, wires or other equipment pass through. Wall castings for 4-inch diameter or larger pipe shall be cast iron having an anchor flange located in the center of the concrete wall or floor. Castings and sleeves shall be similar to those as manufactured by the East Jordan Iron Works or approved equal. Joint between pipe and sleeves shall utilize a link-seal fitting or approved equal.

C. Installation of Piping Valves and Fittings

1. Ductile Iron Piping, Valves and Fittings shall be used for all piping 4-inch diameter and larger. Ductile iron flanged piping, valves and fittings shall be used for all interior exposed piping unless otherwise approved by the Township Engineer. Pipe, valves and fittings shall be carefully laid to line and grade. Care shall be taken to keep the pipe clean and free from dirt and other foreign materials. Piping laid in the ground shall have bearing over its entire length. Piping along floors, walls, or ceiling shall be adequately supported by saddles, posts, wall brackets, pipe hangers, or other approved devices. The exact location, number and design thereof shall be subject to the approval of the Design Engineer.

14.03 Pressure Reducing Valves

Pressure reducing valves of the size and type indicated shall be installed as shown on the drawings. This valve shall maintain a constant downstream pressure regardless of varying inlet pressures. It shall be a hydraulically operated, pilot-controlled, diaphragm-type globe valve. The main valve shall have a single removable seat and a resilient disc. The stem shall be guided at both

ends by a bearing in the valve cover and an integral bearing in the valve seat. No external packing glands are permitted and there shall be no pistons operating the main valve or any pilot controls.

Pressure reducing valves shall have a pressure rating of 250 psi, with an adjustment range of 30 to 300 psi. Valves shall be constructed of cast iron with brass trim.

The pilot control shall be a direct-acting, adjustable, spring-loaded, normally open diaphragm valve designed to permit flow when controlled pressure is less than the spring setting. The control system shall include a fixed orifice.

Pressure reducing valves shall meet the requirements of a Clayton 90G-01 AB (Adjustment Range 30-300 psi) Pressure Reducing Valve as manufactured by Cla-Val Company.

14.04 Pressure Gauges

Pressure gauges, as shown on the plans, shall have a 2-1/2 inch diameter dial with a steel case and a bronze or stainless steel tube. The accuracy of each gauge shall meet or exceed ANSI Grade B, 3-2-3 percent and have a pressure range of 0-200 psi, with a maximum increment of five psi. Pressure gauges shall be as manufactured by Omega Commercial Grade, or approved equal.

14.05 Sump Pump

See standard detail for location of portable pump (supplied by others).

14.06 Equipment Installation and Start-Up

A. General

All equipment shall be installed in a neat, workmanlike manner, acceptable to the Owner and the Engineer and in conformance with all applicable local, state and federal codes and requirements.

B. The contractor shall submit operation and maintenance manuals for the following:

1. Pressure reducing valves

2. Sump pump

C. The contractor shall submit parts lists and/or names of suppliers for any equipment requested by the Township.

14.07 Shop Drawings

The Contractor shall submit, as prescribed under "General Requirements" section, complete shop drawings and details of all equipment to be furnished under this section. These shop drawings shall be submitted and approved by the

Design Engineer with concurrence of the Township Engineer before installation of these items.

14.08 Record Drawings

Any changes that are made in equipment, controls, wiring, etc. from that shown in the plans and specifications shall be made only by approved shop drawings.

After such changes are made, the Contractor shall submit to the Design Engineer and Township Engineer, record drawings which show these changes in equipment installation.

14.09 Guarantee

The Contractor shall furnish a manufacturer's guarantee covering all material and equipment that he furnishes. He shall guarantee his workmanship and material for a period of one year from the date of acceptance. Such guarantee shall provide for the replacement of defective workmanship, together with the restoration of any related materials or workmanship that are disturbed as a result of such imperfections in the work. All such replacements or repairs shall be done without expense to the Owner. All guarantees shall be in written form and submitted to the Owner in triplicate.

14.10 Painting

All pipes, valves, flow meters and any other portions of watermain or ferrous metals exposed inside of the well house shall be painted. If necessary, heat shall be provided to maintain good drying conditions. All items to be painted shall be dry and clean before application of the paint. Any rust or scale shall be removed by wire brushing or scraping. Painting system shall be:

1. coat (350 sf/g) Pug Primer (Kopper's or equal)

2. coats (500 sf/g) Rustamor 500 (Kopper's or equal)

SECTION 15 SUPPLEMENTAL TECHNICAL SPECIFICATIONS

15.01

(This page was left blank intentionally - to be completed by the Design Engineer)