

# Mon Valley Sewage Authority



## MARION AVE / HILLTOP AREA SEWER SEPARATION PROJECT

### CONTRACT DOCUMENTS & SPECIFICATIONS PERMIT SUBMITTAL – APRIL 2026 ISSUED FOR BIDDING – MAY 2026



Prepared By:



444 Liberty Avenue  
Four Gateway Center, Suite 300  
Pittsburgh, PA 15222  
Phone: 412.454.5566  
Fax: 412.454.9001

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**SECTION 00 11 13  
ADVERTISEMENTS FOR BIDS**

**ADVERTISEMENT FOR BIDS FOR THE  
MARION AVE / HILLTOP AREA SEWER SEPARATION PROJECT  
MON VALLEY SEWAGE AUTHORITY**

The Mon Valley Sewage Authority (OWNER) will receive separate and sealed bids for the Marion Ave / Hilltop Area Sewer Separation Project at the Mon Valley Sewage Authority located at 20 S Washington Street, Donora, PA 15033 until 10:00 AM local time on Monday, June 8, 2026, at which time and place said Bids will be opened and publicly read aloud. All bids must be received in a separate and sealed envelope or folder for each contract and clearly labeled "Marion Ave / Hilltop Area Sewer Separation Project" and the respective contract number. The general description of the Work includes, but is not limited to the following:

Marion Ave / Hilltop Area Sewer Separation Project: Work to be completed includes but is not limited to the installation of approximately 4,070 lineal feet of 8"-18" sanitary gravity sewers, approximately 130 lineal feet of 36" storm gravity sewers, approximately 37 – 48" diameter sanitary manholes, approximately 1 – 120" diameter storm manhole, disconnection of existing sanitary laterals in combined portions of existing system, 6" sanitary lateral reconnections and in-line cleanout installations, performing connections to existing manholes, approximately 2,870 lineal feet of 8"-12" CIPP manhole-to-manhole lining of existing sanitary sewers, surface restorations including trench line and curb-to-curb pavement restoration, and other miscellaneous and incidental work items for a complete and fully operational installation.

A more complete description of the Work is provided in the Contract Documents which can be examined at the Authority offices or the offices of the Wade Trim, Inc. (ENGINEER) at the following address: Four Gateway Center, 444 Liberty Avenue, Suite 300, Pittsburgh, PA, 15222. Site inspections prior to bid can be scheduled by contacting *Sean C. Gaskill, General Manager at 724-379-4141, or email at s.gaskill@monvalleysewage.com*

Digital copies of documents for bidding purposes may be obtained at the offices of Wade Trim, Inc. between the hours of 9:00 AM and 3:00 PM local time, Monday through Friday. Bid Specifications and Plan sets will be available for distribution on Tuesday, May 12, 2026.

Each proposal shall be accompanied by a Bid Bond in the amount of ten percent (10%) of the total bid which will be returned upon award of the Contracts.

Any aluminum or steel products to be furnished or used for the Project under any Contract shall comply with the Pennsylvania "Trade Practices Act" (71 P.S. §773, 101, et.seq.).

## **ADVERTISEMENTS FOR BIDS**

The Mon Valley Sewage Authority may during the bidding period make certain changes that may alter the plans and specifications. Bidders shall receive addenda for such revisions and any such addenda will become part of the contract documents.

The Mon Valley Sewage Authority 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 a period of one hundred and twenty (120) days after date of receiving bids.

All inquires should be directed to Jason McBride, P.E. at 412-454-5566 (email [jmcbride@wadetrim.com](mailto:jmcbride@wadetrim.com)) and Carter Johnson at 412-454-5566 (email [cjohnson@wadetrim.com](mailto:cjohnson@wadetrim.com)).

**Steve Walko, Chairman**  
Mon Valley Sewage Authority

**SECTION 00 21 13  
INSTRUCTIONS TO BIDDERS**

**PART 1      GENERAL**

1.1 INTRODUCTION

- A. This project is being bid by the Mon Valley Sewage Authority (MVSA), OWNER, whose offices are located at 20 South Washington Street, Donora, PA 15033. Completed bid documents are to be returned to this address in the form and at the time stipulated in these instructions and/or the Advertisement for Bids to the attention of **Mr. Sean Gaskill, General Manager. Mr. Gaskill can be reached at (724) 379-4141 to arrange for a time to visit the project site.**
- B. ENGINEER for the MVSA is Wade Trim, Inc. with offices located in Four Gateway Center, 444 Liberty Avenue, Suite 300, Pittsburgh, PA 15222. All questions regarding the Contract Documents for this Project should be directed to Carter Johnson at (412) 758-4365 or [cjohnson@wadetrim.com](mailto:cjohnson@wadetrim.com), or Jason McBride, P.E., at (412) 454-5566 or [jmcbride@wadetrim.com](mailto:jmcbride@wadetrim.com). Electronic copies, via secure file transfer, of the Contract Documents can be obtained from Wade Trim, Inc. by contacting Carter Johnson listed above.

1.2 DEFINED TERMS

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

1.3 SCOPE OF WORK

- A. The scope and location of Work are set forth in Section 01 11 00, Summary of Work.

1.4 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, shall furnish evidence, satisfactory to the OWNER, of the Bidder's experience and familiarity with Work of the character specified, and his financial ability to properly prosecute the proposed Work to completion within the specified time. The evidence requested may include, but shall not be limited to, the following:
1. The address and description of the Bidder's plant or permanent place of business.
  2. The Bidder's performance records for all Work awarded to, or started by him within the past three years.
  3. An itemized list of the Bidder's equipment available for use on the proposed Contract.

## INSTRUCTIONS TO BIDDERS

4. The Bidder's financial statements for the last 3 to 5 years, including statement of ownership of equipment necessary to be used in executing Work under Contract.
5. The name and qualifications of the lead Project Manager and Support Team for this Project.
6. List of subcontractors and major equipment suppliers including company name, contact name, address, phone number, fax number and contact email address.
7. 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
8. Such additional information as will satisfy the OWNER that the Bidder is adequately prepared to fulfill the Contract.

### 1.5 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;
  4. Study and carefully correlate Bidder's knowledge and observations with the Contract Documents and such other related data; and
  5. Promptly notify ENGINEER in writing of all conflicts, errors, ambiguities or discrepancies which Bidder has discovered in or between Contract Documents and such related documents.
- B. On request OWNER will provide each Bidder access to the site to conduct such investigations and tests as each Bidder deems necessary for submission of his Bid. Bidder shall fill all holes and clean up and restore the site to its former conditions upon completion of such investigation and tests.
- C. The lands upon which the Work is to be performed, rights-of-way for access thereto and other lands designated for use by CONTRACTOR in performing the Work are identified in Section 01 11 00, Summary of Work, or on the Plans, as applicable.
- D. The locations of utilities or structures as shown on the Plans are taken from sources believed to be reliable. Neither OWNER nor ENGINEER will be

## INSTRUCTIONS TO BIDDERS

responsible for any omissions of or variations from, the indicated location of existing utilities or structures which may be encountered in the Work.

- E. The submission of a Bid will constitute an incontrovertible representation by the Bidder that he 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 meeting the OWNER's requirements as set forth in the Contract Documents, that BIDDER has given ENGINEER written notice of all conflicts, errors, ambiguities and discrepancies that BIDDER has discovered in Contract Documents and the resolution by ENGINEER is acceptable to BIDDER, and that the Contract Documents are sufficient in scope and detail to indicate and convey sufficient 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.

### 1.6 INTERPRETATIONS ADDENDA

- A. Should any prospective bidder find discrepancies in or omissions from the Plans, Specifications or other parts of the Contract Documents, he 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 may not be answered. Any interpretation of inquiry will be made by Addendum duly issued to all prospective bidders via electronic email.
- B. Any change in or addition to the Contract Documents deemed necessary by the OWNER shall be made in the form of an Addendum issued to all prospective bidders who have taken out Contract Documents and all such Addenda shall 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.

### 1.7 BID SECURITY

- A. Bid Security shall be made payable to OWNER, in the amount of ten (10) percent of the Bidder's maximum Bid price and in a form as indicated in the Advertisement. Bid Bonds, shall be issued on the form included in the Contract Documents by a Surety meeting the requirements of paragraph 5.01 of the General Conditions.
- B. The Bid Security of the Successful Bidder will be retained until such Bidder has executed the 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, OWNER may annul the Notice of Award and the Bid Security of that Bidder will be forfeited. The Bid Security of any Bidder whom OWNER believes to have a reasonable chance of receiving the award may be retained by 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

## INSTRUCTIONS TO BIDDERS

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.

### 1.8 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 Proposal and will be included in the Agreement.

### 1.9 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. 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 CONTRACTOR, if acceptable to ENGINEER, application for such acceptance will not be considered by ENGINEER until after the Effective Date of Agreement. In addition, in no case shall ENGINEER's denial of CONTRACTOR's application give rise to any claim for additional cost, it being understood by CONTRACTOR that acceptance of substitute or an "or equal" item of material is at the sole discretion of ENGINEER. Costs associated with the acceptance of the "or equal" item shall be the responsibility of the CONTRACTOR and could include labor and material costs associated with the additional engineering review, design changes associated with installation of the "or equal" item, additional construction costs and any and all other charges associated with the "or equal" item.

### 1.10 RECEIPT AND FORM OF BID

- A. Bids shall be submitted at the time and place indicated in the Advertisement for Bids and shall be included 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. If the Bid is sent through the mail or other delivery system, the sealed envelope shall be enclosed in a separate envelope with the notation "BID ENCLOSED" on the face thereof. Any Bid received after the scheduled time and place indicated in the Advertisement for Bids shall be returned unopened.
  - 1. OWNER invites bids on the Proposal and other form(s) attached hereto. Bids will be received at the time and place indicated in the Advertisement and thereupon will be publicly opened and read. An abstract of the amounts of the base bids and any major alternates will be made available after the opening of Bids.
  - 2. OWNER may reject any Bid on which there is an alteration of, or departure from the Proposal Form attached hereto.
  - 3. The complete set of Contract Documents must be used in preparing Bids: neither OWNER nor ENGINEER assumes any responsibility for errors or

## INSTRUCTIONS TO BIDDERS

misinterpretations resulting from the use of incomplete sets of Contract Documents. In order to verify the completeness of the set of Contract Documents the Bidder used in preparing his Bid, the OWNER may require the Bidder to submit the set of Contract Documents he used in preparing his Bid. Bidder shall submit his Bid on the separate Proposal form included in these Contract Documents.

4. The Proposal shall be legibly prepared, with ink or typewriter, on the form included in these Contract Documents. Blank spaces in the proposal forms must be correctly filled in where indicated for each and every item for which a quantity is given. Proposals will be compared on basis of lump sum items, if any, and on product of the quantities of items listed at the respective unit prices bid.
5. Erasures or other changes in the Bids must be explained or noted over the signature of the Bidder.
6. All names must be typed or printed below the signature.
7. The Bidder shall submit a LUMP SUM price proposal for the Work as shown on the Drawings and explained in the Specifications. Bids shall be compared based on the total LUMP SUM price and will serve in the Award of Contracts. Payment will be made based on the approved CONTRACTOR's Schedule of Values and the actual Work completed at the time of payment request. An unbalanced Schedule of Values may be rejected by the OWNER.
8. The Unit Prices bid shall include such amounts as the Bidder deems proper for overhead, profit, taxes, General Conditions and such other incidentals as noted in the Contract Documents.
9. The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Proposal Form.
10. The Legal Status of Bidder Form contained in the Contract Documents must be submitted with each Proposal 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.
11. Other documents to be attached to the Proposal and made a condition thereof are identified in the Proposal. The same individual signing the Proposal shall sign these other documents.

### 1.11 MODIFICATIONS AND WITHDRAWAL OF BIDS

- A. Bids may be modified or withdrawn by an appropriate document duly executed

## INSTRUCTIONS TO BIDDERS

(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. If, within 24 hours after Bids are opened, any Bidder files a duly signed written notice with OWNER and promptly thereafter demonstrates to the reasonable satisfaction of OWNER that there was a material and substantial mistake in the preparation of his Bid, that Bidder may withdraw his Bid and the Bid Security will be returned. Thereafter, at the sole option of OWNER, that Bidder will be disqualified from further Bidding on the Work to be provided under the Contract Documents.

### 1.12 VALIDITY OF BIDS

- A. Title 62 PACSA Section 394, all bids received for the project shall remain valid for a period of 120 days from the date of bid opening.

### 1.13 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 the right to reject all nonconforming, non-responsive, unbalanced, or conditional Bids. 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. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.
- B. In evaluating Bids, OWNER shall 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 OWNER's intent to accept alternates (if any are accepted) in the order in which they are listed in the Bid form but OWNER may accept them in any order or combination. OWNER has the sole discretion to reject any alternate without explanation. Subject to the approval of OWNER, the Contract will be awarded to the lowest responsive and responsible Bidder. Responsibility of Bidder will be determined on basis of past performance on Work of similar character, equipment and labor available to do the Work and financial status. Contract shall be considered to have been awarded after the approval of OWNER has been duly obtained and a formal Notice of Award duly served on the successful Bidder by OWNER. Contract shall not be binding upon OWNER until the Agreement has been duly executed by the Bidder and the duly authorized officials of OWNER.
- C. If the Contract is to be awarded, OWNER will give the successful Bidder a Notice of Award within 120 days after the day of the Bid opening, unless such other time is specified in the Advertisement for Bids.

## INSTRUCTIONS TO BIDDERS

### 1.14 SIGNING OF AGREEMENT

- A. Within 15 days after OWNER gives a Notice of Award to the successful Bidder, the CONTRACTOR shall sign and deliver the specified number of counterparts of the Agreement to OWNER with all other Contract Documents attached. Within ten (10) days thereafter, OWNER will deliver two (2) fully signed counterparts to CONTRACTOR. ENGINEER will identify, date or correct those portions of the Contract Documents not fully signed, dated or executed by OWNER and CONTRACTOR and such identification, dating or correction shall be binding on all parties.

### 1.15 PENNSYLVANIA PREVAILING MINIMUM WAGE RATES

- A. Pennsylvania Prevailing Minimum Wage Rates will apply to this work and have been included with the Contract Documents or will be issued as an addendum to the Contract Documents during Bid Phase.

### 1.16 PENNSYLVANIA STEEL PRODUCTS PROCUREMENT ACT

- A. All materials and installed equipment shall comply with the Commonwealth of Pennsylvania "Steel Products Procurement Act: Act No. 3 of 1978 as amended. It is the responsibility of the CONTRACTOR and MANUFACTURER to verify compliance with the act, and to provide documentation demonstrating compliance at the request of the OWNER. Costs associated with the replacement of non-conforming materials or installed equipment will be the responsibility of the CONTRACTOR.

### 1.17 MANDATORY PREBID MEETING

- A. A mandatory pre-bid meeting for all interested CONTRACTORS will be held at the **Authority office located at the Mon Valley Sewage Authority on Monday, June 1, 2026, at 10:00 AM** by the OWNER and ENGINEER.

If a CONTRACTOR submits a bid who DID NOT attend the mandatory Prebid meeting, his/her bid will be rejected.

### 1.18 PERFORMANCE AND PAYMENT BONDS

- A. The successful BIDDER, simultaneously with the execution of the Agreement, shall furnish a Performance Bond and a Labor and Material Payment Bond, each in an amount equal to one hundred percent (100%) of the contract price. The bonds shall be secured from a surety company acceptable to the OWNER and shall be in a form acceptable to the OWNER. Example forms of the bonds the successful BIDDER will be required to furnish are included in the project bidding documents as Sections 00 61 12 and 00 61 13.

### 1.19 PENNSYLVANIA TRADE PRACTICES ACT

- A. Any aluminum or steel products to be furnished or used for the Project under any Contract shall comply with the Pennsylvania "Trade Practices Act" (71 P.S. §773,

**INSTRUCTIONS TO BIDDERS**

101, et.seq.)

**PART 2**      **PRODUCTS (NOT USED)**

**PART 3**      **EXECUTION (NOT USED)**

END OF SECTION

**SECTION 00 42 43  
BID FORM**

**PROJECT IDENTIFICATION: Marion Ave / Hilltop Area Sewer Separation Project**

THIS BID IS SUBMITTED TO: Mon Valley Sewage Authority, 20 South Washington Street, Donora, PA 15033, hereinafter referred to as OWNER.

1. Enter Into Agreement

The undersigned BIDDER proposes and agrees, if this Bid is accepted, to enter into an Agreement with OWNER in the form included in the Contract Documents to perform and furnish all Work as specified or indicated in the Contract Documents for the Bid Price and within the Bid Times indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.

2. BIDDER Accepts

BIDDER accepts all of the terms and conditions of the Advertisement or Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 120 days after the day of Bid opening. BIDDER will sign and deliver the required number of counterparts of the Agreement with the Bonds and other documents required by the Bidding Requirements within 15 days after the date of OWNER's Notice of Award.

3. BIDDER's Representations

In submitting this Bid, BIDDER represents, as more fully set forth in the Agreement, that:

- a. BIDDER has examined and carefully studied the Bidding Documents and the following Addenda receipt of all which is hereby acknowledged:

Addendum No.	Date of Release	Signature
_____	_____	_____
_____	_____	_____

**BIDDER EXECUTING BID MUST COMPLETE THE FOLLOWING (EACH PAGE)**

Corporation Name \_\_\_\_\_ by \_\_\_\_\_ title \_\_\_\_\_  
*signature*

Individual \_\_\_\_\_  
*printed name* *signature*

Partnership \_\_\_\_\_ by \_\_\_\_\_ Partner  
*name* *signature*

Joint Venture \_\_\_\_\_ by \_\_\_\_\_ title \_\_\_\_\_  
*name* *signature*

**BID FORM**

Addendum No.	Date of Release	Signature
_____	_____	_____
_____	_____	_____
_____	_____	_____

- b. BIDDER has visited the site and become familiar with and is satisfied as to the general, local and site conditions that may affect cost, progress, performance and furnishing of the Work.
- c. BIDDER is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress, performance and furnishing of the Work.
- d. BIDDER has carefully studied all reports of explorations and tests of subsurface conditions at or contiguous to the site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site (except Underground Facilities) which have been identified in paragraph 4.02. of the General Conditions.

BIDDER accepts the limitations set forth in paragraph GC-4.02. of the General Conditions with respect to the reports and drawings.

BIDDER acknowledges that such reports and drawings are not Contract Documents and may not be complete for BIDDER's purposes.

BIDDER acknowledges that OWNER and ENGINEER do not assume responsibility for the accuracy or completeness of information and data shown or indicated with respect to existing Underground Facilities at or contiguous to the site.

- e. BIDDER is aware of the general nature of Work to be performed by OWNER and others at the site that relates to Work for which this Bid is submitted as indicated in the Contract Documents.
- f. BIDDER has correlated the information known to BIDDER, information and observations obtained from visits to the site, reports and drawings identified in the Contract Documents and all additional examinations, investigations, explorations, tests, studies and data with the Contract Documents.

**BIDDER EXECUTING BID MUST COMPLETE THE FOLLOWING (EACH PAGE)**

Corporation Name \_\_\_\_\_ by \_\_\_\_\_ title \_\_\_\_\_  
*signature*

Individual \_\_\_\_\_  
*printed name signature*

Partnership \_\_\_\_\_ by \_\_\_\_\_ Partner  
*name signature*

Joint Venture \_\_\_\_\_ by \_\_\_\_\_ title \_\_\_\_\_  
*name signature*

**BID FORM**

- g. BIDDER has given ENGINEER written notice of all conflicts, errors, ambiguities or discrepancies in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to BIDDER, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work for which this Bid is submitted.

Where conflicts, errors, ambiguities or discrepancies have been discovered in or between Contract Documents and/or other related documents, and where said conflicts, etc., have not been resolved through the interpretations or clarifications by of insufficient time or otherwise, BIDDER has included in the Bid the greater quantity or better quality of Work, or compliance with the more stringent requirement resulting in a greater cost.

- h. This 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 corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for itself any advantage over any other BIDDER or over OWNER.

-----  
**BIDDER EXECUTING BID MUST COMPLETE THE FOLLOWING (EACH PAGE)**

Corporation Name \_\_\_\_\_ by \_\_\_\_\_ title \_\_\_\_\_  
*signature*

Individual \_\_\_\_\_  
*printed name signature*

Partnership \_\_\_\_\_ by \_\_\_\_\_ Partner  
*name signature*

Joint Venture \_\_\_\_\_ by \_\_\_\_\_ title \_\_\_\_\_  
*name signature*

**BID FORM**

4. Bid Prices.

BIDDER shall complete the work in accordance with the Contract Documents for the following **BASE BID** price:

1) **Base Bid –**

*The Marion Avenue / Hill Top Sewer Separation Project consists of separating an existing combined sewer system via installation of a new parallel sanitary sewer, and conversion of the existing combined sewer to storm sewer.*

*The scope of work includes but is not limited to the installation of approximately 4,070 lineal feet of 8"-18" sanitary gravity sewers, approximately 130 lineal feet of 36" storm gravity sewers, approximately 37 - 48" diameter sanitary manholes, approximately 1 - 120" diameter storm manhole, disconnection of existing sanitary laterals in combined portions of existing system, 6" sanitary lateral reconnections and in-line cleanout installations, performing connections to existing manholes, approximately 2,870 lineal feet of 8-12" CIPP manhole-to-manhole lining of existing sanitary sewers, surface restorations including trench line and curb-to-curb pavement restoration, and other miscellaneous and incidental work items for a complete and fully operational installation.*

**BIDDER EXECUTING BID MUST COMPLETE THE FOLLOWING (EACH PAGE)**

Corporation Name \_\_\_\_\_ by \_\_\_\_\_ title \_\_\_\_\_  
*signature*

Individual \_\_\_\_\_  
*printed name signature*

Partnership \_\_\_\_\_ by \_\_\_\_\_ Partner  
*name signature*

Joint Venture \_\_\_\_\_ by \_\_\_\_\_ title \_\_\_\_\_  
*name signature*

**BID FORM**

Item No.	Bid Item	Unit	Quantity	Unit Price	Total
1	8" Main Sewer, SDR 35	LF	3,950	\$ _____	\$ _____
2	12" Main Sewer, SDR 35	LF	90	\$ _____	\$ _____
3	18" Main Sewer, SDR 35	LF	30	\$ _____	\$ _____
4	6" Lateral, SDR 35	LF	935	\$ _____	\$ _____
5	48" Precast Manhole	EA	37	\$ _____	\$ _____
6	36" Storm Sewer, SDR 35	LF	130	\$ _____	\$ _____
7	120" Storm Manhole	EA	1	\$ _____	\$ _____
8	8" Cured-in-Place Pipe (CIPP) Liner	LF	1620		
9	10" Cured-in-Place Pipe (CIPP) Liner	LF	300	\$ _____	\$ _____
10	12" Cured-in-Place Pipe (CIPP) Liner	LF	950		
11	Heavy Cleaning/Root Cutting	LF	15	\$ _____	\$ _____
12	Excavation and Disposal	CY	7,770	\$ _____	\$ _____
13	Aggregate Backfill	CY	6,990	\$ _____	\$ _____
14	Bituminous Pavement Replacement – Base Course	SY	2,140	\$ _____	\$ _____
15	Bituminous Pavement Replacement – Wearing Course	SY	7,880	\$ _____	\$ _____
16	1-1/2" Milling	SY	5,740	\$ _____	\$ _____
17	Concrete Pavement Restoration	CY	160	\$ _____	\$ _____
18	Lawn Restoration	SY	2,450	\$ _____	\$ _____
19	Sidewalk Restoration	SY	15	\$ _____	\$ _____
20	Driveway Restoration	SY	30	\$ _____	\$ _____
21	Asphalt Curb Restoration	LF	4,240	\$ _____	\$ _____
22	Concrete Curb Restoration	LF	80	\$ _____	\$ _____
23	Manhole Connections	EA	12	\$ _____	\$ _____
24	Locate and Raise Manholes	EA	3	\$ _____	\$ _____
25	Bypass Pumping	HR	360	\$ _____	\$ _____
26	Traffic Control	LS	1	\$ _____	\$ _____
27	Flushing of Existing Sewer	LS	1	\$ _____	\$ _____
28	Mobilization	LS	1	\$ _____	\$ _____
<b>TOTAL BASE BID:</b>	\$ _____				

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**BIDDER EXECUTING BID MUST COMPLETE THE FOLLOWING (EACH PAGE)**

Corporation Name \_\_\_\_\_ by \_\_\_\_\_ title \_\_\_\_\_  
*signature*

Individual \_\_\_\_\_  
*printed name signature*

Partnership \_\_\_\_\_ by \_\_\_\_\_ Partner  
*name signature*

Joint Venture \_\_\_\_\_ by \_\_\_\_\_ title \_\_\_\_\_  
*name signature*

**BID FORM**

BIDDER shall complete the work, including the above-listed items, in accordance with the Contract Documents for the Total PRICE of:

\_\_\_\_\_ (\$ \_\_\_\_\_)  
*(use words)* *(use figures)*

5. Completion.

BIDDER agrees that the work will be substantially complete within 365 consecutive calendar days (12 months) after the date when the Contract Times commences to run as provided in paragraph 2.03 and 14.07. of the General Conditions, and completed and ready for final payment in accordance with paragraph 14.09 and 14.10 of the General Conditions within 396 consecutive calendar days (13 months) consecutive calendar days after the date when the Contract Times commences to run.

BIDDER accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work within the times specified in the Agreement.

6. Attached Documents.

The following documents are attached to and made a condition of this Bid:

- a. This Bid Form and the Required Bid Security in the form of a certified or cashiers check or bid bond in an amount not less than ten (10) percent of the bid price.
- b. Non-collusion Affidavit
- c. Legal Status of Bidder

7. Address for Communications.

Communications concerning this Bid shall be addressed to the person and to the address of BIDDER indicated below:

Name (print): \_\_\_\_\_

Phone No.: \_\_\_\_\_

Address: \_\_\_\_\_

**BIDDER EXECUTING BID MUST COMPLETE THE FOLLOWING (EACH PAGE)**

Corporation Name \_\_\_\_\_ by \_\_\_\_\_ title \_\_\_\_\_  
*signature*

Individual \_\_\_\_\_  
*printed name* *signature*

Partnership \_\_\_\_\_ by \_\_\_\_\_ Partner  
*name* *signature*

Joint Venture \_\_\_\_\_ by \_\_\_\_\_ title \_\_\_\_\_  
*name* *signature*

8. Defined Terms.

Terms used in this Bid which are defined in the General Conditions or Instructions will have the meanings indicated in the Instructions, the General Conditions and/or the Supplementary Conditions to the General Conditions.

SUBMITTED on \_\_\_\_\_, 20\_\_\_\_.

State CONTRACTOR License No. \_\_\_\_\_

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**BIDDER EXECUTING BID MUST COMPLETE THE FOLLOWING (EACH PAGE)**

Corporation Name \_\_\_\_\_ by \_\_\_\_\_ title \_\_\_\_\_  
*signature*

Individual \_\_\_\_\_  
*printed name signature*

Partnership \_\_\_\_\_ by \_\_\_\_\_ Partner  
*name signature*

Joint Venture \_\_\_\_\_ by \_\_\_\_\_ title \_\_\_\_\_  
*name signature*

**BID FORM**

If BIDDER is:

**An Individual**

By \_\_\_\_\_ (SEAL)  
*(Individual's name)*

doing business as \_\_\_\_\_

Business address: \_\_\_\_\_

**A Partnership**

By \_\_\_\_\_ (SEAL)  
*(Firm name)*

\_\_\_\_\_  
*(General partner)*

Business address: \_\_\_\_\_

**A Corporation**

By \_\_\_\_\_ (SEAL)  
*(Corporation name)*

\_\_\_\_\_  
*(State of incorporation)*

By \_\_\_\_\_ (SEAL)  
*(Name of person authorized to sign)*

\_\_\_\_\_  
*(Title)*

(Corporate Seal)

Attest \_\_\_\_\_  
*(Secretary)*

Business address: \_\_\_\_\_

**BIDDER EXECUTING BID MUST COMPLETE THE FOLLOWING (EACH PAGE)**

Corporation Name \_\_\_\_\_ by \_\_\_\_\_ title \_\_\_\_\_  
*signature*

Individual \_\_\_\_\_  
*printed name signature*

Partnership \_\_\_\_\_ by \_\_\_\_\_ Partner  
*name signature*

Joint Venture \_\_\_\_\_ by \_\_\_\_\_ title \_\_\_\_\_  
*name signature*

Phone number: \_\_\_\_\_

**A Joint Venture**

By \_\_\_\_\_ (Name) (SEAL)

\_\_\_\_\_  
(Address)

By \_\_\_\_\_ (Name) (SEAL)

\_\_\_\_\_  
(Address)

NOTE: Each joint venturer must sign. The manner of signing for each individual, partnership and corporation that is a party to the joint venture should be in the manner indicated above.

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**BIDDER EXECUTING BID MUST COMPLETE THE FOLLOWING (EACH PAGE)**

Corporation Name \_\_\_\_\_ by \_\_\_\_\_ *signature* title \_\_\_\_\_

Individual \_\_\_\_\_ *printed name* \_\_\_\_\_ *signature*

Partnership \_\_\_\_\_ *name* by \_\_\_\_\_ *signature* Partner

Joint Venture \_\_\_\_\_ *name* by \_\_\_\_\_ *signature* title \_\_\_\_\_

## BID FORM

### INSTRUCTIONS FOR NONCOLLUSION AFFIDAVIT

1. This Noncollusion Affidavit is material to any contract awarded pursuant to this bid. According to the Pennsylvania Antibid-Rigging Act. 73 P.S. §§ 1611, et. seq., governmental agencies may require Noncollusion Affidavits to be submitted together with bids.
2. This Noncollusion Affidavit must be executed by the member, officer or employee of the bidder who makes the final decision on prices and the amount quoted in the bid.
3. Bid rigging and other efforts to restrain competition, and the making of false sworn statements in connection with the submission of bids are unlawful and may be subject to criminal prosecution. The person who signs the Affidavit should examine it carefully before signing and assure himself or herself that each statement is true and accurate, making diligent inquiry, as necessary, of all other persons employed by or associated with the bidder with responsibilities for the preparation, approval or submission of the bid.
4. In the case of a bid submitted by a joint venture, each party to the venture must be identified in the bid documents, and an Affidavit must be submitted separately on behalf of each party.
5. The term "complementary bid", as used in the Affidavit, has the meaning commonly associated with that term in the bidding process, and includes the knowing submission of bids higher than the bid of another firm, any intentionally high or noncompetitive bid, and any other form of bid submitted for the purpose of giving a false appearance of competition.
6. Failure to file an Affidavit in compliance with these instructions will result in disqualification of the bid.

#### **BIDDER EXECUTING BID MUST COMPLETE THE FOLLOWING (EACH PAGE)**

Corporation Name \_\_\_\_\_ by \_\_\_\_\_ title \_\_\_\_\_  
*signature*

Individual \_\_\_\_\_  
*printed name* \_\_\_\_\_  
*signature*

Partnership \_\_\_\_\_ by \_\_\_\_\_ Partner  
*name* \_\_\_\_\_  
*signature*

Joint Venture \_\_\_\_\_ by \_\_\_\_\_ title \_\_\_\_\_  
*name* \_\_\_\_\_  
*signature*

**NONCOLLUSION AFFIDAVIT**

Required by the Mon Valley Sewage Authority and authorized by the Antibid-Rigging Act, Act No. 1983-45, Section 7 (73 P.S. 1617).

BEFORE ME, a Notary Public, personally appeared the undersigned Bidder (the "Bidder"), who being duly authorized to make this Affidavit on behalf of its owners, directors, and officers and being duly sworn according to law, deposes and says that, by submission of the bid to which this Affidavit is attached, the Bidder and each person signing on behalf of the Bidder; and if a joint bid, each signer jointly and severally as Bidders, certifies as to the organization of each under penalty or perjury, that to the best of the knowledge, information and belief of the Bidder, as follows:

SECTION 1. The prices submitted in the attached bid have been calculated and are hereby submitted independently and without collusion, consultation, communication or agreement of any kind with any competitor, for the purposes of restricting competition as to any matter relative to prices, escalations or quotations, with any competitor to the Bidder.

SECTION 2. Unless otherwise required by law, the prices which have been calculated and quoted in the attached bid have not been disclosed knowingly by the Bidder prior to submission of the bid, and will not be disclosed knowingly by the Bidder after the submission and prior to the opening of the bid, either directly or indirectly to any competitor of the Bidder or to any other Bidder.

SECTION 3. No attempt has been made prior to submission of the bid or will be made subsequent to the submission of the bid by the Bidder to induce in any way any other person, association, partnership, joint venture or corporation to submit or refrain from submitting a bid for the purpose of restricting competition.

SECTION 4. That the Bidder in preparation and submission of the attached bid to the Mon Valley Sewage Authority has not engaged in any "bid-rigging" activity as the same are defined in the Antibid-Rigging Act, Act No. 1983-45, Section 2 (73 P.S. 1612).

SECTION 5. The Bidder, its affiliates, subsidiaries, officers, directors and employees, and any person signing on behalf of the Bidder, have not been convicted or found liable for any act prohibited by State or Federal law in any jurisdiction involving conspiracy or collusion with respect to bidding on any public contract within the last three (3) years, except as are listed on the attachment, attached hereto and made a part hereof.

**BIDDER EXECUTING BID MUST COMPLETE THE FOLLOWING (EACH PAGE)**

Corporation Name \_\_\_\_\_ by \_\_\_\_\_ title \_\_\_\_\_  
*signature*

Individual \_\_\_\_\_  
*printed name* \_\_\_\_\_  
*signature*

Partnership \_\_\_\_\_ by \_\_\_\_\_ Partner  
*name* \_\_\_\_\_  
*signature*

Joint Venture \_\_\_\_\_ by \_\_\_\_\_ title \_\_\_\_\_  
*name* \_\_\_\_\_  
*signature*

**BID FORM**

If any such person has been convicted or found liable for any such prohibited act, the same does not prohibit the Mon Valley Sewage Authority from awarding a contract to that person, but may be a ground for consideration on the question of whether the Mon Valley Sewage Authority should decline to award a contract to that person on the basis of lack of responsibility on that person.

SECTION 6. This Affidavit is made and submitted to comply with Section 7 of Act. No. 1983-45 of the Commonwealth of Pennsylvania (73 P.S. 1617) and all amendments or revisions thereto and the rules and regulations authorized thereunder, in order to permit the Mon Valley Sewage Authority to act thereunder as a governmental agency. Any misstatement in this Affidavit is, and shall be treated as, a fraudulent concealment from the Mon Valley Sewage Authority of the true facts relating to the submission of bids for this contract.

ATTEST OR WITNESS:

\_\_\_\_\_  
Bidder

COMMONWEALTH OF PENNSYLVANIA

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

Sworn to and subscribed before me this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

\_\_\_\_\_  
Notary Public

END OF SECTION

**BIDDER EXECUTING BID MUST COMPLETE THE FOLLOWING (EACH PAGE)**

Corporation Name \_\_\_\_\_ by \_\_\_\_\_ title \_\_\_\_\_  
*signature*

Individual \_\_\_\_\_  
*printed name signature*

Partnership \_\_\_\_\_ by \_\_\_\_\_ Partner  
*name signature*

Joint Venture \_\_\_\_\_ by \_\_\_\_\_ title \_\_\_\_\_  
*name signature*

**SECTION 00 43 13  
BID BOND FORM**

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned, \_\_\_\_\_

\_\_\_\_\_ as Principal, hereinafter called the Principal, and \_\_\_\_\_

\_\_\_\_\_ a corporation duly organized under the laws of the State of \_\_\_\_\_

and duly authorized to transact business in the Commonwealth of Pennsylvania, as Surety, hereinafter called the Surety, are held and firmly bound unto the MON VALLEY SEWAGE AUTHORITY as OWNER, hereinafter called the OWNER, in the sum of \_\_\_\_\_

\_\_\_\_\_ Dollars (\$ \_\_\_\_\_),

which is equivalent to ten (10) percent of the total bid price, 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 **Contract-\_\_\_\_\_** of the **Marion Ave / Hilltop Area Sewer Separation Project** being undertaken by the OWNER.

NOW, THEREFORE, if the OWNER shall accept the Bid of the Principal and the Principal shall 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 shall pay 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 shall 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**

This Proposal is submitted in the name of:

(Print) \_\_\_\_\_

The undersigned hereby designates below his business address to which all notices, directions or other communications may be served or mailed:

Street \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ Zip Code \_\_\_\_\_

The undersigned hereby declares that he has legal status checked below:

- SOLE PROPRIETOR
- SOLE PROPRIETOR DOING BUSINESS UNDER AN ASSUMED NAME
- CO-PARTNERSHIP  
The Assumed Name of the Co-Partnership is registered in the County of \_\_\_\_\_, Pennsylvania
- CORPORATION INCORPORATED UNDER THE LAWS OF THE STATE OF \_\_\_\_\_. The Corporation is
  - authorized to conduct business in the Commonwealth of Pennsylvania
  - not now authorized to conduct business in the Commonwealth of Pennsylvania
  - possess all required licenses for the work being bid
  - limited liability corporation

The name, titles, and home addresses of all persons who are officers or partners in the organization are as follows:

NAME AND TITLE	HOME ADDRESS
_____	_____
_____	_____
_____	_____
_____	_____

Signed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

By \_\_\_\_\_ (Signature)

Printed Name of Signer \_\_\_\_\_

Title \_\_\_\_\_

**SECTION 00 51 00  
NOTICE OF AWARD**

To: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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

Attention: \_\_\_\_\_

Project: Marion Ave / Hilltop Area Sewer Separation Project

Gentlemen:

Pursuant to the provisions of Article 1.11 of the Instructions to Bidders, you are hereby notified that the Board of Directors of the Mon Valley Sewage Authority (MVSA) during a scheduled and duly advertised Board Meeting held on \_\_\_\_\_, 20\_\_, directed the acceptance of your Bid for the above referenced Project in the amount of \$ \_\_\_\_\_ (words and numbers) contingent upon the timely securement and final settlement of the necessary financing for the Project and complete and timely compliance with the conditions set forth below as well as any other conditions or requirements set forth in the Documents. This project shall consist of:

The Marion Avenue / Hill Top Sewer Separation Project consists of separating an existing combined sewer system via installation of a new parallel sanitary sewer, and conversion of the existing combined sewer to storm sewer.

The scope of work includes but is not limited to the installation of approximately 4,070 lineal feet of 8"-18" sanitary gravity sewers, approximately 130 lineal feet of 36" storm gravity sewers, approximately 37 - 48" diameter sanitary manholes, approximately 1 - 120" diameter storm manhole, disconnection of existing sanitary laterals in combined portions of existing system, 6" sanitary lateral reconnections and in-line cleanout installations, performing connections to existing manholes, approximately 2,870 lineal feet of 8-12" CIPP manhole-to-manhole lining of existing sanitary sewers, surface restorations including trench line and curb-to-curb pavement restoration, and other miscellaneous and incidental work items for a complete and fully operational installation, as delineated in your Bid submitted to the MVSA on \_\_\_\_\_, 20\_\_. Please comply with the following conditions within fifteen (15) days of the date of this Notice of Award; that is by \_\_\_\_\_, 20\_\_.

1. Deliver to the ENGINEER four (4) fully executed counterparts of the Agreement (attached) including all the Contract Documents.
2. Deliver with each executed Agreement the Contract Security (Bonds), on the form included in the Contract Documents, as specified in the General Conditions (Article 5) and Supplementary Conditions (Article SC-5).
3. Deliver with each executed Agreement the Insurance Certificates (and other evidence of insurance) as specified in General Conditions (Article 5) or the Supplementary General Conditions (Article SC-5).
4. Please do not date Agreement and Contract Security (Bonds), as these will be dated by OWNER when executed by it.

**NOTICE OF AWARD**

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.

Within ten (10) days after you comply with these conditions, OWNER will return to you one (1) fully signed counterpart of the Agreement with the Contract Documents attached.

A pre-construction meeting will be scheduled with all contracts associated with this project after receipt of all executed counterparts of the Agreement from each contractor. In accordance with paragraph 2.05 of the General Conditions, please submit to the ENGINEER the required schedules prior to the scheduling of a Preconstruction Meeting.

If you have any questions regarding the content of this correspondence or the Agreement, please call Mr. Carter Johnson, Wade Trim, Inc., at (412) 758-4365.

\_\_\_\_\_  
*(Owner)*

By: \_\_\_\_\_  
*(Authorized Signatory)*

\_\_\_\_\_  
*(Title)*

cc: Jason McBride, P.E., Wade Trim, Inc.

**SECTION 00500  
AGREEMENT**

**CONTRACT: MARION AVE / HILLTOP AREA SEWER SEPARATION PROJECT**

This Agreement, made and entered into this \_\_\_\_ day of \_\_\_\_ in the year 20\_\_ by and between the Mon Valley Sewage Authority, hereinafter called OWNER, and \_\_\_\_\_, hereinafter called CONTRACTOR, for the following contract:

Marion Ave / Hilltop Area Sewer Separation Project

OWNER and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

**ARTICLE 1. WORK**

CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents.

The Project for which the Work under the Contract Documents may be the whole or only a part is described more fully in the Contract Specifications and on the Contract Drawings.

**ARTICLE 2. ENGINEER**

The Project has been designed by Wade Trim, Inc., Four Gateway Center, 444 Liberty Avenue, Suite 300, Pittsburgh, PA, 15222; telephone (412) 454-5566, who is hereinafter called ENGINEER and who is to act as OWNER's representative, assume all duties and responsibilities, and have the rights and authority assigned to ENGINEER in the Contract Documents, or approved by the OWNER, in connection with completion of the Work in accordance with the Contract Documents.

**ARTICLE 3. CONTRACT TIMES**

3.1 The Work will be substantially completed within **365 consecutive calendar days (12 months)** after the date noted in the Notice to Proceed and completed and ready for final payment in accordance with paragraphs 14.09 and 14.10 of the General Conditions within **396 consecutive calendar days (13 months)** after the date when the Contract Times commence to run.

3.2 Liquidated Damages. OWNER and CONTRACTOR recognize that time is of the essence of this Agreement and that OWNER will suffer financial loss if the Work is not completed within the times specified for final completion in the Contract Documents above. They also recognize the delays, expense and difficulties involved in proving the actual loss suffered by OWNER if the Work is not completed on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty), CONTRACTOR shall pay OWNER **One Thousand Five-Hundred Dollars (\$1,500.00)** for each day that expires after the time specified in the Contract Documents for Final Completion until the Work is finally complete.

**AGREEMENT**

**ARTICLE 4. CONTRACT PRICE**

OWNER shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined pursuant to paragraph 4.1. below:

4.1 For all Work, a Total Price of \_\_\_\_\_  
*(use words)*

\$ \_\_\_\_\_  
*(Figures)*

All specific cash allowances are included in the above price and have been computed in accordance with Article 11 of the General Conditions.

**ARTICLE 5. PAYMENT PROCEDURES**

CONTRACTOR shall submit Applications for Payment to ENGINEER for review and approval by the third day of the month following the month for which the application is made. ENGINEER shall submit the approved application to OWNER for review and approval at least 7 days prior to the OWNER's regularly scheduled meeting on the third Thursday of each month.

5.1 Progress Payments; Retainage. OWNER shall make monthly progress payments on account of the Contract Price on the basis of CONTRACTOR's Applications for Payment as recommended for payment by ENGINEER, during construction as provided in paragraphs 5.1.1 and 5.1.2 below. All such payments will be measured as provided in the approved Schedule of Values.

5.1.1 Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below, but, in each case, less the aggregate of payments previously made and less such amounts in accordance with paragraph 14.03 of the General Conditions.

5.1.1.1 Ninety (90) percent of Work completed and materials stored (with the balance being retainage). If Work has been 50-percent completed as determined by ENGINEER, and if the character and progress of the Work have been satisfactory to OWNER and determined that as long as the character and progress of the Work remain satisfactory to them,

Retainage will be reduced to five (5) percent of all of the Work completed to date and for subsequent future progress payments until Substantial Completion.

5.1.2 Upon Substantial Completion, in an amount sufficient to increase total payments to CONTRACTOR to ninety-seven and one-half (97-1/2) percent of the Contract Price (with the balance being retainage), less such amounts as ENGINEER shall determine, or OWNER may withhold, in accordance with paragraph 14.02 and 14.03 of the General Conditions.

## AGREEMENT

- 5.2 Final Payment. Upon final completion and acceptance of the Work in accordance with paragraphs 14.09 and 14.10 of the General Conditions, OWNER shall pay the remainder of the Contract.

### **ARTICLE 6. CONTRACTOR'S REPRESENTATIONS**

In order to induce OWNER to enter into this Agreement, CONTRACTOR makes the following representations:

- 6.1 CONTRACTOR has thoroughly examined and carefully studied the Contract Documents (including the Addenda listed in paragraph 8) and the other related data identified in the Bidding Documents including "technical data."
- 6.2 CONTRACTOR has visited the site and become familiar with and is satisfied as to the general, local and site conditions that may affect cost, progress, performance or furnishing of the Work.
- 6.3 CONTRACTOR is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress, performance and furnishing of the Work.
- 6.4 CONTRACTOR has carefully studied all reports of explorations and tests of subsurface conditions at or contiguous to the site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site (except Underground Facilities) which, if available, have been identified in the Supplementary Conditions.
- 6.5 CONTRACTOR acknowledges that such reports and drawings are not Contract Documents and may not be complete for CONTRACTOR's purposes.
- 6.6 CONTRACTOR acknowledges that OWNER and ENGINEER do not assume responsibility for the accuracy or completeness of information and data shown or indicated with respect to Underground Facilities at or contiguous to the site.
- 6.7 CONTRACTOR has obtained and carefully studied (or assumes responsibility for having done so) all such additional supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the site or otherwise which may affect cost, progress, performance or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences and procedures of construction to be employed by CONTRACTOR and safety precautions and programs incident thereto.
- 6.8 CONTRACTOR does not consider that any additional examinations, investigations, explorations, tests, studies or data are necessary for the performance and furnishing of the Work at the Contract Price, within the Contract Times and in accordance with the other terms and conditions of the Contract Documents.
- 6.9 CONTRACTOR is aware of the general nature of Work to be performed by OWNER and others at the site that relates to the Work as indicated in the Contract Documents.

## **AGREEMENT**

- 6.10 CONTRACTOR has correlated the information known to CONTRACTOR, information and observations obtained from visits to the site, reports and drawings identified in the Contract Documents and all additional examinations, investigations, explorations, tests, studies and data with the Contract Documents.
- 6.11 CONTRACTOR has given ENGINEER written notice of all conflicts, errors, ambiguities or discrepancies in the Contract Documents and the written resolution thereof by ENGINEER through issued addendum or addenda is acceptable to CONTRACTOR, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work. When said conflicts, etc., have not been resolved through interpretation or clarification by ENGINEER, because of insufficient time or otherwise, CONTRACTOR has included in the Bid the greater quantity or better quality of Work, or compliance with the more stringent requirement resulting in a greater cost; and said greater cost is included in the Contract Price.

## **ARTICLE 7. CONTRACT DOCUMENTS**

The Contract Documents which comprise the entire agreement between OWNER and CONTRACTOR concerning the Work consist of the following:

- 7.1 This Agreement.
- 7.2 Performance, Payment, and other Bonds and insurance certificates.
- 7.3 Notice of Award
- 7.4 Notice to Proceed.
- 7.5 General Conditions.
- 7.6 Supplementary Conditions.
- 7.7 Specifications bearing the title Marion Ave / Hilltop Area Sewer Separation Project and consisting of the divisions and sections, as listed in table of contents thereof.
- 7.8 Drawings consisting of a cover sheet and drawing sheets with each sheet bearing the following general title: Marion Ave / Hilltop Area Sewer Separation Project.
- 7.9 Addenda issued prior to bid and listed in the CONTRACTOR'S Bid Form.
- 7.10 CONTRACTOR's Bid.
- 7.11 Required documentation submitted by CONTRACTOR prior to Notice of Award.
- 7.12 Maintenance Bonds.

## AGREEMENT

- 7.13 Final Record Documents and Close-out Documents.
- 7.14 The following which may be delivered or issued after the Effective Date of the Agreement and are not attached thereto:
- 7.15 All written amendments and other documents amending, modifying or supplementing the Contract Documents pursuant to paragraphs 3.05 of the General Conditions.
- 7.16 There are no Contract Documents other than those listed above in this Article. The Contract Documents may only be amended, modified or supplemented as provided in paragraphs 3.05 of the General Conditions.

### ARTICLE 8. MISCELLANEOUS

- 8.1 Terms used in this Agreement which are defined in Article 1 of the General Conditions will have the meanings indicated in the General Conditions.
- 8.2 No assignment by a party hereto of any rights under or interests in the Contract Documents will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically, but without limitation, moneys that may become due and moneys 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.
- 8.3 OWNER and CONTRACTOR each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect to all covenants, agreements and obligations contained in the Contract Documents.
- 8.4 Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon OWNER and CONTRACTOR, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.
- 8.5 Litigation: In the event of any dispute between the Owner and the Contractor which is not amicably resolved and which results in litigation, the parties agree that the Court of Common Pleas of Washington County, Pennsylvania, is the sole legal forum and shall have exclusive and sole jurisdiction and venue over such litigation.
- 8.6 CONTRACTOR agrees to submit material shop drawings within seven (7) days of Notice to Proceed issuance, and order materials within thirty (30) days of Notice to Proceed issuance.



**AGREEMENT**

Address for giving Notice: \_\_\_\_\_  
\_\_\_\_\_

Phone No.: \_\_\_\_\_

Attest \_\_\_\_\_ (Corporate SEAL)

**A Joint Venture**

\_\_\_\_\_

*Name of Joint Venture*

by \_\_\_\_\_ (SEAL)

*Name*

by \_\_\_\_\_ (SEAL)

*Name*

Address for giving Notice: \_\_\_\_\_  
\_\_\_\_\_

Phone No.: \_\_\_\_\_

Attest \_\_\_\_\_

NOTE: If CONTRACTOR is a corporation, attach evidence of authority to sign.

END OF SECTION

**SECTION 00 55 00  
NOTICE TO PROCEED**

To: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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

Attention: \_\_\_\_\_

Project: Marion Ave / Hilltop Area Sewer Separation Project

Gentlemen:

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 \_\_\_\_\_, **20\_\_**, and \_\_\_\_\_, **20\_\_**, **respectively**.

In accordance with paragraph 2.05 of the General Conditions, please submit to ENGINEER a Schedule of Values, a detailed Construction Schedule (CPM) for the entire Project and in sufficient detail to identify individual tasks (equipment installation, specific subcontractors, milestones, etc.) and the relationship between tasks.

Also, in accordance with paragraph 2.05 of the General Conditions, please request a Preconstruction Meeting from ENGINEER prior to delivery of any materials or start of any construction. A minimum of seven (7) full working days notice is required to set up the Preconstruction Meeting. Also, please notify ENGINEER three (3) full working days in advance of any staking requirements or other activity on the Project.

Work at the site must be started by \_\_\_\_\_, 20\_\_.

\_\_\_\_\_  
Mon Valley Sewage Authority  
(Owner)

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

\_\_\_\_\_  
(Title)

cc: Jason McBride, P.E., Wade Trim, Inc.

**SECTION 00 61 12  
PERFORMANCE BOND**

Bond No. \_\_\_\_\_

KNOW ALL MEN BY THESE PRESENTS, That we, \_\_\_\_\_, a corporation organized and existing under the laws of the State of \_\_\_\_\_, and duly authorized to transact business in the Commonwealth of Pennsylvania, 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 Commonwealth of Pennsylvania, 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 CONDITION 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

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ which contract is 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 shall 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 shall in all respects comply with the terms and conditions of said contract, and his (their or its) obligations thereunder, including the Contract Documents therein referred to and made a part thereof, and such alterations as may be made in such contract or Contract Documents, as herein or therein provided for, then this obligation shall be void; otherwise, this Bond and obligation shall be and remain in full force and effect.

**PERFORMANCE BOND**

Signed and sealed this \_\_\_\_\_ day of \_\_\_\_\_.

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

\_\_\_\_\_  
Address of Surety

\_\_\_\_\_  
City Zip Code

\_\_\_\_\_  
City ZipCode

\_\_\_\_\_  
Telephone

\_\_\_\_\_  
Telephone

**SECTION 00 61 13  
LABOR AND MATERIAL PAYMENT BOND**

Bond No. \_\_\_\_\_

KNOW ALL MEN BY THESE PRESENTS, That we, \_\_\_\_\_, a corporation organized and existing under the laws of the State of \_\_\_\_\_, and duly authorized to transact business in the Commonwealth of Pennsylvania, 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 Commonwealth of Pennsylvania, 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 CONDITION 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

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ which contract is 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 the Public Works Contractor's Bond Law of 1967 (8 P.S. 193; 1967 P.L. 869, No 385), 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 shall 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 Public

**LABOR AND MATERIAL PAYMENT BOND**

Works Contractor's Bond Law of 1967 (8 P.S. 193; 1967 P.L. 869, No 385), 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 shall be void; otherwise, it shall remain in full force and effect.

Signed and sealed this \_\_\_\_\_ day of \_\_\_\_\_.

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

\_\_\_\_\_  
Address of Surety

\_\_\_\_\_  
City Zip Code

\_\_\_\_\_  
City ZipCode

\_\_\_\_\_  
Telephone

\_\_\_\_\_  
Telephone

**SECTION 00 63 25  
SUBSTITUTION REQUEST FORM**

SPECIFICATION SECTION # \_\_\_\_\_

ARTICLE # \_\_\_\_\_

SPECIFIED PRODUCT \_\_\_\_\_

PROPOSED SUBSTITUTION \_\_\_\_\_

- A. Does specified product exceed, in any respect proposed substitution?  Y  N
- B. Does substitution affect dimensions shown on Plans?  Y  N
- C. Does substitution affect other trades more than original product?  Y  N
- D. Does warranty differ from that specified?  Y  N
- E. Does substitution affect cost to OWNER?  Y  N
- F. 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:

1. Explain any differences between proposed substitution and specified product.
2. Summarize experience with product and manufacturer in Project area.
3. 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: \_\_\_\_\_ Date Submitted: \_\_\_\_\_

Company: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_\_ Fax: \_\_\_\_\_

Signature: \_\_\_\_\_

**For use by ENGINEER**

ENGINEER'S RESPONSE	RESPONSE REQUIRED OF CONTRACTOR
No Exceptions Taken <input type="checkbox"/>	None <input type="checkbox"/>
Note Markings <input type="checkbox"/>	Confirm <input type="checkbox"/>
Comments Attached <input type="checkbox"/>	Resubmit <input type="checkbox"/>
Rejected <input type="checkbox"/>	
<p>Engineer's review is for general conformance with the design concept and contract documents. Markings or comments should not be construed as relieving the contractor from compliance with the project plans and specifications, nor departures therefrom. The contractor remains responsible for details and accuracy, for confirming and correlating all quantities and dimensions, for selecting fabrication processes, for techniques of assembly, and for performing his work in a safe manner.</p> <p>By _____ Date _____</p>	



**SECTION 00 63 70  
CHANGE PROPOSAL FORM**

Project:	Date:	
Contractor:		
Owner:		
<p><b>This Change Proposal is submitted in accordance with Paragraph 10.06 of the General Conditions.</b></p> <p>If this Change Proposal is accepted, either in whole or in part, a Change Order will be issued to modify the Contract Documents accordingly.</p>		
<p><b>Detailed Description of Proposed Change:</b></p>          		
<p><b>Attachments: (List documents attached supporting requested change):</b></p>		
A.		
B.		
C.		
D.		
E.		
<b><u>CHANGE IN CONTRACT PRICE</u></b>	<b><u>CHANGE IN CONTRACT TIME</u></b>	
[Increase] [Decrease] of this requested in this Change Proposal: \$	[Increase] [Decrease] of this requested Change Proposal: Substantial completion (days): Ready for final payment (days):	
<p><b>Engineer's Decision on Change Proposal:</b></p>          		
Engineer:  By: _____ <i>Engineer (Authorized Signature)</i>	Owner:  By: _____ <i>Owner (Authorized Signature)</i>	Contractor:  By: _____ <i>Contractor (Authorized Signature)</i>
Date: _____	Date: _____	Date: _____

**SECTION 00 65 16  
CERTIFICATE OF SUBSTANTIAL COMPLETION**

Project: Marion Ave / Hilltop Area Sewer Separation Project

OWNER: Mon Valley Sewage Authority

CONTRACTOR: \_\_\_\_\_

Contract Date: \_\_\_\_\_ Project No.: \_\_\_\_\_

Date of Issuance: \_\_\_\_\_

Project or Designated Portion Shall Include: \_\_\_\_\_

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

**DEFINITION OF DATE OF SUBSTANTIAL COMPLETION**

The date of Substantial Completion of the Work or designated portion thereof, is the date certified by ENGINEER when construction is sufficiently complete, in accordance with the Contract Documents, so 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 ENGINEER is attached hereto. The failure to include any items on such list does not alter the responsibility of 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 OWNER and CONTRACTOR for security, maintenance, heat, utilities, damage to the Work and insurance shall be as follows:

OWNER shall have 45 days after receipt of this certificate during which he 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*                      *Authorized Representative*                      *Date*



**SWORN STATEMENT**

*(Continued)*

That the 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 he or she makes 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 his or her 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 the Commonwealth of Pennsylvania HB 1637 of 2005 (Act 52), an amendment to the Mechanics Lien Law of 1963 (P.L. 1175, No 497).

WARNING TO OWNER: AN OWNER OR LESSEE OF THE PROPERTY DESCRIBED ON THE REVERSE SIDE MAY NOT RELY ON THIS SWORN STATEMENT TO AVOID THE CLAIM OF A SUBCONTRACTOR, SUPPLIER, OR LABORER WHO HAS PROVIDED A NOTICE OF FURNISHING OR A LABORER WHO MAY PROVIDE A NOTICE OF FURNISHING PURSUANT TO PENNSYLVANIA HB 1637 OF 2005, AS AMENDED, TO THE DESIGNEE OR TO THE OWNER OR LESSEE IF THE DESIGNEE IS NOT NAMED OR HAS DIED.

\_\_\_\_\_  
(Deponent)

WARNING TO DEPONENT: A PERSON, WHO WITH INTENT TO DEFRAUD, GIVES A FALSE SWORN STATEMENT IS SUBJECT TO CRIMINAL PENALTIES AS PROVIDED IN PENNSYLVANIA HB 1637 OF 2005, AS AMENDED.

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

\_\_\_\_\_  
Notary Public

\_\_\_\_\_ County, Pennsylvania

My Commission Expires \_\_\_\_\_

**INSTRUCTIONS**

1. 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.
2. An OWNER or lessee may withhold payment to a CONTRACTOR or Subcontractor who has not provided a Sworn Statement. An 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 Pennsylvania Act 52, Mechanics Lien Law, as amended.
3. An 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 Pennsylvania Act 52, Mechanics Lien Law, as amended.
4. If the contract provides for payments by the OWNER to the general 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 he or she shall provide at least 5 business days' notice to the general 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 general contractor.

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## 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 the 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 his 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.

## GENERAL CONDITIONS

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;

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- 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.

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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 paragraphs 9.04 and 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 the 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.

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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 shall start to perform his 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 the 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.

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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.
  - a. Project Specifications are those portions of the Contract Documents which have been prepared specifically for this Project and which are identified by the job number in the lower right-hand corner of each page.
  - b. Standard Specifications are Specification sections that are the same from Project to Project as of the revision date shown in the lower left-hand corner of the page.
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.

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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 the OWNER pays a fixed sum (Unit Price) per each completed unit of Work. Units are listed on the Proposal Form.

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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 shall 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.

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2. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
  3. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
  4. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
  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 Agreements to OWNER, CONTRACTOR shall 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 shall furnish to CONTRACTOR up to 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.

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### **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 30<sup>th</sup> 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 shall start to perform the Work within 10 days of when the Contract Time commences to run, but no Work shall be done at the Site prior to the date on which the Contract Time commences to run. CONTRACTOR shall notify the ENGINEER at least 3 working days in advance of the time he 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, the CONTRACTOR shall request a Preconstruction Meeting from ENGINEER. A minimum of 7 full working days' notice shall be required.
- B. Prior to the scheduling of the Preconstruction Meeting, CONTRACTOR shall 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, the OWNER, ENGINEER, and CONTRACTOR may send, and shall accept, Electronic Documents transmitted by Electronic Means.
- B. If the Contract does not establish protocols for Electronic Means, then OWNER, ENGINEER, and CONTRACTOR shall jointly develop such protocols.

## GENERAL CONDITIONS

- 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.

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### **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, shall 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 shall be furnished and performed whether or not it is specifically called for.
- C. No provision of any standard, specification, manual, code or instruction shall 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 shall 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 shall 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 shall promptly report in writing to ENGINEER any conflict, error, ambiguity, or discrepancy which CONTRACTOR should reasonably have discovered and shall 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 shall report it to ENGINEER in writing at once, and, CONTRACTOR shall 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 shall 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.

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- 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 shall 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 shall submit to the ENGINEER in writing all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. ENGINEER will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work.
- B. ENGINEER will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. ENGINEER's written clarification, interpretation, or decision will be final and binding on CONTRACTOR, unless it appeals by submitting a Change Proposal, and on OWNER, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve
1. the performance or acceptability of the Work under the Contract Documents,
  2. the design (as set forth in the Drawings, Specifications, or otherwise), or
  3. other engineering or technical matters, then ENGINEER will promptly notify OWNER and CONTRACTOR in writing that ENGINEER is unable to provide a decision or interpretation. If OWNER and CONTRACTOR are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in paragraph 11.01.

### 3.05 Order of Precedence

- A. In resolving conflicts, errors or discrepancies between Plans and Specifications,
1. figured dimensions shall govern over scaled dimensions;

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2. Plans shall govern over Standard Specifications;
3. and Project Specifications shall govern over Standard Specifications 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. shall 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 shall 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 shall accept, Project-related correspondence, text, data, documents, drawings, information and graphics, including but not limited to Shop Drawings and other Submittals, in electronic media or digital format, either directly or through access to a secure Project website.

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- 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 shall 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 shall 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 shall 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 the 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 shall 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:
  - a. 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

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- b. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings, or
  - c. any CONTRACTOR interpretation of or conclusion drawn from any "technical data" or any such data, interpretations, opinions or information.
2. The cost of all the following will be included in the Contract Price and CONTRACTOR shall have full responsibility for:
- a. reviewing and checking all such information and data,
  - b. locating all Utilities during construction,
  - c. coordination of the Work with the owners of such Utilities, and
  - d. 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, the CONTRACTOR shall 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 the CONTRACTOR's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise OWNER in writing of ENGINEER's findings, conclusions, and recommendations.

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- C. OWNER's Statement to CONTRACTOR Regarding Site Condition. After receipt of ENGINEER's written findings, conclusions, and recommendations, OWNER shall issue a written statement to CONTRACTOR (with a copy to ENGINEER) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting ENGINEER's written findings, conclusions, and recommendations, in whole or in part.
- D. Possible Price and Times Adjustments.
1. CONTRACTOR shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in CONTRACTOR's cost of, or time required for, performance of the Work; subject, however, to the following:
    - a. such condition must fall within any one or more of the categories described in paragraph 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 shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
    - a. CONTRACTOR knew of the existence of such condition at the time CONTRACTOR made a commitment to OWNER with respect to Contract Price and Contract times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise; or
    - b. the existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for CONTRACTOR prior to CONTRACTOR's making such commitment; or
    - c. CONTRACTOR failed to give the written notice as required by paragraph 4.03.A.

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3. If OWNER and CONTRACTOR agree regarding CONTRACTOR's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order 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 the 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 shall 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 shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by paragraph 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;

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3. obtain any pertinent cost or schedule information from CONTRACTOR;
4. prepare recommendations to OWNER regarding the 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.

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

- D. OWNER's Statement to CONTRACTOR Regarding Utilities. After receipt of ENGINEER's written findings, conclusions, and recommendations, OWNER shall issue a written statement to CONTRACTOR (with a copy to ENGINEER) regarding the 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.

- E. Possible Price and Times Adjustments:

1. CONTRACTOR shall be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing 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.

## GENERAL CONDITIONS

2. If OWNER and CONTRACTOR agree regarding CONTRACTOR's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
3. CONTRACTOR may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after OWNER's issuance of the OWNER's written statement to CONTRACTOR regarding the Underground Facility in question.

### 4.05 Reference Points

- A. OWNER shall provide engineering surveys for construction to establish property corners, monuments, benchmarks and similar reference points which in his judgment are necessary to enable CONTRACTOR to proceed with the Work. CONTRACTOR shall be responsible for the preservation of established reference points and shall make no changes or relocations without the prior written approval of OWNER. CONTRACTOR shall 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 shall 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 shall 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 shall 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 shall 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 shall 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:

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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 shall 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 shall 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.

## **GENERAL CONDITIONS**

### **Article 5 Bonds and Insurance**

#### **5.01 Performance and Other Bonds**

- A. CONTRACTOR shall 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 shall 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 shall also furnish such other Bonds as are required by the Supplementary Conditions.
- B. All Bonds shall 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. All 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 shall within 5 days thereafter substitute another Bond and Surety, both of which shall 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 shall 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 shall 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:

## GENERAL CONDITIONS

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 shall 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 shall be written by the same insurance carrier, though not necessarily in one policy.

## GENERAL CONDITIONS

4. CONTRACTOR shall 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 the 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 shall 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 shall 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).

Coverage shall 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 shall be adjusted with OWNER and CONTRACTOR and paid to OWNER and CONTRACTOR as Trustee for the other insureds.

6. Umbrella or Excess Liability
  - a. The 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 shall be at least as broad as the primary or underlying policy(ies) and shall apply both to CONTRACTOR's General Liability and Automobile Liability Insurance and shall be written on an occurrence basis.

## GENERAL CONDITIONS

### 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 shall be determined by the railroad company(ies) involved. See the 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 shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance shall provide protection against Claims arising out of performance of professional design or related services caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by CONTRACTOR itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.

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

1. OWNER shall 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 shall assume responsibility for such insurance as will protect the 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 shall be not less than those specified in the 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 shall be given to OWNER and to ENGINEER of cancellation, intent not to renew, or material modification of the coverage.

## **GENERAL CONDITIONS**

### **5.06 Evidence of Coverage**

- A. Prior to commencement of the Work, CONTRACTOR shall 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 they have approval of OWNER and ENGINEER.
- B. Prior to the commencement of the Work, CONTRACTOR shall furnish to OWNER complete "originally signed" copies of the Owner's Protective Liability Policy. The number of copies shall 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 shall 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 shall be licensed or approved by the Insurance Bureau of the state in which the Project is located and shall 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 shall furnish to OWNER an acknowledgment receipt from the insurance carrier for each damage claim against the Project. The receipt shall include the insurance carrier's assigned claim number.
- B. Upon request, CONTRACTOR or his insurance carrier shall also furnish to OWNER a status report on all damage claims. This report shall 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 shall 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 the CONTRACTOR in the various prices bid.

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### 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 shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder.
- B. 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 shall 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 shall 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 Order or Work Change Directive.
- B. OWNER as fiduciary shall 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 shall 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 shall 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 shall adjust and settle the loss with the insurers.

## **GENERAL CONDITIONS**

### **Article 6 CONTRACTOR's Responsibilities**

#### **6.01 Supervision and Superintendence**

- A. CONTRACTOR shall 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 shall be solely responsible for the means, methods, techniques, sequences and procedures of construction. CONTRACTOR shall 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 shall 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 shall assign and maintain a competent superintendent who shall 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 shall be removed from the Project. The superintendent will be CONTRACTOR's representative at the Site and shall have authority to act on behalf of CONTRACTOR. All communications given to the superintendent shall be as binding as if given to CONTRACTOR.

#### **6.02 Labor and Working Hours**

- A. CONTRACTOR shall provide competent, suitably qualified personnel in their various duties. CONTRACTOR shall 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 shall 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 shall 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.

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- B. All materials and equipment shall 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 shall expressly run to the benefit of OWNER. If required by ENGINEER, CONTRACTOR shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of materials and equipment to be incorporated in the Work. The CONTRACTOR shall not use material in the Work until Shop Drawing or Submittals have been reviewed by the 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, shall be plainly marked and removed immediately from the Work.
- C. All materials and equipment shall 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.

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- B. CONTRACTOR shall 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 the 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 shall 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.

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 shall be identified in the application and available maintenance, repair and replacement service shall be indicated. The application shall 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 shall 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 shall be final and binding, may not be reversed through an appeal under any provisions of the Contract Documents, and no "or-equal" or substitute shall 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.

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- 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 shall 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 shall 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 shall 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 shall 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 shall submit an acceptable substitute and the Contract Price shall be increased or decreased by the difference in cost occasioned by such substitution, and an appropriate Change Order shall be issued. CONTRACTOR shall not be required to employ any Subcontractor, Supplier, other person or organization against whom CONTRACTOR has reasonable objection.
- C. The CONTRACTOR shall not award Work to Subcontractor(s), in excess of 50% of the Contract Price, without prior written approval of the OWNER.
- D. CONTRACTOR shall be fully responsible for all acts and omissions of his 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 shall create for the benefit of any such Subcontractor, Supplier or other person or organization any contractual relationship between OWNER or ENGINEER and any such Subcontractor, Supplier or other person or organization, nor shall 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.

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- E. The CONTRACTOR shall 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 shall require all Subcontractors, Suppliers and such other persons and organizations performing or furnishing any of the Work to communicate with the 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 the OWNER and CONTRACTOR jointly, Bonds in an amount proportioned to the amount of his subcontract, and for the same purpose and under the same specifications as those of the general Contract. The Surety on the general Contract shall 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 an additional insured on the property insurance provided in paragraph 5.03.A.5, the agreement between the 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 shall file a true copy of such agreement with OWNER.

### **6.06 Patent Fees and Royalties**

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

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- B. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall 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 shall defend all such claims in connection with any alleged infringement of such rights.

### 6.07 Permits and Licenses

- A. CONTRACTOR shall obtain and pay for all construction permits and licenses. OWNER shall assist CONTRACTOR, when necessary, in obtaining such permits and licenses. CONTRACTOR shall pay all governmental charges, 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 shall pay all charges of utility owners for connections to the Work.

### 6.08 Laws and Regulations

- A. CONTRACTOR shall give all notices and comply with all laws, ordinances, rules, and regulations applicable to furnishing and performance of the Work. Neither OWNER nor ENGINEER shall 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 shall bear all claims, costs, losses, damages and expenses caused by, arising out of, or resulting therefrom. However, it shall 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 shall not relieve CONTRACTOR of CONTRACTOR's obligations under paragraph 3.03.
- C. OWNER or CONTRACTOR may give notice to the other party of any changes after the submission of CONTRACTOR's Bid (or after the date when CONTRACTOR became bound under a negotiated Contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If OWNER and CONTRACTOR are unable to agree on entitlement to, or on the amount, or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such notice CONTRACTOR may submit a Change Proposal, or OWNER may initiate a Claim.

## **GENERAL CONDITIONS**

### **6.09 Taxes**

- A. CONTRACTOR shall 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 shall 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 shall not unreasonably encumber the premises with construction equipment or other materials or equipment. CONTRACTOR shall 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 shall 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 shall be applicable to any claim hereunder.

### **6.11 Removal of Debris and Cleaning**

- A. During the progress of the Work, CONTRACTOR shall keep the premises free from accumulations of waste materials, rubbish and other debris resulting from the Work. At the completion of the Work CONTRACTOR shall 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 shall leave the Site clean and ready for occupancy by OWNER at Substantial Completion of the Work. CONTRACTOR shall restore to their original condition all property not designated for alteration by the Contract Documents. If CONTRACTOR shall fail to keep the above noted areas cleaned of dust or debris resulting from CONTRACTOR's operations, CONTRACTOR shall be so notified in writing by ENGINEER. If within 24 hours after receipt of such notice CONTRACTOR shall fail to clean such areas satisfactorily, OWNER may have such other agency as he shall designate, perform the work and all costs of such cleaning shall be paid for by CONTRACTOR.

### **6.12 Loading Structures**

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

## GENERAL CONDITIONS

### 6.13 Protection of Utilities

- A. When it is possible for construction operations to endanger any public or private utility, conduit, or structure, CONTRACTOR shall 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 shall cooperate to the fullest extent with the utility, and he shall see that his operations interfere as little as possible with these operations, and CONTRACTOR shall assume the cost of any charge against OWNER therefor. In cases where existing Utilities or Utility service connections are encountered, CONTRACTOR shall perform his operations in such a manner that service will be uninterrupted, and the cost thereof shall be at CONTRACTOR's expense, unless otherwise provided.

### 6.14 Record Documents

- A. CONTRACTOR shall maintain in a safe place at the site 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 shall be available to ENGINEER for examination and shall be delivered to ENGINEER for OWNER upon completion of the Work.

### 6.15 Safety and Protection

- A. CONTRACTOR shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. CONTRACTOR shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:
1. all persons on the 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 shall 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 shall erect and maintain all necessary safeguards for such safety and protection. CONTRACTOR shall notify owners of adjacent property, Utilities, and utility owners when prosecution of the Work may affect them.

## GENERAL CONDITIONS

- C. CONTRACTOR shall restore, at his own expense, any public or private property damaged or injured in consequence of any act or omission on his part, or on the part of his 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 shall continue until such time as all the Work is completed and ENGINEER has issued a notice to OWNER and CONTRACTOR in accordance with paragraph 14.11 that the Work is Acceptable.
- E. CONTRACTOR shall comply with the applicable requirements of OWNER's safety programs, if any. Any OWNER's safety programs that are applicable to the Work are identified or included in the Supplementary Conditions or Specifications.
- F. CONTRACTOR shall inform OWNER and ENGINEER of the specific requirements of CONTRACTOR's safety program with which OWNER's and ENGINEER's employees and representatives must comply while at the Site.
- 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 shall 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 shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

### **6.17 Hazard Communication Program**

- A. CONTRACTOR shall 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.

## GENERAL CONDITIONS

### 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 shall give ENGINEER prompt written notice if CONTRACTOR believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby. 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 shall submit Shop Drawings required by the Contract Documents to ENGINEER for review, in accordance with an accepted schedule and within seven (7) days of Notice to Proceed issuance. Following material shop drawing review and approval, materials shall be ordered within thirty (30) days of Notice to Proceed issuance. 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 shall 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 shall 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 related to CONTRACTOR's responsibilities in respect of means, methods, techniques, sequences and procedures of construction and safety precautions and programs incident thereto.

## GENERAL CONDITIONS

- B. CONTRACTOR shall 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 shall 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 shall be both 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 shall make corrections required by ENGINEER and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review. CONTRACTOR shall direct specific attention in writing to revisions other than the corrections called for by ENGINEER on previous Submittals.
- F. CONTRACTOR shall furnish required Submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. ENGINEER will record ENGINEER's time for reviewing a fourth or subsequent submittal of Shop Drawings, sample, or other item requiring approval, and CONTRACTOR shall be responsible for ENGINEER's charges to OWNER for such time. OWNER may impose a set-off against payments due to CONTRACTOR to secure reimbursement for such charges.
- G. If CONTRACTOR requests a change of a previously approved Submittal item, CONTRACTOR shall be responsible for ENGINEER's charges to OWNER for its review time, and OWNER may impose a set-off against payments due to CONTRACTOR to secure reimbursement for such charges, unless the need for such change is beyond the control of CONTRACTOR.

### 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 shall be only for conformance with the design concept of the Project and for compliance with the information given in the Contract Documents and shall 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.

## GENERAL CONDITIONS

- B. ENGINEER's review of Shop Drawings or samples shall 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 shall any concurrence by ENGINEER relieve CONTRACTOR from responsibility for errors or omissions in the Shop Drawings. ENGINEER's review shall 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 shall be commenced until the Submittal has been reviewed by the ENGINEER.

### 6.22 Continuing the Work

- A. CONTRACTOR shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with OWNER. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, 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 shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of CONTRACTOR's obligation to perform the Work in accordance with the Contract Documents:
  - 1. observations by ENGINEER;
  - 2. recommendation 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;

## GENERAL CONDITIONS

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 the CONTRACTOR to accept the assignment of a contract entered into by OWNER, then the specific warranties, guarantees, and correction obligations contained in the assigned contract shall govern with respect to CONTRACTOR's performance obligations to OWNER for the Work described in the assigned Contract.
- D. CONTRACTOR shall 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 shall secure the material Supplier's or Subcontractor's consent to assign said warranties to OWNER.
- E. The warranties provided in this section shall 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 shall 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.

## GENERAL CONDITIONS

- 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 shall 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 Article 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 shall 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 the CONTRACTOR to provide indemnification.
- F. The indemnification provisions under this Agreement shall 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 shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for CONTRACTOR under workers' compensation acts. Such obligations shall 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 shall survive the termination of this Agreement.

## **GENERAL CONDITIONS**

- I. CONTRACTOR and Subcontractors will compel their insurance company to waive subrogation against OWNER, all ENGINEERS and all CONTRACTORS 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 shall not be required to provide professional services in violation of applicable Laws and Regulations.
- B. If professional design services or certifications by a design professional related to systems, materials, 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 shall 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 shall appear on all drawings, calculations, specifications, certifications, and other Submittals prepared by such professional. Shop Drawings and other Submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to ENGINEER.
- C. OWNER and ENGINEER shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, or approvals performed by such design professionals.
- 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 shall 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, the OWNER may perform other work at or adjacent to the Site. Such other work may be performed by OWNER's employees, or through contracts between the OWNER and third parties. OWNER may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.

## **GENERAL CONDITIONS**

- 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 shall 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 shall 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 shall 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 shall properly connect and coordinate the Work with theirs. Unless otherwise provided in the Contract Documents, CONTRACTOR shall 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 shall 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 shall 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 therefore 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 shall issue all communications to CONTRACTOR through ENGINEER.

#### **8.02 Replacement of ENGINEER**

- A. In case of termination of the employment of ENGINEER, OWNER shall appoint an engineer against whom CONTRACTOR makes no reasonable objection, whose status under the Contract Documents shall be that of the former ENGINEER.

#### **8.03 Furnishing Data**

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

## **GENERAL CONDITIONS**

### **8.04 Pay When Due**

- A. OWNER shall 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. The OWNER shall not supervise, direct or have control or authority over, nor be responsible for, CONTRACTOR's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the 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 shall 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 shall be as set forth in the Contract Documents.

### **9.02 Visits to Site**

## GENERAL CONDITIONS

- 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 and will confer with ENGINEER regarding his actions. Resident Project Representative's dealings in matters pertaining to the on-Site Work shall in general be only with ENGINEER and CONTRACTOR, and dealings with Subcontractors shall 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:

## GENERAL CONDITIONS

- 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.

## GENERAL CONDITIONS

- (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 shall 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 shall be binding on OWNER, and also on CONTRACTOR who shall 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.

## **GENERAL CONDITIONS**

### **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 with CONTRACTOR ENGINEER's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). ENGINEER's written decision thereon will be final and binding (except as modified by ENGINEER to reflect changed factual conditions or more accurate data) upon OWNER and CONTRACTOR, subject to the provisions of 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, shall 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 ENGINEER's 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, shall 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 shall also apply to ENGINEER's Consultant's, Resident Project Representative and assistants.

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- 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, tortious 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

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- (3) other engineering or technical matters, without the recommendation of ENGINEER. Such an amendment shall 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 shall 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 shall 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 shall be supported by ENGINEER's recommendation, to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes may be accomplished by a Change Order, if OWNER and CONTRACTOR have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive.

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- B. Upon receipt of any such document, CONTRACTOR shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work shall be performed under the applicable conditions of the Contract Documents. Nothing in this paragraph 10.02 shall obligate CONTRACTOR to undertake work that CONTRACTOR reasonably concludes cannot be performed in a manner consistent with CONTRACTOR's safety obligations under the Contract Documents or Laws and Regulations.

### 10.03 Unauthorized Changes in the Work

- A. CONTRACTOR shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in paragraph 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 shall comply with the provisions of paragraph 10.06. Any Claim for an adjustment of Contract Price shall 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, the CONTRACTOR's fee for overhead and profit shall be determined as follows:
  - 1. a mutually acceptable fixed fee; or
  - 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
    - a. for costs incurred under paragraph 12.01.B.1 and 12.01.B.2, the CONTRACTOR's fee shall be 15 percent;

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- b. for costs incurred under paragraph 12.01.B.3, the CONTRACTOR's fee shall be five percent;
- c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of paragraphs 10.04.C.2.a and 10.04.C.2.b is that the CONTRACTOR's fee shall be based on:
  - (1) a fee of 15 percent of the costs incurred under paragraphs 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;

provided, however, that for any such subcontracted work the maximum total fee to be paid by OWNER shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the Work;
- d. no fee shall be payable on the basis of costs itemized under paragraphs 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 shall 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 shall comply with the provisions of paragraph 10.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of paragraph 11.01.
- B. An adjustment of the Contract Times shall be subject to the limitations set forth in paragraph 12.04, concerning delays in CONTRACTOR's progress

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### 10.06 Change Proposals

- A. CONTRACTOR shall submit a Change Proposal to ENGINEER to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by ENGINEER concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seeking other relief under the Contract. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents. Each Change Proposal will address only 1 issue, or a set of closely related issues.
1. Procedures. CONTRACTOR shall 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 shall 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 shall be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which CONTRACTOR believes it is entitled as a result of said event. ENGINEER will advise OWNER regarding the Change Proposal and consider any comments or response from OWNER regarding the Change Proposal.
  2. ENGINEER's Action. ENGINEER will review each Change Proposal and, within 30 days after receipt of the CONTRACTOR's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall be in writing, with a copy provided to OWNER and CONTRACTOR. If ENGINEER does not take action on the Change Proposal within 30 days, then either OWNER or CONTRACTOR may at any time thereafter submit a letter to the other party indicating that as a result of the 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 the ENGINEER is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and CONTRACTOR may choose to seek resolution under the terms of paragraph 11.01.

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### **10.07 Execution of Change Orders**

- A. OWNER and CONTRACTOR shall execute appropriate Change Orders covering:
1. changes in the Contract Price or Contract Times which are agreed to by the Parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
  2. changes in Contract Price resulting from an OWNER set-off, unless CONTRACTOR has duly contested such set-off;
  3. changes in the Work which are:
    - a. ordered by OWNER pursuant to paragraph 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 shall 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 shall be submitted to the Claims process set forth in this Article:
1. Appeals by OWNER or CONTRACTOR of ENGINEER's decisions regarding Change Proposals;

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2. OWNER demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents; and
  3. Disputes that ENGINEER has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters.
- B. **Submittal of Claim:** The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 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 shall also furnish a copy to the ENGINEER, for its information only. The responsibility to substantiate a Claim shall rest with the party making the Claim. In the case of a Claim by CONTRACTOR seeking an increase in the Contract Times or Contract Price, or both, CONTRACTOR shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of CONTRACTOR's knowledge and belief the amount of time or money requested accurately reflects the full amount to which CONTRACTOR is entitled.
- C. **Review and Resolution:** The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim shall be stated in writing and submitted to the other party, with a copy to ENGINEER.
- D. **Mediation:**
1. At any time after initiation of a Claim, OWNER and CONTRACTOR may mutually agree to mediation of the underlying dispute. The agreement to mediate shall stay the Claim submittal and response process.
  2. If OWNER and CONTRACTOR agree to mediation, then after 60 days from such agreement, either OWNER or CONTRACTOR may unilaterally terminate the mediation process, and the Claim submittal and decision process shall resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process shall resume as of the date of the conclusion of the mediation, as determined by the mediator.
  3. OWNER and CONTRACTOR shall each pay one-half of the mediator's fees and costs.
- E. **Partial Approval:** If the party receiving a Claim approves the Claim in part and denies it in part, such action shall be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 16 for final resolution of disputes.

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- F. Denial of Claim: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either OWNER or CONTRACTOR may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim shall be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 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 shall be incorporated in a Change Order to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

### **Article 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 shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in paragraph 12.01.C, and shall include only the following items:

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1. Payroll costs for employees in the direct employ of CONTRACTOR in the performance of the Work under schedules of job classifications agreed upon by OWNER and CONTRACTOR. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by OWNER.
2. 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 shall accrue to CONTRACTOR unless OWNER deposits funds with CONTRACTOR with which to make payments, in which case the cash discounts shall accrue to OWNER. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment shall accrue to OWNER, and CONTRACTOR shall make provisions so that they may be obtained.
3. Payments made by CONTRACTOR to Subcontractors for Work performed by Subcontractors. If required by OWNER, CONTRACTOR shall obtain competitive bids from Subcontractors acceptable to OWNER and CONTRACTOR and shall deliver such bids to OWNER, who will then determine, with the advice of ENGINEER, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as CONTRACTOR's Cost of the Work and fee as provided in this paragraph 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.

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- 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 shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
  - (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 shall be reasonable, but not more than 5 percent of the current list price, or invoice, of the equipment. The base hourly rate shall 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.

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- 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 shall include settlements made with the written consent and approval of OWNER. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining
  - f. The cost of utilities, fuel, and sanitary facilities at the Site.
  - g. The costs of premiums for all bonds and insurance that CONTRACTOR is required by the Contract Documents to purchase and maintain.
- C. Costs Excluded: The term Cost of the Work shall not include any of the following items:
- 1. Payroll costs and other compensation of CONTRACTOR's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by CONTRACTOR, whether at the Site or in CONTRACTOR's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in paragraph 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 the CONTRACTOR's fee.
  - 2. Expenses of CONTRACTOR's principal and branch offices other than CONTRACTOR's office at the Site.
  - 3. Any part of CONTRACTOR's capital expenses, including interest on CONTRACTOR's capital employed for the Work and charges against CONTRACTOR for delinquent payments.
  - 4. Costs due to the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
  - 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in paragraph 12.01.B.

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- 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 shall 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 shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to OWNER and ENGINEER.
- B. Cash Allowances: CONTRACTOR agrees that:
  - 1. the cash allowances include the cost to CONTRACTOR (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
  - 2. CONTRACTOR's costs for unloading and handling 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 shall 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.

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- C. Each Unit Price will be deemed to include an amount considered by CONTRACTOR to be adequate to cover CONTRACTOR's overhead and profit for each separately identified item.
- D. ENGINEER will determine the actual quantities and classifications of Unit Price Work performed by CONTRACTOR. ENGINEER will review with CONTRACTOR the ENGINEER's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). ENGINEER's written decision thereon will be final and binding (except as modified by ENGINEER to reflect changed factual conditions or more accurate data) upon OWNER and CONTRACTOR, subject to the provisions of the following paragraph 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 shall 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 shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of CONTRACTOR. Delay, disruption, and interference attributable to and within the control of a SUBCONTRACTOR or Supplier shall be deemed to be within the control of CONTRACTOR.

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- 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 shall be entitled to an equitable adjustment in Contract Times. CONTRACTOR's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to CONTRACTOR's ability to complete the Work within the Contract Times. Such an adjustment shall be CONTRACTOR's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include 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 the 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 shall not be entitled to an adjustment in Contract Price for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of CONTRACTOR. Such a concurrent delay by CONTRACTOR shall not preclude an adjustment of Contract Times to which CONTRACTOR is otherwise entitled.
  3. Adjustments of Contract Times or Contract Price are subject to the provisions of Article 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

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5. The impact on Contract Price, in accordance with the provisions of Paragraph 10.04.

CONTRACTOR shall also furnish such additional supporting documentation as OWNER or ENGINEER may require including, where appropriate, a revised Progress Schedule indicating all the activities affected by the delay, disruption, or interference, and an explanation of the effect of the delay, disruption, or interference on the critical path to completion of the Work

- F. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by paragraphs 4.03 and 4.06.
- G. 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.
- H. CONTRACTOR shall 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.
- I. 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.
- J. 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 shall be CONTRACTOR's sole and exclusive remedy for such delay. In no event shall 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;
- K. Nor shall 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.

## **GENERAL CONDITIONS**

- L. 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, the CONTRACTOR shall 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 shall 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 shall 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 shall 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 shall assume full responsibility therefor, pay all costs in connection therewith and furnish ENGINEER the required certificates of inspection, testing or approval.
- C. CONTRACTOR shall also be responsible for and shall 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 shall 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 shall 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 shall be paid for by the CONTRACTOR.

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- G. Neither observations by ENGINEER nor inspections, tests or approvals by others shall relieve CONTRACTOR from his 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 shall, if requested by ENGINEER, be uncovered by CONTRACTOR for ENGINEER's observation. Such uncovering shall be at CONTRACTOR's expense unless CONTRACTOR has given ENGINEER timely written notice of his 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, shall 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 shall be paid for as follows:
  - 1. If it is found that such Work is defective, CONTRACTOR shall 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 shall 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 shall 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.

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### 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 shall 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 shall 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 shall 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 shall 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 shall 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) shall be paid by CONTRACTOR.
- C. Repair or replacements made under the guarantee shall bear an additional 1 year guarantee dated from the acceptance of repair or replacement.

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### 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 shall 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 shall be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and OWNER shall be entitled to an appropriate reduction in the Contract Price. If the acceptance occurs after such recommendation, an appropriate amount shall 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 his Surety without prejudice to any other remedy he may have, correct and remedy any such deficiency.
- B. In exercising his rights and remedies under this paragraph 13.09, OWNER shall 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 shall 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 his 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 shall be charged against CONTRACTOR and a Change Order shall be issued incorporating the necessary revisions in the Contract Documents with respect to the Work. OWNER shall 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 shall 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.

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### **Article 14 Payments to CONTRACTOR and Completion**

#### **14.01 Schedules**

- A. At least 10 days prior to submitting the first Application for Payment, CONTRACTOR shall submit to ENGINEER a final Schedule of Submittals, and, where applicable, a Schedule of Values for the Work. These schedules shall be satisfactory in form and substance to ENGINEER as provided in Article 2.
- B. The Schedule of Values shall include quantities and unit prices aggregating the Contract Price and shall subdivide the Work into component parts. Each unit cost so established shall 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 shall equal the total Contract Price established in the Proposal.
- C. The Schedule of Values shall 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 the ENGINEER, it shall become part of the Agreement and shall 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 shall 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 shall 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 shall be on the form provided in the Contract Documents or in a format acceptable to the ENGINEER or OWNER. On the second and all subsequent payments, partial Waivers of Lien and Sworn Statement shall be required for all Work completed and paid for on previous certificates.

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- 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 shall 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 shall 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 shall file with OWNER the written consent of the Surety to such reduction and shall 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 shall 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 shall 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;

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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:

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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 13.09, 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, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;
  2. 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;
  3. CONTRACTOR has failed to provide and maintain required bonds or insurance;
  4. OWNER has been required to remove or remediate a Hazardous Environmental Condition for which CONTRACTOR is responsible;
  5. 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;
  6. The Work is defective, requiring correction or replacement;
  7. OWNER has been required to correct defective Work in accordance with paragraph 13.09, or has accepted defective Work pursuant to paragraph 13.08;

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8. The Contract Price has been reduced by Change Orders;
  9. An event has occurred that would constitute a default by CONTRACTOR and therefore justify a termination for cause;
  10. Liquidated or other damages have accrued as a result of CONTRACTOR's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
  11. 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;
  12. there are other items as set forth in the Contract Documents entitling OWNER to a set off against the amount recommended; or
  13. 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 shall 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 shall 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 shall 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 shall notify OWNER and ENGINEER in writing that the entire Work is substantially complete and request that ENGINEER issue a Certificate of Substantial Completion. CONTRACTOR shall at the same time submit to OWNER and ENGINEER an initial draft of punch list items to be completed or corrected before final payment.

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- B. Promptly after CONTRACTOR's notification, OWNER, CONTRACTOR, and ENGINEER shall make an inspection of the Work to determine the status of completion. If ENGINEER does not consider the Work substantially complete, ENGINEER will notify CONTRACTOR in writing giving the reasons therefor.
- C. Once ENGINEER considers the Work substantially complete, ENGINEER will deliver to OWNER a preliminary Certificate of Substantial Completion which shall fix the date of Substantial Completion. ENGINEER shall attach to the certificate a punch list of items to be completed or corrected before final payment. OWNER shall have 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 shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon OWNER's use or occupancy of the Work.
- E. After Substantial Completion the CONTRACTOR shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases CONTRACTOR may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. OWNER shall have the right to exclude CONTRACTOR from the Site after the date of Substantial Completion subject to allowing CONTRACTOR reasonable access to remove its property and complete or correct items on the punch list.

### 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:

## GENERAL CONDITIONS

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 shall 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 his 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 shall 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 shall have otherwise agreed in writing and so informed ENGINEER.
3. OWNER shall have the right to exclude CONTRACTOR from any part of the Work which ENGINEER has so certified to be substantially complete, but OWNER shall 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.

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### 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 shall 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 shall 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 his 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 his 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.

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- B. Otherwise, ENGINEER will return the Application to CONTRACTOR, indicating in writing the reasons for refusing to recommend final payment, in which case CONTRACTOR shall make the necessary corrections and resubmit the Application.
- C. If the Application and accompanying documentation are appropriate as to form and substance, OWNER shall, 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 shall 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 shall, 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 shall be submitted by CONTRACTOR to ENGINEER with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

### **14.13 Waiver of Claims**

- A. The making and acceptance of final payment shall 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 shall 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. All 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 the OWNER, shall 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 shall store all materials in such manner that they will not become an obstruction, nor become damaged in any way, and CONTRACTOR shall 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 he 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;

## GENERAL CONDITIONS

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 shall 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 shall 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 shall 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 shall 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 shall 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.

## **GENERAL CONDITIONS**

- B. CONTRACTOR shall 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 shall:
  - 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 shall not relieve CONTRACTOR of his 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:

## **GENERAL CONDITIONS**

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 shall be followed:
    - a. The parties shall 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 shall 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) shall 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 shall 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.

## **GENERAL CONDITIONS**

### **17.02 Computation of Time**

- A. When any period of time is referred to in the Contract Documents by days, it shall 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 shall 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 shall 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 shall 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 shall 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 shall 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. The CONTRACTOR shall covenant and agree not to discriminate against any employee or applicant for employment, to be employed in the performance of this Contract, with respect to his 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 shall be paid by CONTRACTOR to OWNER prior to final payment authorization. However, CONTRACTOR shall 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;

## **GENERAL CONDITIONS**

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 shall be made at such times and in such amounts as ENGINEER shall invoice OWNER, provided, however said charges shall be in accordance with ENGINEER's current rate schedule at the time the costs are incurred. Engineering and inspection costs so incurred shall 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 shall 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 shall not constitute a waiver of that provision, nor shall 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**

These Supplementary Conditions amend or supplement Section 00 72 00, General Conditions, as indicated below. All provisions which are not amended or supplemented by this section remain in full force and effect. The terms used in these Supplementary Conditions have the meanings assigned to them in the General Conditions.

**SGC-2.02 Copies of Documents**

Amend the first sentence of paragraph 2.02 by adding "Electronic copies of the Contract Documents, in pdf format, will be provided to the CONTRACTOR upon written request to the ENGINEER.

**SGC-4.01 Availability of Lands**

Add a new paragraph 4.01 which is to read as follows:

Easement lines shown on the Contract Drawings are approximate and were provided to establish a basis for bidding. Upon receiving the final easement descriptions, CONTRACTOR shall compare them to the lines shown on the Contract Drawings. If CONTRACTOR considers the final easements provided to differ materially from the representations on the Contract Drawings, CONTRACTOR shall within five (5) calendar days and before proceeding with the Work, notify ENGINEER in writing of any extra costs or time of performance associated with the differing easement line locations and the claim shall be administered in accordance with the Conditions of the Contract.

**SGC-5.03.D Additional Insured**

Add the following language at the end of Article 5.03.D. of the General Conditions:

The name insured on the OWNER's and CONTRACTOR's Protective Policy shall be:

Mon Valley Sewage Authority

Additional named insured on the General Liability, Workers Compensation and Automotive Policies and the OWNER's and CONTRACTOR's Protective Policy shall include:

Wade Trim, Inc.  
Redevelopment Authority of Westmoreland County (RAWC)  
Commonwealth of Pennsylvania

## SUPPLEMENTARY CONDITIONS

### SGC-5.04 Insurance Limits of Liability

The required limits of liability for insurance coverages requested in Section 5.03 shall 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	\$2,000,000
Products – Com/Ops Aggregate	\$1,000,000
Personal and Advertising Injury	\$ 500,000
Each Occurrence	\$ 500,000
Fire Damage (any one fire)	\$ 100,000
Medical Expense (any one person)	\$ 10,000

#### SGC-5.04.C Comprehensive Automobile Liability

Bodily Injury (each person)	\$ 500,000
Property Damage or combined single limit	\$1,000,000

#### SGC-5.04.D OWNER's Protective – Coverage shall be Occurrence Form

General Aggregate	\$2,000,000
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

### SGC-6.14 Record Documents

At the end of 6.14 add the following language:

The CONTRACTOR shall submit to the OWNER's representative and the ENGINEER on a monthly basis, copies of redline drawings completed for that month. The CONTRACTOR's payment request for that month may not be considered if said redline drawings are not produced or considered adequate for the work completed in that month. CONTRACTOR to make one, final reproducible copy of said record drawings and deliver to ENGINEER for OWNER prior to issuance of the final contract payment.

### SGC-13.03 Tests and Inspections

Add a new paragraph immediately after paragraph one, which is to read as follows:

CONTRACTOR shall submit the name of the independent testing laboratory CONTRACTOR intends to use for the Project to ENGINEER for approval. ENGINEER will not withhold approval except for cause.

## SUPPLEMENTARY CONDITIONS

### SGC-16.07 Liquidated Damages

Add a new Section 16.07 titled "Liquidated Damages" which shall read as follows:

If CONTRACTOR shall fail to substantially complete the work within the contract time, or extension of time granted by OWNER, then CONTRACTOR will pay to the OWNER the amount of liquidated damages as specified in the Agreement for each calendar day that CONTRACTOR shall be in default after the time stipulated in the Contract Documents. The liquidated damages charged shall be deducted from CONTRACTOR's progress payments.

CONTRACTOR shall 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 CONTRACTOR has given written notice of such delay within seven (7) calendar days of the event to OWNER and 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 occasioned by any of the causes specified in Items 1 and 2.

END OF SECTION

**SECTION 00 73 46**  
**WAGE DETERMINATION SCHEDULE**

**PART 1 GENERAL**

1.1 GENERAL

- A. Rates of wages and fringe benefits to be paid to each class of construction employees by CONTRACTOR, subcontractors, and their subcontractors and all employees employed by the CONTRACTOR, shall not be less than the wage and fringe benefit rates per the Pennsylvania Department of Labor and Industry Services schedule of occupational classification and wage and fringe benefit for the locality in which the work is to be performed.
  - 1. The term "Contractor" shall include all general contractors, prime Contractors, project manager, or trade Contractors, and all of their Contractors or subcontractors and persons in privity of contract with them.
- B. CONTRACTOR shall keep posted on the construction site, in a conspicuous place, a copy of all prevailing wage and fringe benefit rates as prescribed in the contract and the address and telephone number of the Pennsylvania Department of Labor and Industry's office responsible for enforcement, and shall keep an accurate record showing the name and occupation of the actual wage and benefits paid to each construction mechanic employed in connection with said contract. This record shall be available for reasonable inspection by the Bureau of Labor Law Compliance and the Pennsylvania Department of Labor and Industry.
- C. In case there is an omission of any trade from the list of wage and fringe benefit rates to be paid to each class of mechanic by CONTRACTOR, it shall be understood that the trades omitted shall also be paid not less than the wage and fringe benefit rates prevailing in the locality in which the work is to be performed.
- D. A finding by the Bureau of Labor Law Compliance that CONTRACTOR or subcontractor is in violation of the requirements of the contract shall be final.
- E. CONTRACTOR may obtain Prevailing Wage Rates for the county in which the project is located by contacting the Pennsylvania Department of Labor and Industry at (717) 787-5279, or by visiting <https://www.dliweb.pa.gov/prevwage/>.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

END OF SECTION

**BUREAU OF LABOR LAW COMPLIANCE  
PREVAILING WAGES PROJECT RATES**

Project Name:	Marion Ave / Hilltop Area Sewer Separation Project
General Description:	Sewer separation via parallel sanitary sewer installation. Includes but is not limited to installation of approximately 4,100 LF of sanitary gravity sewers, 130 LF of storm gravity sewers, 38 manholes, 6" sewer lateral reconnections, 2,900 LF of CIPP manhole-to-manhole lining, surface restorations, and appurtenances necessary to construction.
Project Locality	City of Monessen
Awarding Agency:	Mon Valley Sewage Authority
Contract Award Date:	6/8/2026
Serial Number:	26-04624
Project Classification:	Heavy/Highway
Determination Date:	5/11/2026
Assigned Field Office:	Pittsburgh
Field Office Phone Number:	(412)565-5300
Toll Free Phone Number:	(877)504-8354
Project County:	Westmoreland County

**BUREAU OF LABOR LAW COMPLIANCE  
PREVAILING WAGES PROJECT RATES**

<b>Project: 26-04624 - Building</b>	<b>Effective Date</b>	<b>Expiration Date</b>	<b>Hourly Rate</b>	<b>Fringe Benefits</b>	<b>Total</b>
Asbestos & Insulation Workers	8/1/2024		\$43.40	\$29.51	\$72.91
Asbestos & Insulation Workers	8/1/2025		\$45.10	\$30.31	\$75.41
Boilermakers	6/1/2016		\$40.90	\$27.61	\$68.51
Bricklayer	6/1/2025		\$41.05	\$25.86	\$66.91
Bricklayer	12/1/2025		\$41.55	\$26.36	\$67.91
Bricklayer	6/1/2026		\$42.20	\$26.71	\$68.91
Carpenters - Piledriver/Welder	1/1/2025		\$43.38	\$22.72	\$66.10
Carpenters - Piledriver/Welder	1/1/2026		\$44.63	\$23.47	\$68.10
Carpenters, Drywall Hangers, Framers, Instrument Men, Lathers, Soft Floor Layers	6/1/2024		\$41.49	\$19.93	\$61.42
Carpenters, Drywall Hangers, Framers, Instrument Men, Lathers, Soft Floor Layers	6/1/2025		\$43.34	\$19.93	\$63.27
Cement Mason/Concrete Finisher	6/1/2019		\$31.27	\$19.39	\$50.66
Cement Masons	6/1/2025		\$35.52	\$25.64	\$61.16
Drywall Finisher	1/1/2025		\$34.01	\$24.63	\$58.64
Drywall Finisher	6/1/2025		\$35.16	\$25.98	\$61.14
Electricians & Telecommunications Installation Technician	12/27/2024		\$50.86	\$32.69	\$83.55
Electricians & Telecommunications Installation Technician	12/26/2025		\$53.11	\$33.72	\$86.83
Elevator Constructor	1/1/2025		\$61.07	\$40.05	\$101.12
Elevator Constructor	1/1/2026		\$63.71	\$40.89	\$104.60
Glazier	9/1/2024		\$37.06	\$31.89	\$68.95
Glazier	9/1/2025		\$38.70	\$33.75	\$72.45
Iron Workers	6/1/2024		\$39.89	\$36.47	\$76.36
Iron Workers	6/1/2025		\$41.50	\$37.36	\$78.86
Laborers (Class 01 - See notes)	1/1/2025		\$27.32	\$19.96	\$47.28
Laborers (Class 01 - See notes)	1/1/2026		\$27.82	\$20.46	\$48.28
Laborers (Class 02 - See notes)	1/1/2025		\$27.47	\$19.96	\$47.43
Laborers (Class 02 - See notes)	1/1/2026		\$27.97	\$20.46	\$48.43
Laborers (Class 03 - See notes)	1/1/2025		\$30.47	\$19.96	\$50.43
Laborers (Class 03 - See notes)	1/1/2026		\$30.97	\$20.46	\$51.43
Landscape Laborer (Skilled)	1/1/2025		\$25.79	\$18.78	\$44.57
Landscape Laborer (Skilled)	1/1/2026		\$26.79	\$19.03	\$45.82
Landscape Laborer (Tractor Operator)	1/1/2025		\$26.09	\$18.78	\$44.87
Landscape Laborer (Tractor Operator)	1/1/2026		\$27.09	\$19.03	\$46.12
Landscape Laborer	1/1/2025		\$25.37	\$18.78	\$44.15
Landscape Laborer	1/1/2026		\$26.37	\$19.03	\$45.40
Millwright	6/1/2020		\$41.68	\$20.32	\$62.00
Operators (Class 01 - see notes)	6/1/2025		\$42.72	\$24.79	\$67.51
Operators (Class 01 - see notes)	6/1/2026		\$43.74	\$25.29	\$69.03
Operators (Class 02 -see notes)	6/1/2025		\$36.67	\$24.79	\$61.46
Operators (Class 02 -see notes)	6/1/2026		\$37.67	\$25.29	\$62.96
Operators (Class 03 - See notes)	6/1/2025		\$33.88	\$24.79	\$58.67
Operators (Class 03 - See notes)	6/1/2026		\$34.88	\$25.29	\$60.17
Painters Class 6 (see notes)	6/1/2024		\$32.14	\$24.93	\$57.07

**BUREAU OF LABOR LAW COMPLIANCE  
PREVAILING WAGES PROJECT RATES**

<b>Project: 26-04624 - Building</b>	<b>Effective Date</b>	<b>Expiration Date</b>	<b>Hourly Rate</b>	<b>Fringe Benefits</b>	<b>Total</b>
Painters Class 6 (see notes)	6/1/2025		\$34.16	\$25.81	\$59.97
Pile Driver Divers (Building, Heavy, Highway)	1/1/2025		\$62.82	\$22.72	\$85.54
Pile Driver Divers (Building, Heavy, Highway)	1/1/2026		\$64.70	\$23.47	\$88.17
Piledrivers	1/1/2025		\$41.88	\$22.72	\$64.60
Piledrivers	1/1/2026		\$43.13	\$23.47	\$66.60
Plasterers	6/1/2024		\$33.14	\$21.04	\$54.18
Plumbers and Steamfitters	6/1/2025		\$41.47	\$27.71	\$69.18
Plumbers and Steamfitters	6/1/2026		\$42.92	\$28.45	\$71.37
Pointers, Caulkers, Cleaners	6/1/2025		\$40.66	\$21.99	\$62.65
Pointers, Caulkers, Cleaners	12/1/2025		\$41.50	\$22.50	\$64.00
Pointers, Caulkers, Cleaners	6/1/2026		\$42.20	\$22.80	\$65.00
Roofers	6/1/2025		\$39.91	\$20.76	\$60.67
Roofers	12/1/2025		\$41.21	\$21.46	\$62.67
Roofers	6/1/2026		\$42.00	\$23.17	\$65.17
Sheet Metal Workers	7/1/2024		\$43.00	\$33.96	\$76.96
Sheet Metal Workers	7/1/2025		\$45.00	\$35.16	\$80.16
Sign Makers and Hangars	7/15/2024		\$32.32	\$25.82	\$58.14
Sign Makers and Hangars	7/15/2025		\$33.48	\$26.41	\$59.89
Sprinklerfitters	4/1/2024		\$46.45	\$28.62	\$75.07
Sprinklerfitters	4/1/2025		\$49.75	\$29.21	\$78.96
Sprinklerfitters	4/1/2026		\$52.82	\$30.56	\$83.38
Steamfitters	6/1/2024		\$48.15	\$29.57	\$77.72
Steamfitters	6/1/2025		\$50.20	\$31.02	\$81.22
Stone Masons	12/1/2022		\$38.56	\$23.61	\$62.17
Terrazzo Finisher	6/1/2025		\$41.73	\$19.03	\$60.76
Terrazzo Finisher	12/1/2025		\$42.75	\$19.51	\$62.26
Terrazzo Finisher	6/1/2026		\$43.82	\$19.94	\$63.76
Terrazzo Mechanics	6/1/2025		\$41.13	\$21.28	\$62.41
Terrazzo Mechanics	12/1/2025		\$42.15	\$21.76	\$63.91
Terrazzo Mechanics	6/1/2026		\$43.22	\$22.19	\$65.41
Tile Finisher	6/1/2025		\$33.24	\$18.36	\$51.60
Tile Finisher	12/1/2025		\$33.99	\$18.71	\$52.70
Tile Finisher	6/1/2026		\$34.82	\$18.98	\$53.80
Tile Setter	6/1/2025		\$40.15	\$22.80	\$62.95
Tile Setter	12/1/2025		\$40.80	\$23.25	\$64.05
Tile Setter	6/1/2026		\$41.66	\$23.49	\$65.15
Truckdriver class 1(see notes)	1/1/2025		\$36.43	\$23.21	\$59.64
Truckdriver class 1(see notes)	1/1/2026		\$37.93	\$23.71	\$61.64
Truckdriver class 2 (see notes)	1/1/2025		\$36.89	\$23.52	\$60.41
Truckdriver class 2 (see notes)	1/1/2026		\$38.39	\$24.02	\$62.41
Window Film / Tint Installer	10/1/2019		\$25.00	\$2.63	\$27.63

**BUREAU OF LABOR LAW COMPLIANCE  
PREVAILING WAGES PROJECT RATES**

<b>Project: 26-04624 - Heavy/Highway</b>	<b>Effective Date</b>	<b>Expiration Date</b>	<b>Hourly Rate</b>	<b>Fringe Benefits</b>	<b>Total</b>
Carpenter	1/1/2025		\$41.35	\$22.09	\$63.44
Carpenter	1/1/2026		\$42.60	\$22.84	\$65.44
Carpenter Welder	1/1/2025		\$42.85	\$22.09	\$64.94
Carpenter Welder	1/1/2026		\$44.10	\$22.84	\$66.94
Carpenters - Piledriver/Welder	1/1/2025		\$43.38	\$22.72	\$66.10
Carpenters - Piledriver/Welder	1/1/2026		\$44.63	\$23.47	\$68.10
Cement Finishers	1/1/2024		\$35.14	\$26.30	\$61.44
Cement Finishers	1/1/2025		\$35.94	\$27.50	\$63.44
Cement Masons	1/1/2020		\$32.84	\$21.10	\$53.94
Electric Lineman	6/2/2025		\$57.10	\$31.63	\$88.73
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	6/1/2025		\$41.50	\$37.36	\$78.86
Laborers (Class 01 - See notes)	1/1/2025		\$33.70	\$26.00	\$59.70
Laborers (Class 01 - See notes)	1/1/2026		\$34.70	\$27.00	\$61.70
Laborers (Class 02 - See notes)	1/1/2025		\$33.86	\$26.00	\$59.86
Laborers (Class 02 - See notes)	1/1/2026		\$34.86	\$27.00	\$61.86
Laborers (Class 03 - See notes)	1/1/2025		\$34.25	\$26.00	\$60.25
Laborers (Class 03 - See notes)	1/1/2026		\$35.25	\$27.00	\$62.25
Laborers (Class 04 - See notes)	1/1/2025		\$34.70	\$26.00	\$60.70
Laborers (Class 04 - See notes)	1/1/2026		\$35.70	\$27.00	\$62.70
Laborers (Class 05 - See notes)	1/1/2025		\$35.11	\$26.00	\$61.11
Laborers (Class 05 - See notes)	1/1/2026		\$36.11	\$27.00	\$63.11
Laborers (Class 06 - See notes)	1/1/2025		\$31.95	\$26.00	\$57.95
Laborers (Class 06 - See notes)	1/1/2026		\$32.95	\$27.00	\$59.95
Laborers (Class 07 - See notes)	1/1/2025		\$34.70	\$26.00	\$60.70
Laborers (Class 07 - See notes)	1/1/2026		\$35.70	\$27.00	\$62.70
Laborers (Class 08 - See notes)	1/1/2025		\$36.20	\$26.00	\$62.20
Laborers (Class 08 - See notes)	1/1/2026		\$37.20	\$27.00	\$64.20
Millwright	6/1/2024		\$47.59	\$23.72	\$71.31
Millwright	6/1/2025		\$49.72	\$23.72	\$73.44
Operators (Class 01 - see notes)	1/1/2025		\$40.39	\$24.23	\$64.62
Operators (Class 01 - see notes)	1/1/2026		\$41.96	\$24.66	\$66.62
Operators (Class 02 -see notes)	1/1/2025		\$40.13	\$24.23	\$64.36
Operators (Class 02 -see notes)	1/1/2026		\$41.70	\$24.66	\$66.36
Operators (Class 03 - See notes)	1/1/2025		\$36.48	\$24.23	\$60.71
Operators (Class 03 - See notes)	1/1/2026		\$38.05	\$24.66	\$62.71
Operators (Class 04 - See notes)	1/1/2025		\$36.02	\$24.23	\$60.25
Operators (Class 04 - See notes)	1/1/2026		\$37.59	\$24.66	\$62.25
Operators (Class 05 - See notes)	1/1/2025		\$35.77	\$24.23	\$60.00
Operators (Class 05 - See notes)	1/1/2026		\$37.34	\$24.66	\$62.00
Operators Class 1-A	1/1/2025		\$43.39	\$24.23	\$67.62
Operators Class 1-A	1/1/2026		\$44.96	\$24.66	\$69.62
Operators Class 1-B	1/1/2025		\$42.39	\$24.23	\$66.62
Operators Class 1-B	1/1/2026		\$43.96	\$24.66	\$68.62
Painters Class 1 (see notes)	6/1/2022		\$34.45	\$22.82	\$57.27

**BUREAU OF LABOR LAW COMPLIANCE  
PREVAILING WAGES PROJECT RATES**

<b>Project: 26-04624 - Heavy/Highway</b>	<b>Effective Date</b>	<b>Expiration Date</b>	<b>Hourly Rate</b>	<b>Fringe Benefits</b>	<b>Total</b>
Painters Class 2 (see notes)	6/1/2024		\$38.09	\$24.93	\$63.02
Painters Class 2 (see notes)	6/1/2025		\$40.36	\$25.81	\$66.17
Painters Class 3 (see notes)	6/1/2024		\$40.66	\$24.93	\$65.59
Painters Class 3 (see notes)	6/1/2025		\$43.68	\$25.81	\$69.49
Painters Class 4 (see notes)	6/1/2019		\$28.20	\$20.06	\$48.26
Painters Class 5 (see notes)	6/1/2019		\$22.91	\$20.06	\$42.97
Pile Driver Divers (Building, Heavy, Highway)	1/1/2025		\$62.82	\$22.72	\$85.54
Pile Driver Divers (Building, Heavy, Highway)	1/1/2026		\$64.70	\$23.47	\$88.17
Piledrivers	1/1/2025		\$41.88	\$22.72	\$64.60
Piledrivers	1/1/2026		\$43.13	\$23.47	\$66.60
Steamfitters (Heavy and Highway - Gas Distribution)	5/1/2022		\$48.43	\$40.28	\$88.71
Truckdriver class 1(see notes)	1/1/2025		\$36.43	\$23.21	\$59.64
Truckdriver class 1(see notes)	1/1/2026		\$37.93	\$23.71	\$61.64
Truckdriver class 2 (see notes)	1/1/2025		\$36.89	\$23.52	\$60.41
Truckdriver class 2 (see notes)	1/1/2026		\$38.39	\$24.02	\$62.41

**SECTION 01 11 00  
SUMMARY OF WORK**

**PART 1   GENERAL**

1.1    REQUIREMENTS INCLUDED

- A.    The work to be performed under this Contract shall consist of furnishing all tools, equipment, materials, supplies, and furnishing all transportation and services, including fuel, power, water, and essential communications, and performance of all labor, work or other operations required for the fulfillment of the Contract in strict accordance with the specifications, schedules, drawings, and other Contract Documents as herein defined, all which are made a part hereof, and including such detail drawings as may be furnished by ENGINEER from time to time during construction in clarification of said Contract Documents. Work shall be completed and all work, materials, and services not expressly shown or called for in Contract Documents which may be necessary for the complete and proper construction of the work in good faith shall be performed, furnished, and installed by CONTRACTOR as though originally so specified or shown, at no increase in cost to OWNER.

1.2    WORK COVERED BY CONTRACT DOCUMENTS

- A.    The Work described in the Contract Documents will be completed under contract generally described as follows:
  - 1.    The scope of work includes but is not limited to the installation of approximately 4,070 lineal feet of 8"-18" sanitary gravity sewers, approximately 130 lineal feet of 36" storm gravity sewers, approximately 37 - 48" diameter sanitary manholes, approximately 1 - 120" diameter storm manhole, disconnection of existing sanitary laterals in combined portions of existing system, 6" sanitary lateral reconnections and in-line cleanout installations, performing connections to existing manholes, approximately 2,870 lineal feet of 8-12" CIPP manhole-to-manhole lining of existing sanitary sewers, surface restorations including trench line and curb-to-curb pavement restoration, and other miscellaneous and incidental work items for a complete and fully operational installation.

1.3    CONTRACT METHOD

- A.    Work hereunder will be constructed under Contract as described above and as described in more detail in the Contract Documents.
- B.    All conditions in the Contract Documents shall apply to any and all subcontractors on this project. It shall be the Contractors responsibility to coordinate the Work with their respective subcontractors.

1.4    JURISDICTION

- A.    Agencies having jurisdiction over construction of this project include but are not limited to:

## SUMMARY OF WORK

1. The United States Environmental Protection Agency (USEPA),
  2. The Pennsylvania Department of Environmental Protection (PADEP),
  3. Westmoreland Conservation District (WCD), and
  4. City of Monessen.
- B. CONTRACTOR shall secure any permits associated with construction as required by the agency(s) having jurisdiction, shall abide by all rules and regulations of each and shall pay all costs in connection with the permits. CONTRACTOR shall pay for such permits and inspection fees to ensure compliance with their requirements.
- C. OWNER has obtained permits from various regulatory agencies. The CONTRACTOR shall be responsible for complying with the terms and conditions of the permits. The following agencies will be transferred to the CONTRACTOR following award of contract:
1. PA DEP Water Quality Management General Permit for Sewer Extensions and Pump Stations (WQG-02)
  2. PA DEP Chapter 105 Water Obstructions and Encroachment General Permit
  3. Stormwater NPDES for Site Work

### 1.5 NOTICES

- A. CONTRACTOR's are required to comply with the Pennsylvania One Call requirements prior to digging.
- B. CONTRACTOR shall be responsible to coordinate with the various utility companies the construction methods and work to be done in the vicinity of utilities. When temporary relocation is necessary sufficient advance notice shall be given by CONTRACTOR to the utility involved.
- C. CONTRACTOR is required to notify the City of Monessen of any road openings that require traffic detours, at least five (5) working days prior to beginning the opening.

### 1.6 COORDINATION

- A. It shall be responsibility of CONTRACTOR to coordinate his operations and those of his subcontractors in such a manner so as to avoid interference or delays and ensure the orderly progress of Work in the areas of common or interdependent construction activities. Limits of the Contract are indicated on the Plans and specified herein. However, these limits may be altered by mutual agreement of CONTRACTOR with the OWNER, with the written Agreement of OWNER'S REPRESENTATIVE, in order to facilitate the work operations.
- B. The work of this Contract may involve coordination with other utility companies or agencies, either performing connection, repair or maintenance service on their own facilities. CONTRACTOR shall coordinate and cooperate with all utility companies and other contractors working in the same area that this Contract entails. This shall

## SUMMARY OF WORK

include, but not be limited to, the telephone company; the electric power company; the gas company; all subcontractors; and any other contractors who are performing work within the area of this Contract.

### 1.7 REFERENCE STANDARDS

- A. Reference to the standards of any technical society, organization, or association or to codes of local, state or federal authorities shall mean the latest effective standard, code, specification, or standard adopted and published at the date of receipt of bids, unless specifically stated otherwise.

### 1.8 AVAILABILITY OF LAND

- A. Work is located within the property lines of the OWNER at the following properties:

1. Sherry & David Pavlik  
1532 Grand Blvd.  
Monessen, PA 15062
2. Michael & Terri Fisher  
1535 Meadow Ave.  
Monessen, PA 15062
3. Daniel & Antionette Ducar  
1541 Meadow Ave.  
Monessen, PA 15062
4. Jonathan Baker  
1435 Rostraver St.  
Monessen, PA 15062
5. Monessen VFD Hose House 2  
1545 Grand Blvd.  
Monessen, PA 15062
6. Trinity Restaurant Group LLC.  
1565 Grand Blvd.  
Monessen, PA 15062
7. Benjamin Gush  
1567 Grand Blvd.  
Monessen, PA 15062
8. JDN Investments Inc.  
1575 Grand Blvd.  
Monessen, PA 15062
9. Audrey Hassenfedt  
1427 Rostraver St.

## SUMMARY OF WORK

Monessen, PA 15062

10. Carl & Amy Cooper  
1426 Rostraver St.  
Monessen, PA 15062
11. Cynthia Golomb  
1420 Rostraver St.  
Monessen, PA 15062
12. Alice & Ernesto Escudero  
1425 Grand Blvd.  
Monessen, PA 15062
13. Leslie Bright  
1503 Boston Ave.  
Monessen, PA 15062
14. Deare Kametz  
1501 Grand Blvd.  
Monessen, PA 15062
15. David Trozzo  
1426 Grand Blvd.  
Monessen, PA 15062

In areas where work will extend beyond right-of-ways or the property lines, OWNER will secure a construction easement to facilitate the work.

- B. Nothing in this Contract shall imply that CONTRACTOR has exclusive use of roadways or public and/or private land employed to perform the work.
- C. CONTRACTOR shall coordinate staging, layout and equipment storage areas with OWNER and other CONTRACTORS and subcontractors on site. CONTRACTOR shall be responsible for the complete restoration of areas used by CONTRACTOR for such purposes, the cost of which is to be included in the Lump Sum price for this Project. CONTRACTOR is responsible for securing the staging and storage areas and limiting the ability for persons to access the treatment plant site through the staging and storage area. CONTRACTOR shall coordinate with OWNER to allow reasonable access by OWNER to the staging and storage area to perform routine activities associated with the facility operation.

### 1.9 SALVAGE OF MATERIAL AND EQUIPMENT

- A. No items shall be salvaged and reused without permission from OWNER or OWNER'S REPRESENTATIVE unless specifically stated otherwise in the bid form.
- B. OWNER reserves the right of first refusal to salvage any item from the project site. If so directed by OWNER'S REPRESENTATIVE, CONTRACTOR shall deliver to a

## SUMMARY OF WORK

location on the project site any items to be salvaged by OWNER.

### 1.10 STORAGE OF MATERIALS

- A. Storage conditions shall be acceptable to OWNER for all materials and equipment not incorporated into the Work but included in applications for payment. Such storage arrangements and conditions shall be presented in writing and shall afford adequate and satisfactory security and protection. Off-site storage facilities shall be accessible to OWNER and OWNER'S REPRESENTATIVE. Stored materials shall be insured for full value. Certificates of Insurance coverage must be submitted to OWNER or OWNER'S REPRESENTATIVE with the request for payment by the CONTRACTOR.
- B. All arrangements and costs for storage facilities shall be paid by CONTRACTOR.

### 1.11 CONSTRUCTION SEQUENCE

- A. The Contract Documents include a suggested construction sequence to be used as a guideline during the performance of the Work.

The intent of the construction sequence is to minimize sewer service disruptions to homes during the course of the Work.

- B. After Contract award, CONTRACTORS shall submit a construction sequencing plan for the Improvements that are part of his/her Contract. The sequencing plan may follow the plan provided in the Contract Documents or could be a variation of that plan. CONTRACTOR is ultimately responsible for its own means, methods and materials in the completion of the Contract. CONTRACTOR'S sequencing plan is to be submitted to ENGINEER for review in accordance with the requirement of Section 01 33 00 of these Specifications. Approval of the sequencing plan does not relieve CONTRACTOR from its responsibility to perform the Work in accordance with the Contract Documents.
- C. CONTRACTOR shall achieve all Milestones as set forth in the Specifications, including Substantial Completion, and Final Completion in accordance with the dates set forth in the Contract Documents. CONTRACTOR understands that TIME IS OF THE ESSENCE of this Contract.
- D. OWNER delegates all scheduling and coordination responsibility for the work of the Project to CONTRACTOR. CONTRACTOR shall be responsible for scheduling and coordinating CONTRACTOR'S Work with the OWNER'S forces on the Project.
- E. CONTRACTOR'S Schedule. Within 30 days of the Notice of Award, CONTRACTOR shall provide to Engineer and OWNER for their review, comment and approval a Critical Path Method (CPM) schedule providing for all activities necessary for the completion of CONTRACTOR'S Work within the time limits set forth in the Contract Documents. All CPM Schedules submitted shall provide for the Completion of CONTRACTOR'S work in accordance with the Milestone Dates, the

## **SUMMARY OF WORK**

Substantial Completion Date, and the Final Completion Date, unless such dates are modified in a written Change Order signed by OWNER.

- F. In connection therewith, CONTRACTOR shall organize and conduct at least one schedule coordination meeting between and among CONTRACTOR, OWNER, and ENGINEER to obtain the agreement of all parties to the overall Project Schedule. All parties shall reach agreement and sign off on the overall Project Schedule. When agreed to by all parties, the Project Schedule shall become the baseline schedule for the Project.
- G. No later than the 10th day of each month, CONTRACTOR shall submit to the ENGINEER and OWNER a schedule report containing the updated Project Schedule, identifying and explaining (in the schedule and in narrative form) any changes from the prior schedule, including but not limited to any changes in duration, activity or logic from the prior schedule. All schedules and schedule updates shall be submitted in a separate file, and shall not overwrite the prior version. CONTRACTOR shall coordinate such changes with the overall schedule, and shall be responsible to resolve any schedule or coordination conflicts that arise therefrom. No Milestone Date, Substantial Completion Date or Final Completion Date may be modified or changed without a written Change Order executed by OWNER.
- H. If CONTRACTOR encounters any difficulty in obtaining necessary schedule from OWNER or ENGINEER, CONTRACTOR shall immediately notify OWNER and ENGINEER in writing, and shall schedule a meeting with such OWNER, ENGINEER and CONTRACTOR for the purpose of resolving such issue. Failure to notify OWNER of such issue shall constitute a representation by CONTRACTOR that it has been provided sufficient information to adequately discharge its coordination and scheduling responsibilities hereunder.
- I. All CPM schedules and updates shall be submitted as both paper copies and in electronic native format, or as requested by OWNER or ENGINEER.

### **PART 2 PRODUCTS (NOT USED)**

### **PART 3 EXECUTION (NOT USED)**

END OF SECTION

**SECTION 01 1120**  
**SUGGESTED SEQUENCE OF CONSTRUCTION**

**PART 1   GENERAL**

1.1    DESCRIPTION

- A.     The CONTRACTOR shall field verify the locations and elevations of all existing piping prior to any piping submittals. This may require the excavation of test pits for unknown locations.

1.2    SEQUENCE OF CONSTRUCTION

- A.     The Contractor will be responsible for ordering all equipment, materials, etc. to ensure that it is available when required.
- B.     The construction will have a time limit of 540 calendar days (18 months) from Contract Notice to Proceed, which is anticipated to occur on or about July 1, 2026.
- C.     Following contract award, the CONTRACTOR shall submit a construction sequencing plan for the Work under this Contract. The sequencing plan shall be submitted to the ENGINEER for review in accordance with Section 01 33 00 of these Specifications. Review or approval of the sequencing plan does not relieve the CONTRACTOR of responsibility for performing the Work in full compliance with the Contract Documents. The CONTRACTOR shall retain sole responsibility for all means, methods, materials, techniques, sequences, and procedures of construction.

**PART 2   PRODUCTS (NOT USED)**

**PART 3   EXECUTION (NOT USED)**

END OF SECTION

**SECTION 01 22 00  
UNIT PRICES**

**PART 1      GENERAL**

1.1      MEASUREMENT

- A.      Measurement will be made on basis of completion of work in accordance with Contract Documents and as stated in following Article titled Item Descriptions.

1.2      PAYMENT

- A.      Current Payments: Payments will be made as stated in the Agreement and at the Unit and/or Lump Sum Price(s) bid in the Bid Form.
  
- B.      Partial Payments: Partial payment will be made for products (materials, equipment, apparatus) stored on or off the site in accordance with requirements of paragraph 11.04 of the General Conditions.
  
- C.      Incidental Costs:

- 1.      Include in appropriate pay items cost for:
  - a.      Labor
  - b.      Equipment
  - c.      Materials
  - d.      Transportation
  - e.      Plants
  - f.      Tools
  - g.      Bonds and Insurance
  - h.      Worker's Compensation
  - i.      Licenses
  - j.      Permits not Obtained by Owner
  - k.      Inspection Fees
  - l.      Taxes
  - m.      General Overhead
  - n.      Profits
  - o.      Tests: Incidental to the appropriate pay items
  - p.      Laboratory and Shop Tests
  - q.      Erosion and Sedimentation Controls
  - r.      Pre-Construction Color Photograph / Audio Video Documentation
  - s.      All other expenses necessary for prosecution of the work

## UNIT PRICES

### 1.3 UNIT PRICE BID FORM ITEM DESCRIPTIONS

- A. General Statement Concerning Item Descriptions: The Item Descriptions in the Bid Form are written in an abbreviated format and do not constitute an accurate description of the Work. The Work of the Bid Form Items includes the work of the Specifications Sections referenced hereinafter in the commentary paragraphs concerning the Bid Form Item Description. Such Work also includes the incidental construction as may be included by secondary references to other Specifications Sections in the referenced Sections.
1. Work of Specifications Sections not referenced in the Unit Price Item Description paragraphs is considered incidental to the entire work of the Contract, for which no separate or additional payment will be paid.
  2. In certain instances, the Item Description commentary paragraphs make no reference to a particular Bid Form Item since the descriptions of certain Bid Form Items may be identical or very similar.
- B. Each and Lump Sum Items: Unit Price Bid Form Items with Each or Lump Sum entered under Estimated Quantities shall be measured as stated, except where specified otherwise.
- C. 8-15" Main Sewer, SDR 35  
Bid Item No: 1-3
1. Furnish and install sanitary sewer as shown on the Contract Drawings and called for in the Specifications. This item shall include, but not be limited to, all stakeout, clearing and grubbing, test pits and test holes, trench protection, dewatering, identification markers, pipe material, pipe bedding, repair and / or replacement of existing systems damaged during construction, acceptance testing, repairing of defects found during testing, retesting after repairs, and all other requirements for a complete installation as indicated on the Contract Drawings and in the Specifications. Preparation of as-built drawings shall also be included under this item.
  2. Payment for this item shall be at the unit price within the bid form.
  3. Measurement used for payment of this item shall be the as-built horizontal distance of sanitary sewer.
- D. 6" Lateral, SDR 35  
Bid Item No: 4
1. Furnish and install 6" sewer laterals as shown on the Contract Drawings and called for in the Specifications. This item shall include, but not be

## UNIT PRICES

limited to, excavation, dewatering, furnishing and installing sanitary sewer lateral pipe and fittings, connections to mains or manholes, testing, inspection, backfilling, and cleanup.

2. Payment for this item shall be at the unit price within the bid form.
3. Measurement used for payment of this item shall be the as-built horizontal distance of lateral.

### E. 48" Precast Manhole

Bid Item No: 5

1. Furnish and install sanitary manholes as shown on the Contract Drawings and called for in the Specifications. This item shall include, but not be limited to, excavation, dewatering, shoring, furnishing and installing precast or cast-in-place concrete manhole sections, steps, cast iron frame and cover, pipe connections, joint sealing, adjustments to final grade, testing, inspection, and cleanup.
2. Payment for this item shall be at the unit price within the bid form.
3. Measurement used for payment of this item shall be the as-built manhole total.

### F. 36" Storm Sewer, SDR 35

Bid Item No: 6

1. Furnish and install storm sewer as shown on the Contract Drawings and called for in the Specifications. This item shall include, but not be limited to, all stakeout, clearing and grubbing, test pits and test holes, trench protection, dewatering, identification markers, pipe material, pipe bedding, repair and / or replacement of existing systems damaged during construction, acceptance testing, repairing of defects found during testing, retesting after repairs, and all other requirements for a complete installation as indicated on the Contract Drawings and in the Specifications.
2. Payment for this item shall be at the unit price within the bid form.
3. Measurement used for payment of this item shall be the as-built horizontal distance of storm sewer.

## UNIT PRICES

- G. 120" Storm Manhole  
Bid Item No: 7
1. Furnish and install storm manholes as shown on the Contract Drawings and called for in the Specifications. This item shall include, but not be limited to, excavation, dewatering, shoring, furnishing and installing precast or cast-in-place concrete manhole sections, steps, cast iron frame and cover, pipe connections, joint sealing, adjustments to final grade, testing, inspection, and cleanup.
  2. Payment for this item shall be at the unit price within the bid form.
  3. Measurement used for payment of this item shall be the as-built manhole total.
- H. 8-12" Cured-in-Place (CIPP) Liner  
Bid Item No: 8-10
1. Furnish and install CIPP Lining as shown on the Contract Drawings and called for in the Specifications.
  2. The work shall include, but not be limited to, all liner materials and resin, sewer cleaning, pre- and post-installation CCTV inspections, liner installation and curing, grouting, service lateral reinstatement, acceptance testing, correction of defects identified during testing, retesting following repairs, proper disposal of waste and discarded materials, and all labor, equipment, incidentals, and requirements necessary for a complete and functional installation in accordance with the Contract Drawings and Specifications.
  3. Payment for this item shall be at the unit price within the bid form.
  4. Measurement of CIPP liner will be from inside face of manhole wall to inside face of manhole wall.
- I. Heavy Cleaning/Root Cutting  
Bid Item No: 11
1. The work shall include, but not be limited to, mechanically removing roots, heavy deposits, grease, mineral scale, and other obstructions from existing sanitary sewer mains and laterals. Work includes multiple cleaning passes as required to achieve a clean pipe suitable for

## UNIT PRICES

rehabilitation, proper disposal, and as called for in the Specifications. All work shall be incidental to the unit price unless otherwise noted.

2. Payment for this item shall be at the unit price within the bid form.
3. Measurement used for payment of this item shall be per LF, validated by CCTV.

### J. Excavation and Disposal Bid Item No: 12

1. The work shall include, but not be limited to, excavation of all material types encountered, excavation for pipe trenches, manholes and laterals, loading, hauling, and disposing of excess excavated material or unsuitable or contaminated material, maintenance of trench stability, and as called for in the Specifications. All work shall be incidental to the unit price unless otherwise noted.
2. Payment for this item shall be at the unit price within the bid form.
3. Measurement used for payment shall be per CY excavated.

### K. Aggregate Backfill Bid Item No: 13

1. The work shall include, but not be limited to, furnishing, placing, and compacting approved aggregate material as backfill for sewer trenches and structures, as shown on the Contract Drawings and called for in the Specifications. All work shall be incidental to the unit price unless otherwise noted.
2. Payment for this item shall be at the unit price within the bid form.
3. Measurement used for payment shall be per CY of aggregate placed.

### L. Bituminous Pavement Replacement – Base Course Bid Item No: 14

1. The work shall include, but not be limited to, preparation of the subgrade, furnishing, placing, and compacting bituminous base course to replace existing pavement removed, as shown on the Contract Drawings and called for in the Specifications. All work shall be incidental to the unit price unless otherwise noted.

## UNIT PRICES

2. Payment for this item shall be at the unit price within the bid form.
3. Measurement used for payment shall be per SY of base course placed.

M. Bituminous Pavement Replacement – Wearing Course  
Bid Item No: 15

1. The work shall include, but not be limited to, furnishing, placement to required thickness, compaction, and application of tack coat, as shown on the Contract Drawings and called for in the Specifications. All work shall be incidental to the unit price unless otherwise noted.
2. Unless otherwise indicated in the Contract Documents, the Contractor shall be assessed pay deductions for failure to meet the requirements of the asphalt pavement specification. If any work for the measured property indicates rejected material, remove and replace such material at no additional cost.
3. Payment for this item shall be at the unit price within the bid form.
4. Measurement used for payment shall be per SY of wearing course placed.

N. 1-1/2" Milling  
Bid Item No: 16

1. The work shall, but not be limited to, saw cutting where required, milling to the specified uniform depth of 1-1/2 inches with approved milling equipment, removal and handling of milled material, cleaning of the milled surface, and preparation of the surface to receive subsequent bituminous pavement courses, as shown on the Contract Drawings and called for in the Specifications. All work shall be incidental to the unit price unless otherwise noted.
2. Payment for this item shall be at the unit price within the bid form.
3. Measurement used for payment shall be per SY of milling completed.

## UNIT PRICES

### O. Concrete Pavement Restoration

Bid Item No: 17

1. The work shall include, but not be limited to, sawcutting, full depth removal, preparation of the underlying base or backfill, furnishing and placing new concrete pavement to the required thickness, installation of reinforcements, joints, tie-bars, and dowels, finishing, and curing, as shown on the Contract Drawings and called for in the Specifications. All work shall be incidental to the unit price unless otherwise noted.
2. Unless otherwise indicated in the Contract Documents, the Contractor shall be assessed pay deductions for failure to meet the requirements of the concrete pavement specification. If any work for the measured property indicates rejected material, remove and replace such material at no additional cost.
3. Payment for this item shall be at the unit price within the bid form.
4. Measurement used for payment shall be per CY of concrete pavement restoration completed.

### P. Lawn Restoration

Bid Item No: 18

1. Work shall include, but not limited to, surface grading, furnishing and placing topsoil, seeding or sodding, fertilizing, mulching, lawn maintenance, watering, and establishment of a healthy and uniform lawn cover, as shown on the Contract Drawings and called for in the Specifications. All work shall be incidental to the unit price unless otherwise noted.
2. Payment for this item shall be at the unit price within the bid form.
3. Measurement used for payment shall be per SY of lawn restoration completed.

### Q. Sidewalk Restoration

Bid Item No: 19

1. Work shall include, but not limited to, sawcutting, removal and disposal of damaged sidewalk, placement of concrete sidewalk to match adjacent slabs, finishing, curing, and restoration of joints and edges, as shown on

## UNIT PRICES

the Contract Drawings and called for in the Specifications. All work shall be incidental to the unit price unless otherwise noted.

2. Payment for this item shall be at the unit price within the bid form.
3. Measurement used for payment shall be per SY of sidewalk restoration completed.

### R. Driveway Restoration

Bid Item No: 20

1. Work shall include, but not limited to, sawcutting, removal and disposal of damaged driveway, placement of concrete driveway to match adjacent slabs, finishing, curing, and restoration of joints and edges, as shown on the Contract Drawings and called for in the Specifications. All work shall be incidental to the unit price unless otherwise noted.
2. Payment for this item shall be at the unit price within the bid form.
3. Measurement used for payment shall be per SY of driveway restoration completed.

### S. Curb Restoration

Bid Item No: 21-22

1. Work shall include, but not limited to, sawcutting, removal and disposal of existing curb, placement of new curb of matching type, alignment, finish, and restoration of adjacent areas, as shown on the Contract Drawings and called for in the Specifications. All work shall be incidental to the unit price unless otherwise noted.
2. Payment for this item shall be at the unit price within the bid form.
3. Measurement used for payment shall be per LF of curb restoration completed.

### T. Manhole Connections

Bid Item No: 23

1. Work shall include, but not be limited to, reconnection of existing pipe segments into newly constructed manholes, furnishing and installing pipe couplings, pipe stubs, and watertight seals, as shown on the Contract Drawings and called for in the Specifications.

## UNIT PRICES

2. Payment for this item shall be at the unit price within the bid form.
3. Measurement used for payment shall be for each manhole connection installed.

### U. Locate and Raise Manholes

Bid Item No: 24

1. Work shall include, but not be limited to, locating existing manholes, excavating as necessary, furnishing and installing adjustment rings, sealing all joints with mortar, and resetting frames and covers to raise the manhole to the required finished grade, as shown on the Contract Drawings and called for in the Specifications.
2. Payment for this item shall be at the unit price within the bid form.
3. Measurement used for payment shall be for each manhole located and raised.

### V. Bypass Pumping

Bid Item No: 25

1. Work shall include, but not be limited to, furnishing, installing, operating, maintaining, and removing a complete sewer bypass pumping system required to maintain continuous flow control. Equipment shall include, but not be limited to, pumps, suction and discharge piping, fittings, temporary connections, flow control, power supply, standby equipment, monitoring, and emergency response, as shown on the Contract Drawings and called for in the Specifications.
2. Payment for this item shall be at the unit price within the bid form.
3. Measurement used for payment shall be per hour of bypass pumping.

### W. Traffic Control

Bid Item No: 26

1. Work shall include, but not be limited to, preparation and implementation of a traffic control plan, furnishing and installing signs, cones, barricades, temporary pavement markings, flagging operations, temporary lane closures or detours, maintenance of access to adjacent properties, and

## UNIT PRICES

coordination with local agencies as required, as shown on the Contract Drawings and called for in the Specifications.

2. Payment for this item shall be at the lump sum within the bid form.
3. Payments shall be made based on the percentage of Project completion.

### X. Flushing of Existing Sewer

Bid Item No: 27

1. Work shall include, but not be limited to, flushing the existing sewers with clean water after all sewage connections have been removed and prior to permitting any discharges from the newly converted storm sewers.
2. Water from flushing shall be treated at the MVSA STP.
3. Payment for this item shall be at the lump sum within the bid form.

### Y. Mobilization

Bid Item No. 28

1. Work shall include, but not be limited to, transportation of personnel, equipment, and materials to and from the project site, establishment and removal of field offices and furnishings, staging areas, storage areas, coordination and scheduling efforts, as shown on the Contract Drawings and called for in the Specifications. Mobilization shall also include final demobilization and site cleanup upon completion of the work.
2. Mobilization shall include the following principal items:
  - a. Providing all required insurance certificates and bonds.
  - b. Obtaining all required site permits, licenses, fees and certificates.
  - c. Development of a detailed baseline construction schedule for review.
  - d. Development of Schedule of Values as required by the Contract Documents.
  - e. Field location of existing utilities, unless included as a specific line item.
3. Demobilization shall include the following principal items:
  - a. Providing all documentation required indicating closure, where required, of site permits and certificates.

## UNIT PRICES

- b. Submittal and acceptance by the Engineer for Substantial Completion.
  - c. Removal of any temporary construction utilities and notifications provided to utility companies as required.
3. Payment for Mobilization shall be made based on the percentage of Project completion. The sum of the payments shall equal the lump sum on the bid form.
4. The combined total value for "Mobilization" shall be limited to no more than five (5) percent of the Total Bid Price.
  - a. If the amount entered for Mobilization exceeds five (5) percent of the Total Bid Price, the Total Bid Price shall remain as is and the Bid Item amount shall be reduced to five (5) percent of the Total Bid Price.
  - b. The dollar amount above five (5) percent that is no longer included in the Mobilization bid item shall be added to existing Bid Items to be paid out over the course of the entire construction project. The reapportionment of the dollar amount to other line items will be as agreed to by the CONTRACTOR and ENGINEER.

**PART 2**      **PRODUCTS (NOT USED)**

**PART 3**      **EXECUTION (NOT USED)**

END OF SECTION

**SECTION 01 25 13  
SUBSTITUTION PROCEDURES**

**PART 1      GENERAL**

1.1 SECTION INCLUDES

- A. Options for making product or process selections.
- B. Procedures for proposing equivalent construction products or processes, including preapproved, prequalified, and approved products or processes.

1.2 DEFINITIONS

- A. Product: Means materials, equipment, or systems incorporated into the Project. Product does not include machinery and equipment used for production, fabrication, conveying, and erection of the Work. Products may also include existing materials or components designated for reuse.
- B. Process: Any proprietary system or method for installing system components resulting in an integral, functioning part of the Work. For this Section, the word Product includes Processes.

1.3 SELECTION OPTIONS

- A. Approved Products: Construction products or processes of certain manufacturers or suppliers designated in the Specifications followed by the words "or approved equal." Approval of alternate products or processes not listed in the Specifications may be obtained through provisions for product options and substitutions in Document 00 72 00 - General Conditions, and by following the submittal procedures specified in 01 33 00 - Submittal Procedures.
- B. Product Compatibility: To the maximum extent possible, provide products that are of the same type or function from a single manufacturer, make, or source. Where more than one choice is available as a CONTRACTOR's option, select a product which is compatible with other products already selected, specified, or in use by OWNER.

1.4 CONTRACTOR'S RESPONSIBILITY

- A. CONTRACTOR's responsibility related to product options and substitutions is defined in Section 00 72 00, General Conditions.
- B. Furnish information ENGINEER deems necessary to judge equivalency of the alternate product.
- C. Pay for laboratory testing, as well as any other review or examination costs, needed to establish the equivalency between products in order to obtain information upon which ENGINEER can base a decision.
- D. If ENGINEER determines that an alternate product is not equal to that named in the Specifications, CONTRACTOR shall furnish one of the specified products.

## **SUBSTITUTION PROCEDURES**

### **1.5 ENGINEER'S REVIEW**

- A. Alternate products or processes may be used only if approved in writing by ENGINEER. ENGINEER's determination regarding acceptance of a proposed alternate product is final.
- B. Alternate products will be accepted if the product is judged by ENGINEER to be equivalent to the specified product or to offer substantial benefit to OWNER.
- C. OWNER retains the right to accept any product or process deemed advantageous to OWNER, and similarly, to reject any product or process deemed not beneficial to OWNER.

### **1.6 SUBSTITUTION PROCEDURE**

- A. Collect and assemble technical information applicable to the proposed product to aid in determining equivalency as related to the approved product specified.
- B. Submit a written request for a construction product to be considered as an alternate product.
- C. Submit the product information after the effective date of the Agreement and within the time period allowed for substitution submittals given in Section 00 72 00, General Conditions. After the submittal period has expired, requests for alternate products will be considered only when a specified product becomes unavailable because of conditions beyond CONTRACTOR's control.
- D. Submit one (1) electronic copy in PDF format of each request for alternate product approval. Include the following information:
  - 1. Complete data substantiating compliance of proposed substitution with Contract Documents.
  - 2. For products:
    - a. Product identification, including manufacturer's name and address.
    - b. Manufacturer's literature with product description, performance and test data, and reference standards.
    - c. Samples, as applicable.
    - d. Name and address of similar projects on which product was used and date of installation. Include the name of OWNER, ENGINEER, and CONTRACTOR.
  - 3. For construction methods:
    - a. Detailed description of proposed method.

## **SUBSTITUTION PROCEDURES**

- b. Drawings illustrating methods.
  - 4. Itemized comparison of proposed substitution with product or method specified.
  - 5. Data relating to changes in construction schedule.
  - 6. Relation to separate contracts, if any.
  - 7. Accurate cost data on proposed substitution in comparison with product or method specified.
  - 8. Other information requested by ENGINEER.
- E. Approved alternate products will be subject to the same review process as the specified product would have been for shop drawings, product data, and samples.

**PART 2**      **PRODUCTS (NOT USED)**

**PART 3**      **EXECUTION (NOT USED)**

END OF SECTION

**SECTION 01 31 19  
PROJECT MEETINGS**

**PART 1      GENERAL**

1.1 PRECONSTRUCTION MEETING

- A. Prior to the delivery of materials or the start of any construction, CONTRACTOR shall request a Preconstruction Meeting from ENGINEER. A minimum seven (7) working days' notification to meeting participants shall be required.
  
- B. Schedule:
  - 1. ENGINEER will establish the meeting place, time and date, distribute agenda, notify participants, and administer the meeting. CONTRACTOR shall notify major Subcontractors.
  
- C. Attendance:
  - 1. OWNER
  - 2. ENGINEER
  - 3. CONTRACTOR
  - 4. Major Subcontractors
  - 5. Utility Companies
  - 6. Safety Representatives
  - 7. Governmental Agencies
  
- D. Agenda:
  - 1. Distribution by CONTRACTOR and discussion, 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. Project coordination.
  - 4. Responsibilities of OWNER, ENGINEER, CONTRACTOR and other agencies.
  - 5. Procedures and processing of:
    - a. Field decisions.
    - b. Proposal requests.
    - c. Submittals.
    - d. Change Orders.
    - e. Applications for Payment.
  - 6. Adequacy of distribution of Contract Documents.
  - 7. Procedures for maintaining Record Documents.
  - 8. Use of premises.
  - 9. Construction facilities, controls and construction aids.

## PROJECT MEETINGS

10. Temporary utilities.
11. Safety and first aid procedures.
12. Security procedures.
13. Housekeeping procedures.
14. Testing

### E. Minutes:

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

## 1.2 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 shall 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:

## PROJECT MEETINGS

1. ENGINEER will prepare and distribute copies to participants and 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**

1.1      GENERAL REQUIREMENTS

- A.      CONTRACTOR shall submit Shop Drawings, product data, and Samples, as required by the individual Specification sections, to ENGINEER for review in accordance with the provisions of General Conditions.
- B.      CONTRACTOR shall submit material shop drawings within seven (7) days, and order materials within thirty (30) days of receiving Notice to Proceed.

1.2      PROGRESS SCHEDULES

- A.      CONTRACTOR shall 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 ENGINEER.
  - 1.      Proposed Progress Schedules shall be submitted to ENGINEER prior to the pre-construction meeting.
  - 2.      CONTRACTOR shall distribute hard copies of the Progress Schedules during the pre-construction meeting for discussion.
  - 3.      Progress Schedules shall be updated by CONTRACTOR and submitted electronically (in PDF format) to 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.

1.3      SHOP DRAWING SCHEDULE

- A.      CONTRACTOR shall submit one (1) electronic copy in PDF format of the Shop Drawing Schedule indicating the individual items and submission dates to ENGINEER.
  - 1.      A preliminary Shop Drawing Schedule in accordance with the requirements in the General Conditions shall be submitted by CONTRACTOR prior to the pre-construction meeting.
  - 2.      CONTRACTOR shall distribute hard copies of the Shop Drawing Schedule during the pre-construction meeting for discussion.
  - 3.      A final electronic copy of the Shop Drawing Schedule (in PDF format) shall be submitted by CONTRACTOR at least ten (10) days prior to submitting the first Application for a Payment.

## **SUBMITTAL PROCEDURES**

### **1.4 SCHEDULE OF VALUES**

- A. CONTRACTOR, if applicable, shall submit one (1) electronic copy in PDF format Schedule of Values of the Work to ENGINEER.
  - 1. A preliminary Schedule of Values shall be submitted by CONTRACTOR prior to the pre-construction meeting.
  - 2. CONTRACTOR shall distribute hard copies of the Schedule of Values during the pre-construction meeting for discussion.
  - 3. A final Schedule of Values (in PDF format), prepared in accordance with the General Conditions and presented in sufficient detail to serve as the basis for payments during construction, shall be submitted to ENGINEER for review at least ten (10) days prior to submitting the first Application for Payment.

### **1.5 STAKING SCHEDULE**

- A. CONTRACTOR shall submit one (1) electronic copy in PDF format of the staking schedule, in accordance with the "Construction Layout" specification section prior to the start of construction.
  - 1. The staking schedule should be updated as outlined in the Specifications and submitted by CONTRACTOR to ENGINEER through completion of the Work.

### **1.6 APPLICATIONS FOR PAYMENT**

- A. CONTRACTOR shall submit one (1) electronic copy in PDF format of the Applications for Payment to ENGINEER in accordance with the provisions of Article 14 of the General Conditions.
- B. Applications for Payment shall be made on forms provided by or approved by ENGINEER.
  - 1. Sample 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 ENGINEER.
- C. Copies of these forms, with Project specific information completed by ENGINEER, will be given to CONTRACTOR at the preconstruction meeting or, if applicable, after approval of the final Schedule of Values.
- D. CONTRACTOR shall submit a completed Payment Schedule with an executed Contractor's Application for Payment and Contractor's Declaration to ENGINEER not more often than once per month.

## SUBMITTAL PROCEDURES

- E. ENGINEER will certify payments with the use of Engineer's Certificate for Payment.

### 1.7 SHOP DRAWINGS

- A. Shop Drawings shall be presented in a clear and thorough manner. Details shall be identified by reference to plan sheet number, detail number if applicable, and Specification section number, and article number.

### 1.8 PRODUCT DATA

- A. Product Data shall be presented in a clear and thorough manner identified the same as the Shop Drawings. Included with the information shall be performance characteristics and capacities depicting dimensions and clearances required.
- B. Manufacturer's standard schematic drawings and diagrams shall be modified to delete information which is not applicable to the Work. Manufacturer's standard information shall be supplemented to provide information specifically applicable to the Work.

### 1.9 SAMPLES

- A. Samples shall 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. CONTRACTOR shall make Submittals in accordance with the approved 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. CONTRACTOR shall submit an entire package of Shop Drawings and Product Data information for major items of Work so that ENGINEER can review the package as a unit.
- C. CONTRACTOR shall 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.

## SUBMITTAL PROCEDURES

- D. CONTRACTOR shall initial or sign Shop Drawings and Product Data submittals, certifying CONTRACTOR's review and approval of Submittal per the General Conditions; 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 shall initial or sign Shop Drawings and Product Data submittal and shall indicate the status of the Submittal, or requirements for resubmittal. ENGINEER shall return to 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, 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 the General Conditions.
- B. After review of any Submittal, 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:
    - No Exceptions Taken
    - Note Markings
    - Comments Attached
    - Rejected
  - 2. Notations for Response Required by CONTRACTOR:
    - None
    - Confirm
    - Resubmit
- D. Notation Meanings:
  - 1. Elements marked "No Exceptions Taken" indicate that CONTRACTOR may commence with construction, fabrication or purchase of such items provided CONTRACTOR.

## **SUBMITTAL PROCEDURES**

2. Elements marked "Note Markings" indicate that the CONTRACTOR may commence with construction, fabrication or purchase of such items provided the CONTRACTOR.
  - a. Proceeds in strict accordance with ENGINEER's notes and/or required corrections/deletions/additions indicated thereon;
  - b. Pending appropriate response by CONTRACTOR as further noted.
3. Elements marked "Comments Attached" indicate that further comments or explanations have been affixed to the Submittal, which may require action(s) by CONTRACTOR as further noted.
4. Elements marked "Rejected" indicate that CONTRACTOR must make the required corrections as shown or noted and resubmit such items to ENGINEER for further review.
5. Elements marked "None" indicate that the Submittal requires no further action by CONTRACTOR.
6. Elements marked "Confirm" require CONTRACTOR to provide affirmation to ENGINEER regarding comments, notes, markings, etc. made by ENGINEER, and to affirm that CONTRACTOR will comply with the comments, notes, markings, etc.
7. Elements marked "Resubmit" indicate that CONTRACTOR may not commence with construction, fabrication or purchase of such items, and that 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 ENGINEER.

### **1.12 RESUBMISSION REQUIREMENTS**

- A. CONTRACTOR shall make all corrections or changes in the Submittals required by ENGINEER and resubmit. CONTRACTOR shall indicate any changes which have been made other than those requested by ENGINEER.

### **1.13 MANUFACTURER'S OPERATION AND MAINTENANCE DATA**

- A. CONTRACTOR shall 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 shall have submitted one (1) acceptable copy to ENGINEER for review.
- B. Final copies of the operation and maintenance data shall be bound in a suitable number of 3-inch or 4-inch, 3-ring hard cover binders. Permanently imprinted on the cover shall be the words "Manufacturer's Operation and Maintenance Data",

## SUBMITTAL PROCEDURES

Project title, location of the Project, and the date. A table of contents shall 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 shall include, but not be limited to, detailed equipment drawings; sections cut through all of the major equipment and subassemblies; 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 shall be provided for each piece of equipment in the section.
  - 1. The schedule shall 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 the Summary of Work, Section 01 11 00, CONTRACTOR shall furnish ENGINEER with an "Audio/Video Route Survey" record of the existing conditions prior to the start of construction.
- B. CONTRACTOR must enlist the services of a firm having a minimum of one (1) year experience in audio/video recording of construction projects.
- C. Prior to beginning the audio/video recording, CONTRACTOR shall review with ENGINEER the Project requirements to ensure that the audio/video is adequate for its intended purpose. OWNER shall have the authority to designate areas for which coverage may be added or omitted. The audio/video recording shall be done prior to placement of materials or equipment on the construction area and furnished one (1) week prior to the pre-construction meeting.
- D. Format:
  - 1. Audio/Video route survey shall be submitted in the format(s) as specified here-in:
    - a. Format: USB or electronic submission
    - b. Video Encoding: Highest available bit rate (6-9 Megabit), 60 fields per second interlaced video

## SUBMITTAL PROCEDURES

- c. Audio Encoding: Uncompressed stereo wave or stereo Dolby Digital (256 kilobit or better)
  - d. Aspect Ratio: 4x3 (720x480 pixels)
  - e. No Macrovision or other copy protection encoding. No region code or region code 1.
- E. Complete coverage shall include all surface features located within the public right-of-way, easement areas and adjacent private properties up to building line when such properties lie within the zone of influence of construction and will be supported by appropriate audio description made simultaneously with video coverage. Such coverage shall include, but not be limited to, all existing driveways, sidewalks, curbs, ditches, roadways, landscaping, trees, culvert, headwalls, retaining walls, and buildings located within such zone of influence. Video coverage shall be clear enough to identify cracks, depressions, holes and other defects in existing surfaces.
- F. Houses and buildings shall 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 shall be identified by audio or visual means at intervals not-to-exceed 100 linear feet (30 m) in the general direction of travel.
- G. When conventional wheeled vehicles are used, the distance from the camera lens to the ground shall 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 shall not exceed 30 feet/minute (10 m/min). Panning rates and zoom-in, zoom-out rates shall be controlled sufficiently such that stop action during play-back will produce clarity of detail of the object viewed.
- H. 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 shall consist of hours, minutes, and seconds, separated by colons. For example, hh:mm:ss.
- I. 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.
- J. Recording shall be done during times of good visibility. No recording shall be done during periods of visible precipitation, or when more than ten (10) percent of the

## **SUBMITTAL PROCEDURES**

ground area is covered with snow or standing water, unless otherwise authorized by OWNER.

- K. In some instances, audio/video coverage may not be suitable for recording necessary details. In such instances, OWNER may specify still photographs to provide coverage. One (1) color photograph shall be provided in accordance with Article 1.15 of this Section with a suitable description of the photograph's location.
- L. Any portion of the Audio/Video Route Survey of insufficient quality as determined by ENGINEER shall be redone by CONTRACTOR at no additional cost to OWNER.
- M. Each USB or electronic submittal shall be properly identified with the Project Title, location, time, and date in a manner acceptable to OWNER.
  - 1. Each video shall be individually named to clearly identify the corresponding manhole-to-manhole segment

### **1.15 PHOTOGRAPHS**

- A. When required in the Summary of Work, Section 01 11 00, CONTRACTOR shall furnish 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 the Summary of Work.
- B. Photos shall be in digital format (i.e., JPEF, TIFF, GIF, PNG or PDF) and shall have a minimum resolution of 300 dpi.
- C. The following information shall 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. CONTRACTOR shall submit photographs monthly along with the Application for Payment as described in Article 14 of the General Conditions.

**PART 2      PRODUCTS (NOT USED)**

**PART 3      EXECUTION (NOT USED)**

END OF SECTION

**SECTION 01 35 23  
JOB CONDITIONS**

**PART 1      GENERAL**

1.1 PROJECT CONDITIONS

A. Traffic Control and Public Coordination

1. The CONTRACTOR shall provide and maintain all temporary traffic control in accordance with applicable City of Monessen Ordinance and other requirements, PennDOT Publication 213, PennDOT Publication 408, and the MUTCD. All traffic control devices shall be properly installed, maintained, and removed as required, and all necessary permits shall be obtained prior to construction.
2. The CONTRACTOR shall maintain uninterrupted access for vehicular traffic, pedestrians, and emergency vehicles unless otherwise approved by the ENGINEER or OWNER. Temporary lane closures, detours, flagging operations, and sidewalk closures shall be coordinated to minimize impacts to the public and adjacent properties.
  - a. Particular care shall be taken to maintain emergency response access to Monessen Fire Department No. 2, located at 1510 Marion Avenue, ensuring that access routes remain open and passable at all times.
  - b. CONTRACTOR is required to notify the City of Monessen of any road openings that require traffic detours, at least five (5) working days prior to beginning the opening or road closures.
3. The CONTRACTOR shall be responsible for advance notification to residents and other affected stakeholders regarding construction activities, traffic pattern changes, and temporary access impacts.

B. Sewer Flow Control and Bypass Pumping

1. The CONTRACTOR shall maintain continuous sewer service at all times. Sewer flows shall not be interrupted without prior written approval from the OWNER and ENGINEER. All measures shall be taken to prevent surcharging, backups, or overflows during construction.
2. The CONTRACTOR shall be solely responsible for the design, sizing, installation, operation, monitoring, and removal of all temporary sewer flow control and bypass pumping systems required to perform the Work. Systems shall be capable of conveying anticipated peak flows.
3. The CONTRACTOR shall provide backup power, and standby equipment sufficient to ensure uninterrupted operation.

## **JOB CONDITIONS**

### **C. Safety and Health Requirements**

1. All excavations shall comply with OSHA requirements, including the use of trench boxes, shoring, or other protective systems.
2. Entry into sewers, manholes, or other confined spaces shall comply with applicable OSHA confined space regulations, including required testing, ventilation, and rescue provisions.
3. The CONTRACTOR shall maintain an emergency response and spill control plan addressing trench incidents, utility strikes, sewer overflows, and hazardous material releases.
4. The CONTRACTOR shall control air quality within and adjacent to construction areas to prevent the release and migration of gases, fumes, vapors, dust, and particulates generated by construction activities, including but not limited to the application of adhesives, coatings, CIPP liner installations, or other construction operations.
5. Construction activities shall comply with applicable municipal noise ordinances. Unless otherwise permitted, construction noise shall be limited to daytime hours, between 7:00 AM and 7:00 PM, with quiet hours observed between 10:00 PM and 7:00 AM. Night work or work outside these hours shall require prior approval by the OWNER and the City of Monessen.
6. CONTRACTOR shall hold daily safety meetings with field personnel working in this area to ensure that the personnel understand the conditions in which they are working.

**PART 2      PRODUCTS (NOT USED)**

**PART 3      EXECUTION (NOT USED)**

END OF SECTION

**SECTION 01 35 43**  
**ENVIRONMENTAL PROTECTION AND SPECIAL CONTROLS**

**PART 1**      **GENERAL**

1.1 SCOPE OF WORK

- A. Minimizing the pollution of air, water, or land; control of noise, the disposal of solid waste materials, and protection of deposits of historical or archaeological interest.

1.2 QUALITY ASSURANCE

- A. CONTRACTOR shall retain the services of an independent soils laboratory to conduct in-place moisture-density testing for backfilling to ensure all work complies with this specification.
- B. CONTRACTOR shall comply with all OSHA regulations concerning trenching, shoring and backfilling of trenching. CONTRACTOR shall retain an engineer licensed in the Commonwealth of Pennsylvania for the design of trenching systems or other trench safety plans.

1.3 SUBMITTALS

- A. Shop Drawings:
  - 1. Prior to the start of any construction activities submit:
    - a. A detailed proposal of all methods of control and preventive measures to be utilized for environmental protection.
    - b. A drawing of the work area, haul routes, storage areas, access routes and current land conditions including trees and vegetation.
    - c. A copy of the NPDES permit for storm water discharges from construction activities, if required.
    - d. A copy of the approved Pollution Prevention Plan.

**PART 2**      **PRODUCTS (NOT USED)**

**PART 3**      **EXECUTION**

3.1 INSTALLATION

- A. Employ and utilize environmental protection methods, obtain all necessary permits, and fully observe all local, state, and federal regulations including U.S. EPA, Commonwealth of Pennsylvania Department of Environmental Protection, City of Monessen and the Westmoreland County Conservation District.

## ENVIRONMENTAL PROTECTION AND SPECIAL CONTROLS

### B. Land Protection:

1. Except for any work or storage area and access routes specifically assigned for the use of the CONTRACTOR, the land areas outside the limits of construction shall be preserved in their present condition. CONTRACTOR shall confine his construction activities to areas defined for work within the Contract Documents.
2. Manage and control all borrow areas, work or storage areas, access routes and embankments to prevent sediment from entering nearby water or land adjacent to the work site.
3. Restore all disturbed areas including borrow and haul areas and establish permanent type of locally adaptable vegetative cover.
4. Unless earthwork is immediately paved or surfaced, protect all side slopes and backslopes immediately upon completion of final grading.
5. Plan and execute earthwork in a manner to minimize duration of exposure of unprotected soils.
6. Except for areas designated by the Contract Documents to be cleared and grubbed, the Contractor shall not deface, injure or destroy trees and vegetation, nor remove, cut, or disturb them without approval of the ENGINEER. Any damage caused by CONTRACTOR's equipment or operations shall be restored as nearly as possible to its original condition at CONTRACTOR's expense.

### C. Surface Water Protection:

1. Utilize, as necessary, erosion control methods to protect side and backslopes, minimize and the discharge of sediment to the surface water leaving the construction site as soon as rough grading is complete. These controls shall be maintained until the site is ready for final grading and landscaping or until they are no longer warranted and concurrence is received from ENGINEER. Physically retard the rate and volume of runoff and runoff by:
  - a. Implementing structural practices such as diversion swales, terraces, straw bales, silt fences, berms, storm drain inlet protection, rock outlet protection, sediment traps and temporary basins.
  - b. Implementing vegetative practices such as temporary seeding, permanent seeding, mulching, sod stabilization, vegetative buffers, hydroseeding, anchored erosion control blankets, sodding, vegetated swales or a combination of these methods.

## ENVIRONMENTAL PROTECTION AND SPECIAL CONTROLS

- c. Providing Construction sites with graveled or rocked access entrance and exit drives and parking areas to reduce the tracking of sediment onto public or private roads.
  2. Discharges from the construction site shall not contain pollutants at concentrations that produce objectionable films, colors, turbidity, deposits or noxious odors in the receiving stream or waterway.
- D. Solid Waste Disposal:
  1. Collect solid waste on a daily basis.
  2. Provide disposal of degradable solid waste to an approved solid waste disposal site.
  3. Provide disposal of non-degradable solid waste to an approved solid waste disposal site or in an alternate manner approved by ENGINEER and regulatory agencies.
  4. No building materials wastes or unused building materials shall be buried, dumped, or disposed of on the site.
- E. Fuel and Chemical Handling:
  1. Store and dispose of chemical wastes in a manner approved by regulatory agencies.
  2. Take special measures to prevent chemicals, fuels, oils, greases, herbicides, and insecticides from entering drainage ways.
  3. Do not allow water used in onsite material processing, concrete curing, cleanup, and other waste waters to enter a drainage way(s) or stream.
  4. CONTRACTOR shall provide containment around fueling and chemical storage areas to ensure that spills in these areas do not reach waters of the state.
- F. Control of Dust:
  1. The control of dust shall mean that no construction activity shall take place without applying all such reasonable measures as may be required to prevent particulate matter from becoming airborne so that it remains visible beyond the limits of construction. Reasonable measures may include paving, frequent road cleaning, planting vegetative groundcover, application of water or application of chemical dust suppressants. The use of chemical agents such as calcium chloride must be approved by PennDOT.

## ENVIRONMENTAL PROTECTION AND SPECIAL CONTROLS

2. Utilize methods and practices of construction to eliminate dust in full observance of agency regulations.
  3. ENGINEER will determine the effectiveness of the dust control program and may request the CONTRACTOR to provide additional measures, at no additional cost to OWNER.
- G. Burning:
1. Do not burn material on the site. If CONTRACTOR elects to dispose of waste materials by burning, make arrangements for an off-site burning area and conform to all local and state agency regulations.
- H. Control of Noise:
1. Control noise by fitting equipment with appropriate mufflers.
- I. Completion of Work:
1. Upon completion of work, leave area in a clean, natural looking condition.
  2. Ensure all signs of temporary construction and activities incidental to construction of required permanent work are removed.
  3. Grade, fill and seed all disturbed areas.
- J. Historical Protection:
1. If during the course of construction, evidence of deposits of historical or archaeological interests are found, cease work affecting find and notify ENGINEER. Do not disturb deposits until written notice from ENGINEER is given to proceed.
  2. CONTRACTOR will be compensated for lost time or changes in construction to avoid the find based upon normal change order procedures.

END OF SECTION

**SECTION 01 45 00**  
**QUALITY CONTROL**

**PART 1      GENERAL**

1.1      GENERAL REQUIREMENTS

- A.      Sampling of materials will be made by the ENGINEER in accordance with the methods designated by the Specifications. The CONTRACTOR shall furnish such facilities as the ENGINEER may require for collecting, storing, and forwarding samples to the Laboratory. The CONTRACTOR in all cases shall furnish the required samples to the OWNER without charge.

1.2      TEST OF MATERIALS

- A.      All materials in the Work shall meet the requirements of the Contract Documents.
- B.      Tests of materials will be made as specified herein. The ENGINEER shall at all times have access to all 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 shall 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, shall be as established by ASTM International. All 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 shall be done by generally accepted methods, unless otherwise specified by the ENGINEER.

1.3      CERTIFICATION OF MATERIALS

- A.      At the request of the ENGINEER, the CONTRACTOR shall provide the ENGINEER with certification that the various materials to be used conform to the standards referred to in the Contract Documents.

1.4      SOURCE QUALITY CONTROL

- A.      Testing identified in the Specifications as Source Quality Control, which is required to establish quality of materials, equipment or fabricated items, shall be paid for by the CONTRACTOR.

## **QUALITY CONTROL**

### **1.5 INSPECTOR DAYS**

- A. Resident Project Representative(s) will be assigned to the Project by ENGINEER, as necessary (in the opinion of ENGINEER) to periodically monitor CONTRACTOR's work. When multiple CONTRACTOR crews are working on the Project, multiple Resident Project Representatives may be assigned to the Project.
- B. CONTRACTOR shall give ENGINEER at least 48 hours' notice, excluding Saturdays, Sundays or holidays, when the Project requires an increase or decrease in the number of Resident Project Representatives.
  - 1. Failure to observe this requirement will either necessitate the charging of 4 hours show-up time if the Resident Project Representative appears on the Project, or the halting of all additional operations until a Resident Project Representative is available.
- C. Unless the Resident Project Representative is notified in advance, Inspector days will be charged when a Resident Project Representative appears on a project and CONTRACTOR decides not to work.
- D. A separate Inspector Day or a partial Inspector Day shall be charged for each and every Resident Project Representative working on a project for monitoring purposes.

**PART 2      PRODUCTS (NOT USED)**

**PART 3      EXECUTION (NOT USED)**

END OF SECTION

**SECTION 01 50 00**  
**TEMPORARY FACILITIES AND CONTROLS**

**PART 1**      **GENERAL**

1.1      SITE ACCESS AND PARKING

- A.      CONTRACTOR shall 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 shall be hard surfaced unless otherwise approved by ENGINEER.
- B.      CONTRACTOR shall maintain driveways a minimum of 15 feet (5 m) wide between and around combustible materials in storage and mobilization areas.
- C.      CONTRACTOR shall maintain traffic areas as free as possible of excavated materials, construction equipment, products, snow, ice, and debris.
- D.      CONTRACTOR shall 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.

1.2      TRUCKING ROUTE AND PUBLIC ROAD MAINTENANCE

- A.      Prior to the start of construction, CONTRACTOR shall submit for review a schedule and list indicating the streets and roads within the municipality that his equipment will use off the Project site.
- B.      CONTRACTOR shall comply with all safety requirements, weight restrictions and speed limits.
- C.      Paved streets shall be maintained in a reasonable state of cleanliness and CONTRACTOR shall remove accumulations of debris, dirt or mud caused by his operations. Removal shall be done in such a manner as to prevent the release of dust. This shall be done at least every day at the close of each day's operation and additionally when requested by ENGINEER.
- D.      Roads or streets damaged by CONTRACTOR's operations, shall be repaired or removed and replaced to satisfactions of the agency having jurisdiction at no additional cost to the Project.
- E.      In order to ensure adequate street maintenance and restoration as outlined above, CONTRACTOR may be required to deposit with the Agency having jurisdiction a cash Road Protection Bond.
  - 1.      This Bond, if required, will be held in escrow until final release is given by the Agency having jurisdiction. In the event CONTRACTOR fails or neglects to maintain or restore the streets to the satisfaction of the Agency having jurisdiction, the Agency having jurisdiction shall have the required maintenance or restoration work done and the cost incurred shall be deducted from the Road Protection Bond.

## TEMPORARY FACILITIES AND CONTROLS

2. At the completion of the Project, the Agency having jurisdiction shall return the Road Protection Bond less any monies expended by the Agency having jurisdiction and shall render to CONTRACTOR an accounting of all monies so expended.

F. CONTRACTOR shall not store any equipment, supplies, construction material or excess excavated material on any roads or streets unless otherwise approved by ENGINEER.

### 1.3 EMERGENCY ACCESS

A. CONTRACTOR shall 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. Any areas damaged by emergency vehicles shall be restored by CONTRACTOR at no additional cost to OWNER.

### 1.4 TEMPORARY ELECTRICITY AND LIGHTING

A. CONTRACTOR shall be responsible for and pay all costs for the installation and removal of circuit and branch wiring, with area distribution boxes located so that power and lighting is available throughout the construction by the use of construction-type power cords and shall pay all costs of electrical power used.

B. Electrical wiring and distribution shall conform to the National Electrical Code as adopted by the State of Pennsylvania.

### 1.5 USE OF WATER

A. CONTRACTOR shall acquire any permits, post any bonds and pay all fees required by the local agency having jurisdiction prior to using hydrants or any other source of water.

B. CONTRACTOR shall reimburse OWNER for water consumed during course of the Project at the current rate as set by the agency having jurisdiction, unless other arrangements are made with OWNER.

### 1.6 SANITARY PROVISIONS

A. CONTRACTOR shall be responsible for installation, maintenance and removal of temporary sanitary facilities for use of construction personnel including OWNER and ENGINEER. All rules and regulations of the State and local health officials shall be observed, with precautions taken to avoid creating unsanitary conditions.

### 1.7 POTABLE WATER

A. CONTRACTOR shall furnish a supply of potable water available for use of construction personnel including OWNER and ENGINEER.

## TEMPORARY FACILITIES AND CONTROLS

### 1.8 MEDICAL SERVICES AND FIRST AID

- A. CONTRACTOR shall furnish first aid supplies and a person trained in first aid with a valid first aid certificate available for use of construction personnel including OWNER and ENGINEER. CONTRACTOR shall also furnish a communication system for contacting emergency services. Telephone numbers of the physician, hospital, or emergency services shall be conspicuously posted at the job site.

### 1.9 ENGINEER'S FIELD OFFICE

- A. CONTRACTOR (*Contract One- General Construction*) shall furnish and maintain, for the exclusive use of ENGINEER, an approved weatherproof building as a field office. The building shall be located as directed by ENGINEER, in full view of the Work and with at least one (1) window facing construction operations. ENGINEER's field office shall meet the following minimum requirements:
  - 1. Securely fixed to foundation
  - 2. Structurally sound and watertight
  - 3. Stairs and landings for doors as necessary
  - 4. Three hundred (300) square feet (28 m<sup>2</sup>)
  - 5. Three operable and locking windows with screens and storms.
  - 6. Two locking, standard sized, entrance/exit doors
  - 7. Wi-Fi internet access
  - 8. One multipurpose printer/scanner
  - 9. 120 volt electrical service per nec, complete
  - 10. One 36" x 42" (1m x 1.1m) drafting table
  - 11. One drafting stool
  - 12. One 30" x 60" (.75m x 1.5m) desk
  - 13. One four drawer locking file cabinet
  - 14. Two desk chairs
  - 15. One plan rack (minimum capacity eight plan sets)
  - 16. One first aid kit
  - 17. One 10A:80-B:C fire extinguisher
  - 18. Automatically controlled heating, ventilating, air conditioning system to maintain temperature between 68° and 76° Fahrenheit (20° and 25° Celsius) year round.
- B. CONTRACTOR shall furnish and maintain bottled water and sanitary facilities for the field office. CONTRACTOR shall clean the office at least once per week. CONTRACTOR shall provide and pay for utility service throughout the duration of the Project.
- C. A trailer having equal facilities and floor space may be used in place of the above described field office if so desired.
- D. The field office shall be furnished with a minimum of an aggregate surfaced driveway and parking area, for the exclusive use of ENGINEER, for at least three (3) vehicles. CONTRACTOR shall maintain parking area including snow removal.

## TEMPORARY FACILITIES AND CONTROLS

- E. Cost for furnishing and installing the field office, for furnishing utilities and utility service, and for maintenance of the field office and facilities, unless otherwise specified in the Proposal, will not be paid for separately but shall be included in the price bid for various items of Work under the Contract. The building shall be removed by the CONTRACTOR upon completion of the Contract and shall become his property.

### 1.10 BYPASS PUMPING

- A. CONTRACTOR shall maintain flow in existing sewers at all times by pumping, bypassing, or fluming as necessary. During wet weather events, the flow in the sewer will rise rapidly and may become surcharged. CONTRACTOR shall maintain flow in such a manner as the existing flow can be adequately transported including wet weather flow.
- B. CONTRACTOR shall furnish, install, operate, and maintain temporary pumping facilities to service the upstream area including piping, temporary channels, pumps, sumps, controls, temporary plugs, and bulkheads.
- C. For sanitary sewerage, bypass piping shall be PVC Schedule 80, ABS truss pipe, or equivalent with solvent welded joints, or HDPE with butt fused joints. Flexible hoses of whatever types are not acceptable. Bypassed flow shall be discharged to a sanitary sewer of acceptable size to handle the bypassed and existing flows. CONTRACTOR shall plan his operation such that there will be no backups, leaks, or discharges of pollutants.
- D. CONTRACTOR shall also furnish and have available, redundant pumping facilities in case of any failure of the pumping system including pumps, piping, electrical, connections, etc. Redundant pumping facilities also include having a backup power generator in case the primary power source fails. CONTRACTOR shall provide an adequate labor force, when required, to oversee the bypass pumping including providing labor to maintain 24 hour per day operation and emergency backup service.
- E. Costs for pumping and by-passing flow shall be included in the lump sum bid for other items of Work unless otherwise specified in the Proposal.
- F. CONTRACTOR shall submit a bypass pumping/diversion scheme to OWNER and ENGINEER for approval not less than 15 days prior to any anticipated bypass pumping/diversion. The bypass plan shall include pumping capacity and expected flow rates.
- G. See Section 01 89 33 – Temporary Bypass Pumping for additional requirements.

**PART 2**      **PRODUCTS (NOT USED)**

**PART 3**      **EXECUTION (NOT USED)**

END OF SECTION

**SECTION 01 57 13**  
**TEMPORARY EROSION AND SEDIMENT CONTROL**

**PART 1**      **GENERAL**

1.1      SCOPE OF WORK

- A.      This Section includes furnishing, installing, maintaining, and removing at project completion, Soil Erosion and Sedimentation Control devices. Devices include silt fence, inlet filters, ditch sediment traps, etc.

1.2      RELATED WORK SPECIFIED ELSEWHERE

- A.      Section 01 89 00: Site Construction Performance Requirements
- B.      Section 31 23 13: Subgrade Preparation
- C.      Section 31 23 19: Dewatering
- D.      Section 31 23 33: Trenching and Backfilling
- E.      Section 31 35 00: Slope Protection
- F.      Section 32 92 19: Seeding
- G.      Section 32 92 23: Sodding

1.3      REFERENCE STANDARDS

- A.      Unless otherwise specified, the Work for this Section shall conform to the applicable portions of the following Standard Specifications:
  - 1.      ASTM - ASTM International
  - 2.      PennDOT – Pennsylvania Department of Transportation, Standard Specifications for Construction, latest edition

1.4      REQUIREMENTS OF REGULATORY AGENCIES

- A.      The OWNER has obtained permits, but the CONTRACTOR, at his expense, shall comply with Pennsylvania Code, Title 25. Environmental Protection, Chapter 102: Erosion and Sediment Control and the National Pollution Discharge Elimination System (NPDES) Rules for storm water discharges from construction activity. CONTRACTOR may need to obtain additional permits, bonds, or deposits as required by ENGINEER or OWNER for compliance.
- B.      Comply with all requirements of the agency having jurisdiction. OWNER may withhold payment to CONTRACTOR equivalent to any fines resulting from non-compliance with applicable regulations.

## 1.5 PERFORMANCE REQUIREMENTS

- A. Employ Best Management Practices as defined in 2022 or most recent EPA Construction General Permit.
- B. Put preventative measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.
- C. Control increased storm water runoff due to disturbance of surface cover due to construction activities for this Project. Prevent runoff into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less. Anticipate runoff volume due to the most extreme short term and 24-hour rainfall event that might occur in 10 years.
- D. Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this Project.
- E. Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this Project. Prevent windblown soil from leaving the project site.
- F. Comply with fugitive dust ordinances of agencies having jurisdiction. Prevent tracking or flowing of mud and sediment onto public or private roads, sidewalks or pavements outside of the site.
- G. Prevent sedimentation of waterways on or off the project site, including rivers, streams, lakes, ponds, open drainage ditches, storm sewers, and sanitary sewers. If sedimentation occurs, install or correct preventative measures immediately at no cost to the OWNER. Comply with requirements of agencies having jurisdiction.
- H. Maintain temporary preventative measures until permanent measures have been established. Remove temporary measures when permanent measures have been established.
- I. If erosion or sedimentation occurs due to non-compliance with these requirements, remove deposited sediment or restore eroded areas at no cost to the OWNER.

## 1.6 SUBMITTALS

- A. Submit schedule of Soil Erosion and Sedimentation Control activities to agency having jurisdiction. Include events (with days and/or dates of the various activities) for review and approval prior to obtaining a permit.

## **PART 2**      **PRODUCTS**

### 2.1 SILT FENCE

- A. Polypropylene geotextile fabric, resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible; meeting the following requirements:
  - 1. Average Opening Size: 40 U.S. Std. Sieve (400  $\mu\text{m}$ ), maximum; ASTM D4751.
  - 2. Permittivity: 0.05  $\text{sec}^{-1}$ , minimum; ASTM D4491.
  - 3. Ultraviolet Resistance: Retaining at least 80 percent of tensile strength; ASTM D4335.
  - 4. Tensile Strength: 200 lb-f (890 N) minimum, in cross-machine direction; 200 lb-f (890 N) minimum in machine direction; ASTM D4632
  - 5. Elongation: 15 to 20 percent; ASTM D4632.
  - 6. Tear Strength: 75 lb-f (334 N) minimum; ASTM D4533
- B. Posts shall be 2 by 2-inch (50 mm x 50 mm) cross section hardwood stakes, minimum 3-feet (1.0 m) long.
- C. Must meet the requirements set forth in PennDOT Section 865 and Pub. 464.

### 2.2 DEWATERING DISCHARGE FILTER BAG

- A. UV-stabilized, non-woven geotextile bag to filter sediment from water prior to discharging. Geotextile fabric shall meet the following minimum average roll requirements:
  - 1. Tensile Strength: 180 lb-f (200 N) minimum; ASTM D4632
  - 2. Elongation: 50 percent minimum; ASTM D4632
  - 3. CBR Puncture Strength: 775 lb-f (3447 N) minimum; ASTM D6241
  - 4. Trapezoidal Tear: 100 lb-f (445 N) minimum; ASTM D4533
  - 5. Flow Rate: 80 gal/min/sf. (54  $\text{l/s/m}^2$ ) Minimum; ASTM D4491
  - 6. Permittivity: 1.4  $\text{sec}^{-1}$  minimum; ASTM D4491
  - 7. Apparent Opening Size: 100 U.S. Std. Sieve (150  $\mu\text{m}$ ) maximum; ASTM D4751

8. UV-Stability: 70% retained strength; ASTM D4355 after 500 hours.
- B. Must meet the requirements set forth in PennDOT Section 855.

### 2.3 EROSION CONTROL BLANKETS

- A. Machine produced blanket with a consistent thickness of evenly distributed straw or coconut fiber as specified.
- B. Unless otherwise specified on the Plans, the erosion control blanket shall have the following minimum properties:
1. Double net 100% straw blanket
  2. Top and bottom photodegradable polypropylene netting, 0.2 oz/yd<sup>2</sup>; ASTM D6475
  3. 100% agricultural straw 0.5 lbs. / sy. (.27 kg/m<sup>2</sup>)
  4. Stitch spacing: 1.5 inches (40 mm) on centers
- C. Pegs shall be 6-inch (150 mm) long, hardwood pegs.
- D. Must meet the requirements set forth in PennDOT Pub 408 and Pub 464.

### 2.4 BONDED FIBER MATRIX

- A. Bonded fiber matrix (BFM) shall consist of long strand, residual, softwood fibers joined together by a high-strength, nontoxic adhesive. The BFM shall be 100% biodegradable, and be nontoxic to fish, wildlife, and humans. Upon drying the matrix shall form a high strength, porous and erosion resistant mat that shall not inhibit the germination and growth of plants. The BFM shall retain its form despite re-wetting.
- B. Bonded fiber matrix shall consist of:
1. Seed and Fertilizer per Section 32 92 19, Seeding.
  2. Wood Fiber Mulch - Thermo-mechanically defibrated long, softwood fibers manufactured from select northern softwood wood chips.
  3. Polyacrylamide Binder - Site specific, fully biodegradable, polyacrylamides (PAM's) binders, with cross-linking long organic jute fibers
- C. Must meet the requirements set forth in PennDOT Section 805 and Pub. 464.

## 2.5 INLET FILTER FABRIC

- A. Provide bag from woven polypropylene material with the properties listed below:
  - 1. Grab Tensile Strength: 300 lbs; ASTM D4632
  - 2. Grab Tensile Elongation: 15-50 percent; ASTM D4632
  - 3. Puncture Resistance: 120 lbs; ASTM D4833
  - 4. Trapezoidal Tear Strength: 120 lbs; ASTM D4533
  - 5. Flow Rate: 40 gal/min/sf; ASTM D4491
  - 6. Permittivity: 0.55 sec<sup>-1</sup>; ASTM D4491
  - 7. Apparent Opening Size: 40 U.S. Std. Sieve; ASTM D4751
  - 8. UV Resistance: 80% retained strength; ASTM D4355 after 150 hours.
- B. Must meet the requirements set forth in PennDOT Section 860 and Publication 464.

## **PART 3**      **EXECUTION**

### 3.1 PREPARATION

- A. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to the greatest extent possible.
- B. Except in areas to be cleared, do not remove, cut, deface, injure or destroy trees or shrubs without the ENGINEER's approval. Protect existing trees or shrubs that are to remain and which may be injured, bruised, defaced, or otherwise damaged by construction operations, with suitable fences or other means as approved by the ENGINEER.
- C. Schedule work so that the soil surfaces are left exposed for the minimum amount of time. Place permanent soil and sedimentation control measures as soon as practical.

### 3.2 GENERAL

- A. Do not discharge excavation ground water to the sanitary sewer, storm sewer, or to rivers, streams, etc. without authorization from the agency having jurisdiction.
- B. Construction site runoff will be prevented from entering any storm drain, river, stream, etc. directly by the use of silt fences or other suitable methods.
- C. CONTRACTOR shall provide erosion protection of surrounding soils.

- D. Sedimentation control devices shall be installed prior to CONTRACTOR beginning Work. All Soil Erosion and Sedimentation Control Devices shall be maintained in an effective functioning condition at all times during the course of the Work.
- E. Immediately bring earthwork to final grade and protect sideslopes and backslopes from erosion. Plan and conduct earthwork to minimize duration of exposure of unprotected soils.

### 3.3 DUST CONTROL

- A. Keep dust down at all times, including during non-working periods.
- B. Sprinkle or treat, with dust suppressants, the soil at the site, haul roads, and other areas disturbed by operations.
- C. Dry power brooming is not permitted.

### 3.4 INSTALLATION – GENERAL

- A. Install all soil erosion control devices as detailed on the plans.
- B. Maintain devices until permanent control measures are completed and effectively established.
- C. Remove temporary control devices after permanent measures are established.
- D. Remove and replace temporary control devices if they become ineffective at no additional cost to the OWNER.
- E. Install temporary erosion and sedimentation control devices per the manufacturer's recommendations. Advise ENGINEER of any discrepancies between the manufacturer's recommendations and the details on the plans and install per ENGINEER's resolution of discrepancy.

### 3.5 MAINTENANCE

- A. Inspect preventative measures a minimum of once per week and within a minimum of 24 hours after every rainfall. Any soil erosion control measures damaged or rendered ineffective shall be immediately repaired or removed and replaced at no additional cost.

### 3.6 INSTALLATION OF EROSION CONTROL BLANKETS

- A. Erosion control blankets shall be pegged at the pattern and rate as recommended by the manufacturer, however, at a minimum, blankets shall be pegged at the rate of 1.75 pegs per square yard (2pegs/m<sup>2</sup>) of blanket, unless otherwise indicated on the plans.

### 3.7 APPLICATION OF BONDED FIBER MATRIX

- A. The slope shall be prepared and graded prior to application of bonded fiber matrix (BFM). Mixture of wood fiber mulch and polyacrylamide binder shall be blended, with the appropriate amount of seed and fertilizer per Section 32 92 19, Seeding, according to manufacturer's recommendations.
- B. The BFM shall be hydraulically applied to the soil as a viscous mixture, creating a continuous, three-dimensional blanket that adheres to the soil surface.
- C. The BFM shall be applied at the rate of 3,000 lb/acre for slopes up to 3H:1V, unless otherwise indicated on the Plans.
- D. The resulting coverage must be at least 1/8 inch (3 mm) thick over the entire surface area.
- E. The BFM shall be applied in two applications from alternate directions to eliminate shadowing, and shall be applied when no rain is expected for 48 hours.

### 3.8 DEWATERING DISCHARGE

- A. Should it be necessary for the CONTRACTOR to do any dewatering during the course of construction, the CONTRACTOR shall filter all discharge through a discharge filter bag or other sediment control device that will filter all discharge water.
- B. No dewatering discharge shall be allowed to flow unfiltered from the construction site.

### 3.9 PROJECT COMPLETION

- A. Remove all temporary soil erosion and sedimentation control devices as soon as the permanent measures have been established.

END OF SECTION

**SECTION 01 60 00**  
**PRODUCT REQUIREMENTS**

**PART 1   GENERAL**

1.1    **TRANSPORTATION AND HANDLING**

- A.    The CONTRACTOR shall 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.
- B.    Materials and equipment shall be delivered in original containers or packaging with identifying labels intact and legible.
- C.    The CONTRACTOR shall provide equipment and personnel at the site to unload and handle materials and equipment in a manner to avoid damage. Materials and equipment shall be handled only at designated lifting points by methods to prevent bending or overstressing.

1.2    **STORAGE AND PROTECTION**

- A.    The CONTRACTOR shall store materials and equipment immediately on delivery and protect it until installed in the Work.
- B.    Products subject to damage by elements shall be stored in weather-tight enclosures with temperature and humidity ranges as required by manufacturer's instructions.
- C.    Loose granular materials shall be stored on solid surfaces to prevent mixing with foreign matter.
- D.    The place of storage shall be located so as to minimize interference with traffic and to provide easy access for inspection. No material shall be stored closer than five (5) feet (1.5 m) to the edge of a pavement or traveled way open to the public.
- E.    Materials that have been stored shall be subject to retest and shall meet the requirements of their respective specifications at the time they are to be used in the Work.
- F.    The CONTRACTOR shall provide protection of stored or installed materials and equipment as necessary to prevent damage from traffic and subsequent operations.

1.3    **MANUFACTURER'S INSTRUCTIONS**

- A.    When the Contract Documents require that installation of Work shall comply with manufacturer's instructions, the CONTRACTOR shall obtain and distribute copies of such instructions to parties involved in the installation including one (1) PDF copy to the ENGINEER.
- B.    The CONTRACTOR shall handle, install, connect, clean, condition and adjust products in strict accord with such instructions and in conformity with specified

## PRODUCT REQUIREMENTS

requirements. Should Project conditions or specified requirements conflict with manufacturer's instructions, consult with ENGINEER for further instructions.

### 1.4 PRODUCTS LIST

- A. Within four (4) days of request, the CONTRACTOR shall submit a complete list of major products proposed to be used, with the name of the manufacturer and the installing subcontractor, if applicable, to the ENGINEER.

### 1.5 CONTRACTOR'S PRODUCT OPTIONS

- A. For products specified only by reference standard, the CONTRACTOR shall select any product meeting that standard.
- B. For products specified by naming several products or manufacturers, the CONTRACTOR shall 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," the CONTRACTOR must submit a Substitution Request Form for any product or manufacturer not specifically named, in accordance with the General Conditions.
- D. For products specified by naming only one product and manufacturer, there is no option.

### 1.6 EQUIPMENT STARTUP AND TESTING

- A. The CONTRACTOR shall 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 shall 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 shall be operated both by itself and automatically as a system to verify its proper operation.
- C. CONTRACTOR is to provide to ENGINEER, in advance of startup, a schedule and listing of startup and testing procedures for review by ENGINEER. Checklists and diagrams may be required to ensure adequate startup and testing. The ENGINEER may recommend changes to the startup procedure as necessary.
- D. All 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 shall make all adjustments necessary to assure correct operation. When required, equipment installation and operation is to be witnessed and checked by manufacturer.
- E. When required, the CONTRACTOR shall train OWNER's operation and maintenance personnel in the proper operation and maintenance of each piece of equipment and the system as a whole.

## PRODUCT REQUIREMENTS

F. All equipment startup is to be witnessed by the OWNER and ENGINEER.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

END OF SECTION

**SECTION 01 7700  
CLOSEOUT PROCEDURES**

**PART 1      GENERAL**

1.1    CLEANING

- A.    CONTRACTOR shall perform periodic cleaning to keep the Work, the site and adjacent properties free from accumulations of waste materials, rubbish and wind-blown debris, resulting from construction operations.
- B.    Waste material, debris and rubbish shall be periodically removed from the site and disposed of at legal disposal areas away from the site.
- C.    Prior to OWNER acceptance CONTRACTOR shall conduct an inspection of sight-exposed surfaces, and all Work areas, to verify that the entire Work is clean.
- D.    CONTRACTOR shall broom clean exterior paved surfaces and rake clean other exterior surfaces of the site.

1.2    PROJECT RECORD DOCUMENTS

- A.    CONTRACTOR shall deliver one (1) copy of all Specifications, Plans, Addenda, Shop Drawings and Samples, annotated to show all changes made during the construction process, to ENGINEER upon completion of the Work. Submittal of the record documents shall be made with a transmittal letter containing:
  - 1.    Date
  - 2.    Project Title and Number
  - 3.    CONTRACTOR's Name and Address
  - 4.    Title and Number of each Record Document
  - 5.    Certification that each Document as submitted is complete and accurate
  - 6.    Documents shall be submitted in good order and in a legible condition.

1.3    SUBSTANTIAL COMPLETION

- A.    Certification that the Work is substantially complete shall be in accordance with paragraph 14.07 of the General Conditions.

1.4    FINAL PAYMENT AND ACCEPTANCE

- A.    The final inspection, final application for payment and acceptance shall be in accordance with paragraphs 14.09 through 14.13 of the General Conditions.

**PART 2      PRODUCTS (NOT USED)**

**PART 3      EXECUTION (NOT USED)**

END OF SECTION

**SECTION 01 89 00**  
**SITE CONSTRUCTION PERFORMANCE REQUIREMENTS**

**PART 1   GENERAL**

1.1   SCOPE OF WORK

- A.   This Section includes general performance requirements for earthwork complete with, removal and disposal of structures and obstructions, protection of existing sewers, tiles and mains; protection of existing building and improvements, protection of trees and other types of vegetation, protection of utility lines, requirements for pavement replacement, restoration of driveways and parking areas, restoration of sidewalks, restoration of lawns and disturbed areas, transportation and disposal of excess excavation.

1.2   RELATED WORK SPECIFIED ELSEWHERE

- A.   Section 01 57 13: Temporary Erosion and Sediment Control
- B.   Section 31 23 13: Subgrade Preparation
- C.   Section 31 23 33: Trenching and Backfilling
- D.   Section 32 92 19: Seeding
- E.   Section 32 92 23: Sodding

1.3   REFERENCE STANDARDS

- A.   Unless otherwise specified, the Work for this Section shall conform to the applicable portions of the following Standard Specifications:
  - 1.   City of Monessen Ordinance.
  - 2.   PennDOT: Pennsylvania Department of Transportation Standard Specifications for Construction, latest edition.

1.4   REQUIREMENTS OF REGULATORY AGENCIES

- A.   CONTRACTOR shall comply with Section 01 57 13, Temporary Erosion and Sediment Control. The CONTRACTOR, at his expense, shall secure all permits, and post all bonds or deposits required to comply with 25 Pa. Code Chapter 102.
- B.   CONTRACTOR shall comply with all requirements of the National Pollutant Discharge Elimination System (NPDES) Storm Water Program for Construction Activities, Part 31 of PA 451 of 1994 as amended.
- C.   The CONTRACTOR shall provide, maintain and remove such temporary and/or permanent Soil Erosion and Sedimentation Control measures as specified on the Plans or as determined by the ENGINEER. The measures shall prevent surface runoff from carrying excavated materials into the waterways, to reduce erosion of the slopes, and to prevent silting in of waterways downstream of the Work. Also, the measures should include provisions to reduce erosion by the wind of all areas stripped of vegetation, including material stockpiles.

## **SITE CONSTRUCTION PERFORMANCE REQUIREMENTS**

### **1.5 SUBMITTALS**

- A. Written permission for the use of all disposal and borrow sites shall be obtained and copies shall be furnished to the ENGINEER.

### **1.6 PROTECTION OF PLANT LIFE**

- A. All trees, shrubs, and other types of vegetation not within the limits of the Work or not designated on the Plans or by the ENGINEER to be removed, shall be carefully protected from damage or injury during the various construction operations.
- B. Any tree, shrub or other type of vegetation not designated to be removed but which is damaged by the CONTRACTOR's operation shall be repaired or replaced by the CONTRACTOR, at his expense, as determined by the ENGINEER.

### **1.7 PROTECTION OF EXISTING STRUCTURES AND IMPROVEMENTS**

- A. All existing culverts, sewers, drainage structures, manholes, water gate wells, hydrants, water mains, utility poles, overhead lines, underground conduits, underground cables, pavement, or other types of improvements within the construction limits, not designated on the Plans to be removed, shall be carefully protected from damage during the construction operations.
- B. Any existing structure or improvement not designated to be removed, but which is damaged by the CONTRACTOR's operations shall be repaired or replaced by the CONTRACTOR, to the satisfaction of the owner, at his expense.
- C. Any deposits of dirt or debris in sewers, culverts, tiles, drainage structures, manholes, gate wells, etc. caused by the CONTRACTOR shall be cleaned out at the CONTRACTOR's expense.

### **1.8 MAINTAINING DRAINAGE**

- A. All existing open drains, field and roadway ditches, drainage tile, sewers, enclosed drains, natural and artificial watercourses, surface drainage or any other types of drainage within the limits of the Work shall be maintained and free to discharge during construction.
- B. Any drainage facility not designated to be abandoned, but which is damaged, or any drainage interrupted by the CONTRACTOR's operation shall be immediately repaired, replaced, or cleared by the CONTRACTOR. All costs incurred shall be incidental to the excavating, backfilling and compacting or grading operations.

## **PART 2 PRODUCTS**

### **2.1 GRANULAR MATERIAL**

- A. Granular material, Type 1 or Type 2, meeting the requirements of PennDOT's current standards.

## **SITE CONSTRUCTION PERFORMANCE REQUIREMENTS**

### **2.2 AGGREGATE FOR SHOULDERS, PARKING AREAS, DRIVEWAYS OR ROADS**

- A. Crushed Limestone, Natural Aggregate or Slag and meeting the requirements of most recent PennDOT standards.

## **PART 3 EXECUTION**

### **3.1 DEWATERING**

- A. The area within the vicinity of the new Work shall be dewatered prior to commencing any construction activities. The depth of the dewatering shall be sufficient to allow the Work area to remain in a dry condition during the various construction operations.
- B. The costs incurred for furnishing, installing, maintaining and removing the dewatering equipment shall be at the CONTRACTOR's expense.
- C. Refer to Section 31 23 19, Dewatering, for additional requirements.

### **3.2 GENERAL**

- A. The various construction operations shall be restricted to the existing right-of-way or the areas indicated on the Plans. If the CONTRACTOR requires additional area, the CONTRACTOR shall furnish the ENGINEER with written permission obtained from the property owner for any part of the operations he conducts outside of the right-of-way or limits indicated.

### **3.3 EXISTING IMPROVEMENTS**

- A. The CONTRACTOR shall expose existing sewers and structures to which the new Work is to be connected and notify the ENGINEER of same. The ENGINEER will verify the vertical and horizontal locations of the existing system and shall inform the CONTRACTOR as to the necessary adjustments required to align the new Work with the existing system.

### **3.4 EXISTING UTILITIES**

- A. When existing utilities are shown on the Plans, their locations are approximate only, as secured in the field investigation and/or from available public records. The CONTRACTOR, prior to the start of construction, shall contact the Pennsylvania One Call System and the public agency or utility having jurisdiction to request the verification of all utilities within the construction area.
- B. When existing utility lines, structures or utility poles are encountered during the performance of the Work, the CONTRACTOR, at his expense, shall perform his operations in such a manner that the service will be uninterrupted.
- C. The CONTRACTOR shall expose all existing utility lines prior to any excavation operation, to determine any conflict with the proposed improvement. The

## SITE CONSTRUCTION PERFORMANCE REQUIREMENTS

CONTRACTOR shall be responsible for any relocation required as a result of any conflict of existing utilities shown on the plans, with the proposed improvement.

- D. Should it become necessary to move any utility structure, line or pole shown on the Plans or otherwise found necessary to be moved, the CONTRACTOR shall make all arrangements with the OWNER of the utility for the moving. All costs incurred for such moving shall be at the CONTRACTOR's expense unless indicated otherwise. However, before disturbing a utility line, structure or pole, the CONTRACTOR shall furnish the ENGINEER with satisfactory evidence, in writing, that proper arrangements have been made with the Owner of the utility.

### 3.5 UTILITY POLES

- A. The CONTRACTOR shall be responsible for any removal or relocation required as a result of any conflict of existing utility poles (including street light poles, guy poles, telephone poles, etc.) with proposed improvements.
- B. The CONTRACTOR shall make all arrangements for removing or relocating utility poles with the owner of the utility pole.
- C. Prior to disturbing any utility pole, the CONTRACTOR shall provide the ENGINEER with written evidence that proper arrangements have been made with the owner of the utility pole.
- D. When required by the Work, CONTRACTOR shall temporarily support poles in the vicinity of the Work at no additional cost to the OWNER. Support shall be in accordance with and to the satisfaction of the utility company.

### 3.6 EXISTING SEWERS, TILE, AND MAINS

- A. Existing sanitary sewers, storm sewers, drain tile, septic tank bed tiles, water mains or building services or leads, that are encountered during the performance of the Work that require relocation or are damaged, shall be restored with new materials equal in quality and type to the materials encountered.
- B. The new material shall be installed as specified in the Contract Documents and per the requirements of the local agencies. The bedding and backfill material, unless otherwise specified, shall be a PennDOT approved granular material, compacted to 98% of its maximum unit weight.
- C. Seepage bed tile and water mains shall be replaced in accordance with the requirement of the agency having jurisdiction.
- D. The relocation or protection of existing sewers, tiles, tile field, water mains or building services and leads shall be at the CONTRACTOR's expense, unless otherwise indicated in the Contract Documents.

## SITE CONSTRUCTION PERFORMANCE REQUIREMENTS

### 3.7 EXISTING STRUCTURES

- A. Existing surface and subsurface structures may be shown on the Plans, in locations considered most probable from information secured in the field investigation or from available public records. Neither the correctness nor completeness of such information is guaranteed or implied. All structures shall be protected, preserved or restored by the CONTRACTOR, to the satisfaction of the structure owner, at no additional cost to the Project.

### 3.8 EXISTING BUILDINGS

- A. Existing buildings or structures may be encountered throughout the Project within limits of the presently established right-of-way or easement. Good construction methods and procedures shall be employed by the CONTRACTOR, at his expense, to protect the structures.
- B. When it becomes necessary for the CONTRACTOR to move one of these buildings or structures in order to proceed with construction, the CONTRACTOR, at his expense, shall exercise all due care in moving the building or structure to prevent undue damage. Prior to moving an existing building or structure, the CONTRACTOR shall furnish the ENGINEER with satisfactory evidence, in writing, that proper arrangements have been made with the owner.
- C. Unless otherwise specified in the Contract Documents, the length of the move shall be maintained to a minimum which will allow for construction of the improvement.

### 3.9 REMOVAL OF SEWERS AND CULVERTS

- A. Unless otherwise specified in the Contract Documents, the CONTRACTOR, at his expense, shall remove any abandoned culvert, pipe, sewer, structure or part of a structure which is to be replaced or rendered useless by the new construction. When a sewer or culvert is removed at a structure, the CONTRACTOR shall install a masonry bulkhead in the structure. Removal of a culvert or sewer also includes the removal and disposal of any end treatments or headwalls.

## **SITE CONSTRUCTION PERFORMANCE REQUIREMENTS**

### **3.10 REMOVAL OF STRUCTURES**

- A. The removal of existing structures shall consist of removing and salvaging the existing frame and cover. The ends of the existing pipe shall be plugged and braced. The complete structure shall be removed entirely and disposed of. The excavation shall be backfilled with sand and compacted to 98 percent of its maximum unit weight. Maximum unit weight shall be determined by ASTM D698, Method B.
- B. If a structure is to be removed from a system that is to remain in service, a bypass system, approved by the ENGINEER, shall be installed and maintained by the CONTRACTOR, during the rebuilding period.

### **3.11 ABANDONING STRUCTURES**

- A. The structure shall be broken down to at least 30 inches (750 mm) below the subgrade. All pipes connected to the structure shall be plugged with a brick, masonry or concrete bulkhead approved by the ENGINEER. The structure shall be backfilled with flowable fill to 1-foot (300 mm) above the pipes and the remainder of the structure backfilled with sand-cement mixture at a 10 to 1 ratio to subgrade elevation or to 1-foot (300 mm) below finished grade. The remainder of the excavation shall be backfilled with a PennDOT approved granular material, compacted to 98% of its unit weight, and shall meet with the approval of the ENGINEER. Maximum unit weight shall be determined by ASTM D698, Method B.

### **3.12 SALVAGED MATERIAL**

- A. Salvaged materials shall become the property of the CONTRACTOR unless otherwise specified in the Contract Documents, and shall be disposed of by the CONTRACTOR, at his expense.

### **3.13 TREES**

- A. All trees excepting those specified on the Plans to be removed, shall be effectively protected by the CONTRACTOR during his construction operations. If in the opinion of the ENGINEER, the methods of protection employed by the CONTRACTOR are not adequate, the CONTRACTOR shall carry on his operation by tunneling, or by other approved means, which will not cause undue damage to the trees.
- B. The requirements for tree tunneling are as follows:
  - 1. Depth of Cover
    - a. Tunnels shall be placed at a minimum depth of 30 inches (0.75 m), measured from the ground surface to the top of the tunnel.
  - 2. Length of Tunnel
    - a. Tunnel length in feet (meters) shall be in direct proportion to diameter of tree in inches (millimeters) for trees eight (8) inches (200 mm) or larger in diameter. One (1) foot of tunnel shall be constructed for each inch of tree diameter whenever the trench or

## SITE CONSTRUCTION PERFORMANCE REQUIREMENTS

any portion thereof approaches the tree trunk a distance in feet equal to one-half the tree diameter in inches. (Or one (1) meter of tunnel shall be constructed for every one hundred millimeters (100 mm) of tree diameter whenever any portion of the trench approaches the tree trunk a distance in meters equal to 1/200 of the tree diameter in millimeters).

- b. Example: A tree 12 inches in diameter shall require a 12-foot tunnel whenever the trench or any portion thereof approaches within six (6) feet of said tree. (A tree 300 mm in diameter shall require a 3 m tunnel whenever any portion of the trench approaches within 1.5m of the tree trunk).

### 3. Measurements

- a. Trees under eight inches (200 mm) in diameter will require the same length of tunnel as 8-inch (200 mm) trees. Measurements of tree diameters shall be taken four (4) feet (1 m) above the ground surface.
- C. Where the Plans indicate areas allowing the cutting of minor trees, care should be used to keep damage to adjacent trees to an absolute minimum. Where these areas are specifically indicated on the Plan, they are to be cleared and all trunks and branches shall be disposed of by the CONTRACTOR. Debris shall not be bulldozed on to adjacent private property.
  - D. Trees damaged by the construction operation shall be repaired so not to inhibit growth or replaced at the expense of the CONTRACTOR. Repair or replacement shall be contingent upon agreement between the damaged tree OWNER and CONTRACTOR. In any event, limbs, branches and roots damaged by the CONTRACTOR shall be properly pruned to the satisfaction of the ENGINEER.
  - E. Costs incurred for protection of trees, including tunneling, repair and replacement, if necessary, shall be at the CONTRACTOR's expense.

### 3.14 REMOVE AND REPLACE TREE

- A. Tree removal and replacement may be accomplished in two ways.
  - 1. The CONTRACTOR may completely remove and dispose of the existing trees, and after the new improvement has been completed, tested, accepted and rough grading has been completed, the CONTRACTOR shall plant new trees, in approximately the same location and of similar size and species as the existing trees.
  - 2. The CONTRACTOR may remove and preserve the existing trees. The trees shall be properly cared for and maintained in a healthy condition. After the new improvement has been installed, tested, accepted and rough grading completed, the trees shall be replanted in approximately the same location.

## SITE CONSTRUCTION PERFORMANCE REQUIREMENTS

Any trees damaged, destroyed or which die, shall be replaced at no additional cost.

- B. All trees, whether replanted or planted new, shall be guaranteed for a period of two years from the date of substantial completion.

### 3.15 REMOVING PAVEMENT

- A. The removal of concrete and bituminous pavement as called for on the Plans shall consist of removing and disposing of pavement and shall include base courses, surface courses, integral and separate curbs, integral and separate curb and gutters, sidewalks and end headers.
- B. The pavement shall be removed to an existing joint or cut parallel to the existing pavement joints.
- C. The cutting shall be accomplished by using a power-driven concrete saw approved by the ENGINEER. The depth of the saw cut shall be a minimum of six (6) inches (150 mm), to ensure that the removal of the old pavement will not disturb or damage the section of pavement remaining in place.
- D. Residual concrete pavement shall not be less than five feet (1.5 m) measured transversely, nor less than six feet (1.8 m) longitudinally measured from a joint.
- E. In removing a concrete base course, where part of the existing bituminous surface is to remain in place, the bituminous surface shall be cut the full depth by the use of a power-driven saw, approved by the ENGINEER along a line parallel to and at least one foot (300 mm) from either side of the base course removal.
- F. Old pavement with a concrete cap shall be considered as only one (1) pavement, whether or not there is a separation layer of earth, aggregate, or bituminous material between the old material and the concrete cap.
- G. Removal of Curb for Curb Drop
  - 1. Where curb is to be removed for a curb drop, the operation shall be performed by saw cutting or by cold milling, approved by the ENGINEER, so as to leave a neat surface with a maximum 1-inch lip, without damage to the underlying pavement.
- H. Removal of Curb and Gutter
  - 1. Where curb and gutter are to be removed, the operation shall be performed by saw cutting. The limits of the removal shall be as called for on the Plans, or as approved by the ENGINEER. However, in no case shall the width of removal be less than 18 inches (450 mm) for sections with rolled or straight curb or less than 24 inches (600 mm) for mountable curbs.

## SITE CONSTRUCTION PERFORMANCE REQUIREMENTS

- I. If during the pavement removal operation any concrete or bituminous pavement or surfacing is damaged beyond the removal limits designated, the damaged pavement or surfacing shall be removed and replaced at the CONTRACTOR's expense.
- J. Any earth which may be removed during the pavement removal operation shall be replaced by backfilling to the proposed subgrade with a suitable material, approved by the ENGINEER, at the CONTRACTOR's expense.

### 3.16 GUARDRAIL

- A. Beam guardrail shall be relocated or shall be removed as specified on the Plans or as determined by the ENGINEER. If any of the existing material is damaged or destroyed, the CONTRACTOR shall replace the material at his expense.
- B. Where guardrail is encountered during construction, and its removal was not called for on the Plans, it shall be replaced or restored, at the CONTRACTOR's expense, to a condition comparable to that prior to construction.
- C. After the guardrail removal or relocation operations are complete, all surplus material shall be removed and disposed of by the CONTRACTOR, at his expense, unless otherwise called for in the Contract Documents.
- D. Any holes or voids resulting from the guardrail removal operation shall be backfilled with a Class II granular material, approved by the ENGINEER.

### 3.17 FENCES

- A. Fences shall be removed and replaced or shall be removed as indicated on the Plans. If any of the existing material is damaged or destroyed, the CONTRACTOR shall replace the material at his expense.
- B. Where fencing is encountered during construction, and its removal was not called for on the Plans, it shall be replaced or restored, at the CONTRACTOR's expense, to a condition comparable to that prior to construction.
- C. After the fence removal or relocation operations are complete, all surplus material shall be removed and disposed of by the CONTRACTOR, at his expense, unless otherwise called for in the Contract Documents.
- D. Any holes or voids resulting from the fence removal operation shall be backfilled with a suitable material, approved by the ENGINEER.
- E. Where fences are encountered that are being used to confine livestock or to provide security, the fence shall be immediately replaced following construction. During construction, the CONTRACTOR, at his expense, shall provide, install and maintain a temporary fence, meeting the approval of the ENGINEER.
- F. Refer to Section 32 31 00, Fences and Gates, for additional requirements.

## **SITE CONSTRUCTION PERFORMANCE REQUIREMENTS**

### **3.18 HOLES**

- A. Earth removed during any phase of the excavation or removal operations, resulting in a hole or void, shall be replaced by backfilling to the proposed subgrade with a suitable granular material. The material shall be placed by the controlled density method or other effective means having the approval of the ENGINEER and shall be compacted to 98% of maximum unit weight.
- B. The furnishing, placing and compacting of the backfill material shall be at the CONTRACTOR's expense.

### **3.19 RESTORATION IN RIGHT-OF-WAY AND YARD AREAS**

- A. The right-of-way and yard areas not paved or aggregate surfaced shall be restored in accordance with the type and location specified herein unless indicated otherwise on the Plans. The disturbed areas may be shaped by "Machine Grading" or another method approved by the ENGINEER to achieve the cross section, line and grade shown on the Plans. Areas where slopes are 1 on 4 or flatter shall be restored with topsoil, seed and mulch. Slopes steeper than 1 on 4 shall be restored with sod.
- B. Any excess material from the restoration operation shall be disposed of by the CONTRACTOR at his expense.
- C. The disturbed areas shall be graded to receive either topsoil and seed or topsoil and sod. The topsoil, seed, sod, fertilizer and mulch shall conform to the requirements specified on the Plans and in Section 32 92 19, Seeding, or Section 32 92 23, Sodding.
- D. The CONTRACTOR, at his expense, shall furnish, place, and compact any additional fill, meeting the approval of the ENGINEER, needed to restore the disturbed areas to the cross sections called for on the Plans or as determined by the ENGINEER.

### **3.20 RESTORATION OF AGGREGATE SURFACES**

- A. Shoulders
  - 1. The shoulder shall be regarded as the area between the edge of pavement and the ditch, or the area within ten (10) feet (3 m) of the pavement, whichever is the lesser.
  - 2. The backfilling of trenches in the shoulder area shall be carried to within five (5) inches (125 mm) of the existing surface. The remaining depth shall be backfilled with a minimum of five inches (125 mm) of compacted PennDOT approved aggregate with calcium chloride applied, at the rate of six (6) pounds per Ton of aggregate (3 kg per metric ton of aggregate).
  - 3. The CONTRACTOR, at his expense, shall furnish, place and compact all materials necessary to complete the backfilling and restoration operation within the shoulder area.

## SITE CONSTRUCTION PERFORMANCE REQUIREMENTS

### B. Driveways and Parking Areas

1. Aggregate driveway areas shall be regarded as the area from the right-of-way line to the edge of the traveled roadway and shall include the shoulder area.
2. The backfilling of trenches crossing aggregate surfaced driveways and parking areas shall be carried to the bottom of the proposed base course. The remaining depth shall be backfilled with a minimum of six inches (150 mm) of PennDOT approved aggregate, with calcium chloride applied at the rate of six (6) pounds per Ton of aggregate (3 kg per 1000 kg of aggregate).
3. Any aggregate surfaced areas beyond the limits of the actual excavation which are disturbed, as determined by the ENGINEER, by such operations as temporary storage of materials or passage of equipment, shall be resurfaced, at the CONTRACTOR's expense. The upper three (3) inches (75 mm) of disturbed areas shall be removed as necessary to allow the final elevation of the resurfacing course to be at the elevation of the drive or parking area which existed prior to excavation. The disturbed area shall be resurfaced with a minimum of three (3) inches (75 mm) of compacted PennDOT approved aggregate, with calcium chloride applied at the rate of six (6) pounds per Ton of aggregate (3 kg per metric ton of aggregate).
4. The CONTRACTOR, at his expense, shall furnish, place, and compact all materials necessary to complete the backfilling and restoration operations within the driveway and parking area.

### C. Roads and Streets

1. Backfilling of trenches crossing aggregate surfaced roads or streets shall be carried to within 12 inches (300 mm) of the existing surface. The remaining depth shall be backfilled with two 6-inch (150 mm) layers of compacted PennDOT approved aggregate, with calcium chloride applied at the rate of six (6) pounds per Ton of aggregate (3 kg per metric ton of aggregate).
2. The CONTRACTOR, at his expense, shall furnish, place, and compact all materials necessary to complete the backfilling and restoration operations within the roadway or street area.
3. Also, any settlement of the aggregate surface shall be restored by placing additional aggregate, up to the original grade, and shall be done at the CONTRACTOR's expense.

### D. Compaction

1. The compaction of all aggregate shall be performed by a pneumatic-tired roller or a vibratory compactor until the material forms a stable surface.

## SITE CONSTRUCTION PERFORMANCE REQUIREMENTS

### 3.21 RESTORATION OF PAVED SURFACES

- A. The CONTRACTOR, at his expense, shall provide the materials necessary to complete the backfilling and restoration operations, which shall include furnishing, compacting, forming, placing, rolling, floating, jointing, finishing, curing and providing protection against elements.
- B. Restoration of any roadways that are partially damaged shall include a minimum replacement of one (1), full width lane of roadway. The length of replacement shall be at least equal to the width.
- C. Concrete
  - 1. The backfilling of trenches crossing concrete driveways, sidewalks, roads, streets or parking areas shall be carried to the bottom of the proposed pavement as specified under PennDOT's current standards.
  - 2. Unless otherwise specified on the Plans or as determined by the ENGINEER, the concrete removed shall be replaced with 3,500 psi (24 MPa) concrete of the thickness removed and shall include reinforcing equal to the existing, if the existing pavement was reinforced. The construction of concrete pavements shall be in accordance with Section 32 13 13, Concrete Paving.
  - 3. Restoration of sidewalks shall also include the construction of sidewalk ramps at the intersection of the curb and shall conform to the current rules and regulations PennDOT Publication 72M and to Section 32 13 15, Sidewalks and Driveways, and unless otherwise indicated in the Proposal, shall be considered incidental to the Project.
- D. Bituminous
  - 1. The backfilling of trenches crossing bituminous driveways, sidewalks, roads, streets or parking areas shall be constructed as specified under PennDOT's current standards.
  - 2. The bituminous pavement or bituminous surface course with an aggregate base shall be replaced in accordance with Section 32 12 16, Bituminous Paving.
  - 3. Bituminous surfaced areas beyond the limits of the actual excavation which are disturbed by such operations, as temporary storage of materials or passage of equipment, shall be resurfaced with an approved bituminous mixture the same thickness as removed, but in no case less than two (2) inches (50 mm) in thickness. The replacement material shall extend to smooth-cut edges, shall be uniform in direction and shall be at an elevation which provides a uniform surface between the undisturbed abutting surfaces.
  - 4. Restoration of any bituminous chip seal shoulders that are damaged or partially damaged, as determined by the ENGINEER, shall include complete

## SITE CONSTRUCTION PERFORMANCE REQUIREMENTS

replacement full width and length (extending a minimum of 25 linear feet (7.6 m) beyond the damaged area both ways). Existing bituminous chip seal shoulders shall be brought to proper grade with compacted PennDOT approved aggregate and resurfaced with a double chip seal per Section 32 12 16, Bituminous Paving.

### 3.22 SOIL EROSION AND SEDIMENTATION CONTROL

- A. CONTRACTOR shall comply with the requirements of Section 01 57 13, Temporary Erosion and Sediment Control. Prior to commencing any type of earthwork, the CONTRACTOR shall obtain a Soil Erosion and Sedimentation Control permit from the local enforcing Agency.
- B. The CONTRACTOR, at his expense, shall obtain all approvals, secure all permits and post all bonds and deposits required to comply with 25 Pa. Code Chapter 102, as amended, and those of the enforcing agency.
- C. The CONTRACTOR shall provide the ENGINEER with a copy of the soil erosion permit issued by the local enforcing agency for the Project, prior to commencing any type of earthwork on the Project.

### 3.23 EXCESS EXCAVATION

- A. Excess excavation shall be defined as all surplus earth material realized from the construction that is free of brush, roots, stumps, broken concrete, pipe, debris, and other extraneous material.
- B. The CONTRACTOR, when requested by the OWNER, shall transport all excess excavation to a site(s) designated by the OWNER. The excess excavation shall be graded by the CONTRACTOR to provide positive surface drainage of the site(s). The grading shall be done such that adjacent properties are not damaged or affected. The grading shall include removal of all surface irregularities to provide a smooth surface ( $\pm 0.25$  foot) ( $\pm 75$  mm).
- C. When the excess excavation has not been requested by the OWNER, the CONTRACTOR shall remove and properly dispose of the material at no additional cost to the OWNER.
- D. Proper disposal of all excess excavation, including transportation, grading, and protection of adjacent properties shall be considered as a final cleanup item. No additional payment will be made for this item.
- E. Any brush, roots, stumps, broken concrete, pipe, debris, and other extraneous material from the construction shall become the property of the CONTRACTOR, and shall be disposed of per all applicable Laws, rules or regulations. Removal and disposal of this material shall be considered as part of final cleanup. No additional payment will be made for this item.

## **SITE CONSTRUCTION PERFORMANCE REQUIREMENTS**

- F. OWNER approval of the final site(s) condition in writing will be required prior to final payment authorization.

END OF SECTION

**SECTION 01 89 33**  
**TEMPORARY BYPASS PUMPING**

**PART 1   GENERAL**

1.1    SCOPE OF WORK

- A.    CONTRACTOR shall provide a complete sewer bypassing system including, but not limited to, the following:
  - 1.    Developing a bypassing plan.
  - 2.    Developing a spill prevention and emergency response plan.
  - 3.    Submitting and obtaining approval from the ENGINEER/OWNER for bypassing plan, spill prevention plan and emergency response plan.
  - 4.    Implementing the bypassing and spill prevention and emergency response plan.
  - 5.    Providing bypassing in accordance with the approved plans throughout the duration of the Work where bypass pumping is required.

1.2    RELATED WORK SPECIFIED ELSEWHERE

- A.    Section 01 33 00: Submittal Procedures
- B.    Section 33 30 00: Sanitary Utility Sewerage Piping

1.3    SYSTEM DESCRIPTION

- A.    Flow control during construction shall be provided to meet the minimum flow rate(s) as listed on Schedule and shall perform reliably and continuously to provide uninterrupted sanitary service during the execution of the Work.
- B.    Provide temporary flow control facilities that can be installed, operated, maintained, and removed without damage to existing structures.
  - 1.    Under no circumstances shall sewage or solids be deposited onto the ground surface, streets, or into ditches, catch basins or storm drains, or natural drainage ways.
  - 2.    In the event that the sewage backup occurs and enters dwellings or other structures, the CONTRACTOR shall be responsible for clean-up, repair, property damage costs, fines imposed by jurisdictional authorities, and claims arising therefrom.
  - 3.    Spills shall be contained and returned to the sewer system unless the pumped liquid is approved by the authorities having proper jurisdiction to be discharged to surface waters of the State.

1.4    SUBMITTALS

- A.    Flow Control Plan: Submit in accordance with Section 01 33 00, covering the items included under this Section. Submittal shall include:
  - 1.    Schedule for installation and maintenance of bypass pumping system.

## **TEMPORARY BYPASS PUMPING**

2. Staging areas for pumps.
3. Bypass pump sizes, capacity, number of each size to be on site and power requirements.
4. Calculations of static lift, friction losses, and flow velocity
5. Pump curves showing pump operating range.
6. Protection against main breaks.
7. Plugging methods and bypass time duration for each sewer section.
8. Size, length, material, location and method of installation for suction and discharge piping.
9. Include tapping procedures.
10. Sections showing suction and discharge pipe depth, embedment, select fill and special backfill.
11. Method of noise control for each pump and/or generator.
12. Standby power generator size and location.
13. Downstream discharging plan.
14. Methods of protecting discharge manholes or structures from erosion and damage.
15. Restraining lengths for piping. Thrust blocks will not be allowed as a method of restraint for bypass pumping systems.
16. Location of fuel tank(s) and other potential contaminants.
17. Control and reliability methods including float switches, visual and audible alarms, and pump controls.
18. Overflow Prevention, Containment and Cleanup Plan.

### **1.5 EMERGENCY PERSONNEL**

- A. Provide at least 2 contacts who can be contacted 24 hours per day by phone to address emergencies, along with their names, phone numbers, and working schedules.
- B. List shall be updated if there are any substitutions at least 2 days in advance. These contacts shall be connected to the control system automatic dialer (or equivalent).

### **1.6 EMERGENCY PERSONNEL**

- A. Quality Assurance
  1. Qualifications: Firms regularly engaged in bypass pumping systems, of types and sizes required, and whose systems have been used with successful results in similar service for not less than 5 years.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Subject to compliance with specified requirements, the temporary flow control bypass pumping companies offering services must be submitted to ENGINEER for approval.

## TEMPORARY BYPASS PUMPING

### 2.2 PERFORMANCE REQUIREMENTS

- A. It is essential to the operation of the existing sewerage system that there is no interruption in the flow of sewage throughout the duration of the project.
- B. CONTRACTOR shall provide, maintain, and operate all temporary facilities such as dams, plugs, pumping equipment (both primary and back-up units as required), conduits, all necessary power, and all other labor and equipment necessary to intercept the sewage flow before it reaches the point where it would interfere with work, carry it past the work area, and return it to the existing sewer downstream of the Work area.

### 2.3 DESIGN REQUIREMENTS

- A. Bypass pumping system shall be designed to provide adequate capacity for peak flows around the Work area as necessary for satisfactory performance of the Work.
- B. CONTRACTOR shall provide pipeline plugs, pumps and temporary discharge piping to ensure that the total flow of the main can be safely diverted.
- C. Bypass pumping system may be required to be operated 24 hours a day. CONTRACTOR shall provide necessary monitoring devices to notify the CONTRACTOR of any pump failure.
- D. CONTRACTOR shall have adequate standby equipment available and ready for immediate operation and use in the event of an emergency or breakdown. One standby pump for each pump size utilized shall be installed at the mainline flow bypassing locations, ready for use in the event of primary pump failure.
- E. CONTRACTOR shall have adequate standby equipment available and ready for immediate operation and use in the event of an emergency or breakdown. One standby pump for each pump size utilized shall be installed at the mainline flow bypassing locations, ready for use in the event of primary pump failure.
- F. Design, installation, and operation of the temporary pumping system shall be the CONTRACTOR's responsibility.
  - 1. Bypass system shall meet the requirements of local, State, and Federal codes and regulations.
  - 2. CONTRACTOR shall not be permitted to stop or impede the main flows under any circumstances.
  - 3. CONTRACTOR shall maintain flow around the Work area in a manner that will not cause surcharging of sewers, damage to sewers, and that will protect public and private property from damage and flooding.
  - 4. CONTRACTOR shall protect water resources, wetlands, and other natural resources.

## TEMPORARY BYPASS PUMPING

### 2.4 EQUIPMENT

#### A. Pumps

1. No electric pumps will be allowed; pumps must be diesel powered.
2. Pumps shall be specifically intended for use with sewage and shall be capable of passing a 3-inch diameter solid.
3. Pumps used for sewer bypassing shall be the submersible type and shall only be operated below ground in the sewer manhole or other designated facility. The use of above ground pumps or pumps not specifically designed for submersible service are not allowed.
4. Pumps shall be sized to fit in manholes or other designated areas necessary to successfully complete the sewer bypassing. CONTRACTOR shall ensure equipment used for bypassing will operate under the conditions required and the CONTRACTOR will be responsible for costs associated with changes to the bypassing system due to inappropriate equipment or non-conformance with the Contract Documents.
5. Pumps used shall be fully automatic self-priming units that do not require the use of foot-valves or vacuum pumps in the priming system. Pumps used must be constructed to allow dry running for long periods of time to account for the cyclical nature of effluent flows.
6. CONTRACTOR shall provide the necessary stop/start controls for each pump.
7. CONTRACTOR shall include one stand-by pump for each size to be maintained on site. Back-up pumps shall be on-line, isolated from the primary system by a valve.
8. CONTRACTOR shall provide an emergency standby power generator, sized to operate the bypass system at a minimum, to be used to operate the submersible pumps if electrical power is lost during the progress of the Work and a spill will occur.

#### B. Piping

1. Discharge and suction piping sizing shall be determined according to flow calculations and system operating calculations. Provide piping designed to withstand minimum 1.5 times the maximum system pressure.
2. Rigid or hard piping shall be constructed with positive restrained joints.
3. Piping shall be maintained in a watertight condition and leaks shall be immediately repaired.

## TEMPORARY BYPASS PUMPING

### C. Flexible Hose

1. Flexible hose and couplings shall be abrasive resistant and suitable for the intended services (i.e., fire hoses are not permitted).
2. Flexible hose and couplings shall be rated for external and internal loads anticipated including test pressure.
3. External load design shall incorporate anticipated traffic loadings, including traffic impact loading where applicable. When subjected to traffic loading, the system shall be composed of traffic ramps and covers maintaining an H-20 loading requirement while in use or as directed by OWNER.

### D. System Controls

1. CONTRACTOR shall continuously (while in use) monitor the operation of the bypass system and impacted facilities.
2. CONTRACTOR shall submit, as part of their bypass plan, their system monitoring procedure and frequency. CONTRACTOR shall maintain a log of the monitoring in a manner acceptable to ENGINEER.
3. Control panel(s) equipped with necessary fused-switch combination starters, control transformer, Start-Stop controls, cycle controls, variable speed drive controls, and alarm systems. Provide all necessary relays, timers, interlocks, and control devices. If mounted outdoors enclosure shall be minimum NEMA.4.
  - a. Level controls such as float switches, pressure transducers, or level sensors along with the necessary wiring back to the temporary control panel shall be provided as required.
  - b. In lieu of providing manpower to continuously monitor the pumping equipment on a 24-hour basis a dialer may be provided that will alert the CONTRACTOR when an alarm condition exists. CONTRACTOR shall make arrangements to obtain temporary phone service for dialer system or the dialer shall be connected to the OWNER's operating and control system, if shown.
  - c. Automatic switch over capabilities shall be provided to activate standby equipment.
  - d. Alarm when stand by equipment is operating.
  - e. Alarm when aeration tank effluent channel is outside of normal operating range.
  - f. Alarm when there is a power outage.
  - g. Alarm status indication consisting of alarm light, mounted in an easily visible location.
  - h. If shown, the temporary flow control system shall be wired into the OWNER's operating and control system.
  - i. Provide temporary lighting available for 24-hour per day pumping operations to aid with reliable system operation, maintenance and safety of personnel.

## **TEMPORARY BYPASS PUMPING**

### **PART 3 EXECUTION**

#### **3.1 PREPARATION**

##### **A. Existing Utilities**

1. CONTRACTOR is responsible for locating any existing utilities in the area the CONTRACTOR selects to locate the bypass pipeline(s).
2. CONTRACTOR shall locate bypass pipelines to minimize any disturbance to existing utilities and shall obtain approval of the pipeline locations from OWNER.
3. Costs associated with relocating utilities and obtaining approvals shall be the responsibility of the CONTRACTOR.

##### **B. Precautions**

1. During bypass pumping operation, the CONTRACTOR shall protect the pumping station, sewer mains and local sewer lines from damage inflicted by any equipment.
2. CONTRACTOR shall be responsible for any physical damage to the pumping station, sewer mains and local sewer lines caused by human or mechanical failure.

#### **3.2 INSTALLATION AND REMOVAL**

- A. CONTRACTOR shall remove manhole sections or make connections to the existing sewer and construct temporary bypass pumping structures only at the access locations indicated on the bypass pumping plan.
- B. Plugging or blocking of sewage flows shall incorporate primary and secondary plugging devices. When plugging or blocking is no longer needed for performance and acceptance of Work, the plugging or blocking shall be removed in a manner that permits the sewage flow to slowly return to normal without surge, to prevent surcharging, and/or causing other major disturbances downstream.
- C. When working inside a manhole, force main, or other designated facility, the CONTRACTOR shall exercise caution and comply with PAOSHA requirements for working in the presence of sewer gases, combustible oxygen-deficient atmospheres, and confined spaces.
- D. The bypass pipeline shall be located off streets sidewalks, and on shoulders of the roads. When the bypass pipeline crosses local streets and private driveways, the CONTRACTOR shall place the bypass line in trenches and cover with temporary pavement or shall install the bypass pipeline by trenchless installation methods.

## TEMPORARY BYPASS PUMPING

- E. CONTRACTOR is responsible for obtaining any approvals for placement of temporary pipelines from local agencies.
- F. Upon completion of the bypass pumping operations, and after the receipt of written permission from the OWNER, the CONTRACTOR shall remove all piping, restore property to pre-construction condition, and restore pavement, sidewalks and/or roadways affected by bypass pumping operations.

### 3.3 FIELD QUALITY CONTROL AND MAINTENANCE

- A. CONTRACTOR shall perform leakage and pressure tests of the bypass pumping system after the equipment has been installed to demonstrate the system is in good working order, the units have been properly installed, will operate satisfactorily, and meet the specified conditions.
  - 1. Clean water shall be used for testing.
  - 2. CONTRACTOR shall give the OWNER 24 hours' notice prior to testing.
- B. CONTRACTOR shall ensure that the temporary pumping system is properly maintained, and a responsible operator shall be on hand at all times when pump(s) is operating.
- C. Unless otherwise approved in the Flow Control Plan, there shall be minimum one responsible person or combination of responsible people available 24 hours per day to respond immediately and arrive onsite within 15 minutes to monitor and maintain the bypass and implement the emergency procedures if necessary. At a minimum, the CONTRACTOR shall inspect bypass pumping system every 2 hours to ensure that the system is working properly.
- D. CONTRACTOR shall immediately notify the OWNER and the ENGINEER if a sanitary sewage overflow occurs and take the necessary action to clean up and disinfect the spillage to the satisfaction of the OWNER or other governmental agencies.
  - 1. If sewage is spilled onto public or private property, the CONTRACTOR shall wash down, clean up, and disinfect the spillage to the satisfaction of the property owner.
  - 2. In the event that sewage backup occurs and enters dwellings or other structures, the CONTRACTOR shall be responsible for clean-up, repair, property damage costs, fines imposed by jurisdictional authorities, and claims arising therefrom. Spills shall be contained and returned to the sewer system.
- E. Spare parts and materials for pumps and piping shall be kept onsite, as required
- F. Adequate hoisting equipment for each pump and accessories shall be maintained onsite.

END OF SECTION

**SECTION 02 32 13  
EXPLORATORY EXCAVATION**

**PART 1   GENERAL**

1.1   SCOPE OF WORK

- A.   Locate underground infrastructure, such as culverts, sewers, utilities, and/or to expose the existing pavement section.
- B.   “Exploratory Excavation” is not to be used by the CONTRACTOR to locate existing utilities throughout the project. Use must only be as directed and approved by the ENGINEER prior to beginning the Work.
- C.   The CONTRACTOR is responsible for using reasonable care to establish the precise location of the underground facilities in advance of construction (PA One Call) as a part of Work.

1.2   PRELIMINARY PROCEDURES

- A.   Comply with all Federal, State and local laws, regulations and ordinances relating to the performance of this work.
- B.   Procure all required permits, certifications and licenses required by Federal, State, and local law for the execution of this work. Submit copies of all permits, certifications, and licenses prior to starting work.
- C.   The CONTRACTOR is solely responsible for preserving all samples taken as part of this Work in good condition.
  - 1.   Samples shall be kept from freezing and from undue exposure to the weather.
  - 2.   CONTRACTOR shall keep all descriptive labels and designations on sample jars, tubes, and boxes clean and legible until final delivery of samples to ENGINEER or OWNER.
  - 3.   Samples shall be shipped in containers approved by the ENGINEER and shall be of sufficient durability to protect the samples from any damage during shipment.

1.3   SUBMITTALS

- A.   All submittals shall be provided in accordance with the requirements of Section 01 33 00 – Submittal Procedures.

## **EXPLORATORY EXCAVATION**

### **PART 2 PRODUCTS**

#### **2.1 BACKFILL**

- A. Use material removed during exploratory investigation for backfill only if approved by of the ENGINEER.

#### **2.2 GRANULAR MATERIAL, TYPE 2**

- A. Material consisting of natural or synthetic mineral aggregates having less than or equal to 70% of the material passing the 3/8-inch sieve (greater than or equal 30% retained on the 3/8-inch sieve) and less than 20% passing the No. 200 sieve. Also includes AASHTO Nos. 8 or 57 coarse aggregate, or PennDOT Nos. 2A or OGS coarse aggregate meeting the requirements specified in PennDOT Section 703.2, select granular material (2RC) meeting the requirements specified in PennDOT Section 703.3, and structure backfill.

#### **2.3 SAMPLE JAR**

- A. Sample jars shall be 1 quart capacity, wide-mouth, glass or plastic jars with moisture-tight screw tops.
- B. A printed or type-written, fade resistant and waterproof label shall be affixed to the outside of each jar and shall contain the following information:
  - 1. Date and time
  - 2. Project
  - 3. Location of sample (Station, distance R/L)
  - 4. Depth of sample

### **PART 3 EXECUTION**

#### **3.1 PREPARATION**

- A. Contact PA One Call system at least 3 days prior to beginning Work.
- B. Establish necessary lane, shoulder and/or sidewalk closures required to perform work.
  - 1. All traffic maintenance and control and devices shall be in accordance with the Pennsylvania Manual of Uniform Traffic Control Devices.

#### **3.2 CONSTRUCTION**

- A. Advance the exploratory excavation using vacuum excavation, hand digging, conventional machine excavation, or a combination thereof subject to approval of the ENGINEER.
- B. Allow the ENGINEER access to document the necessary information.

## EXPLORATORY EXCAVATION

- C. Information to be collected includes the following:
  - 1. Location of pipe tied to permanent points
  - 2. Depth of pipe
  - 3. Type of pipe on both sides of cleanout
  - 4. Nominal size of pipe
  
- D. If the technique used to advance the excavation causes any damage to the existing facilities, immediately contact the utility owner and cease all work until ENGINEER approves of an alternate method.
  
- E. Take care to protect the exposed utility from damage during construction. Repair or replace any culvert, sewer or utility, damaged during exploratory excavation, in accordance with the requirements of the utility owner, at no additional cost to the Project.
  - 1. The CONTRACTOR is responsible for all costs associated with the repair work and out of service time of all broken or damaged existing culverts, sewers or utilities resulting from any action by the CONTRACTOR.
  - 2. If the exploratory investigation results in damage to utilities, contact the owner of such utility to coordinate the repair.
  
- F. Obtain the ENGINEER's approval before backfilling the excavation.
  - 1. Complete backfilling no later than 24 hours after ENGINEER'S approval.
  - 2. Backfill under paved surfaces and elsewhere as determined by the ENGINEER.
  
- G. Exploratory excavation shall be backfilled with Granular Material, Type 2, found in PennDOT Section 206.2.
  
- H. Backfill in accordance with PennDOT Section 206.3 (b).1.c. in full uniform horizontal layers of not more than a compacted 8-inch depth .
  
- I. Dispose of excess material in accordance with the specifications.

END OF SECTION

**SECTION 03 00 00**  
**CAST-IN-PLACE CONCRETE**

**PART 1**      **GENERAL**

1.1 SCOPE

- A. This Section includes all monolithic cast-in-place concrete work complete with materials, mixes, installation and testing.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 31 23 19: Dewatering

1.3 REFERENCE STANDARDS

- A. Unless otherwise specified, the Work of this Section shall conform to the applicable portions of the following Standard Specifications:
  - 1. ACI - American Concrete Institute
  - 2. ASTM - ASTM International
  - 3. AASHTO - American Association of State Highways and Transportation Officials
  - 4. PennDOT - Pennsylvania Department of Transportation, Standard Specifications for Construction, latest edition

1.4 REFERENCE SPECIFICATIONS

- A. The latest or current ACI Standards and Code Requirements for "Concrete and Reinforced Concrete" shall govern all concrete Work except where otherwise specified herein.

1.5 TESTING AGENCY

- A. All inspections and tests required by this Section shall be performed by organizations acceptable to the ENGINEER.

1.6 ALLOWABLE TOLERANCES

- A. Allowable tolerances for concrete surfaces shall be as specified in ACI 117-10.

1.7 DESIGN CRITERIA

- A. Mixes shall be designed and tested for each size and gradation of aggregates and for each consistency intended for use. Design quantities and test results of each mix shall be submitted for review.
- B. Necessary construction joints are shown on the Plans. Modification of location or placement of construction joints not indicated on the Plans shall be subject to approval of the ENGINEER. In general, they shall be located within the middle one-third of the span of slabs, beams, and girders unless a beam intersects a girder at

## CAST-IN-PLACE CONCRETE

this point, in which case the joint in the girder shall be offset a distance equal to twice the width of the beam.

- C. Expansion joint locations and details shall be as shown on the Plans. In no case shall any fixed metal be continuous through an expansion joint.
- D. Keyways shall be provided in all joints where required to provide for either shear or watertightness. Unless otherwise required, the width of keys shall be at least one-third the thickness of the section at that point and their depth at least one-third their width.

### 1.8 SOURCE QUALITY CONTROL

- A. Furnish tests of cement and aggregates. Material sampling shall conform to the following ASTM Standards:
  - 1. Cement C183
  - 2. Aggregates D75.
- B. Testing shall be in accordance with applicable ASTM Standards to assure compliance with Specifications.
- C. Make tests for the following quantities, or fraction thereof:
  - 1. Cement 550 tons (500 metric ton)
  - 2. Fine Aggregate 2,000 Tons (1800 metric ton)
  - 3. Coarse Aggregate 2,000 Tons (1800 metric ton)
- D. Use same brand cement for any given structure produced by a single mill unless otherwise provided by authorization of the ENGINEER.

### 1.9 SUBMITTALS

- A. Submit Shop Drawings showing the location of joints. Included shall be a schedule of the concrete pouring. The location of joints and pouring schedule shall be subject to approval by the ENGINEER.
- B. The CONTRACTOR shall submit test reports for cement and aggregates to assure compliance with the Specifications.
- C. Concrete mixture designs and test data shall be submitted for review by the ENGINEER with a written request for approval. No concrete shall be placed until the CONTRACTOR has received such approval in writing.
  - 1. Each mixture report shall include:
    - a. Slump on which design is based.
    - b. Total gallons of water per cubic yard (l/m<sup>3</sup>).
    - c. Brand, type, composition, and quantity of cement.

## CAST-IN-PLACE CONCRETE

- d. Brand, type, composition, and quantity of pozzolan or other mineral admixtures.
  - e. Brand, type, composition, and quantity of ground granulated blast furnace slag.
  - f. Specific gravity and gradation of each aggregate.
  - g. Ratio of fine to total aggregates.
  - h. Weight (surface dry) of each aggregate, lbs./c.y. ( $\text{kg}/\text{m}^3$ ).
  - i. Brand, type, ASTM designation, active chemical ingredients, and quantity of each admixture.
  - j. Air content.
  - k. Compressive strength based on 7-day and 28-day compression tests.
  - l. Time of initial set.
- D. Submit manufacturer's literature of abrasive wear resistant floor finish and of chemical curing compound for review by the ENGINEER.
- E. Submit a sample concrete delivery ticket for review by the ENGINEER.
- F. Submit tickets collected at the site of concrete placement accompanying each load of concrete. A printout system for producing these tickets in connection with automatic batching will be permitted.
- G. Each ticket shall be serially numbered, show the charging time, quantity and grade of concrete, location of delivery and the signatures of inspectors at the plant and site. Transit mixed concrete tickets shall also include revolution counter reading at charging and mixing completion.
- H. Submit reports of the sampling and testing of slump, air content and strength performed.
- I. Submit reports of nondestructive, core and/or liquid retention testing required for acceptance of concrete in place.

### 1.10 MATERIAL STORAGE AND HANDLING

- A. Materials shall be stored and handled in accordance with ACI 304 and as specified below.
- B. When permission is given to store cement in the open, a floor at least six (6) inches (150 mm) above the ground and a waterproof covering shall be provided and so placed as to insure runoff in case of rain.
- C. Cement sacks shall be thoroughly shaken when emptying sacks into the batch. Cement salvaged by the CONTRACTOR by cleaning sacks mechanically or otherwise, or from discarded sacks of cement, shall not be used in the Work. The use of a fractional sack of cement will not be permitted unless the fractional part is measured by weight. At the time of its use in the Work, the cement shall be free from lumps.

## **CAST-IN-PLACE CONCRETE**

1. The use of a fractional sack of cement will not be permitted unless the fractional part is measured by weight.
  2. At the time of its use in the Work, the cement shall be free from lumps.
- D. No aggregates which have become intermixed prior to proportioning shall be used. Sufficient aggregate shall be available at the site to preclude the possibility of damaging delays while placing the concrete.
- E. Cars used for shipping aggregates shall be clean and in good repair.
1. The use of straw, marsh, hay or other similar materials for closing cracks or holes in cars will not be tolerated.
- F. Pozzolans and other cementitious materials shall be stored and handled in the manner of cement.
- G. Store and handle curing compound in a manner to prevent contamination.

### **1.11 ENVIRONMENTAL REQUIREMENTS**

- A. Environmental requirements shall be in accordance with ACI 305 for hot weather concreting, and ACI 306 for cold weather concreting.
- B. Specific temperature requirements are contained in Article 2.10 of this Section for mixing and Article 3.13 of this Section for placing.

## **PART 2      PRODUCTS**

### **2.1 MATERIALS – GENERAL**

- A. The materials shall meet the requirements of ACI 301, ACI 318, and current PennDOT specifications.
- B. Concrete materials shall be tested and inspected as the Work progresses. The review and/or check-test of the proposed materials, securing of production samples of materials at plant stockpiles and/or review of the manufacturer's reports for compliance will be performed at no cost to the CONTRACTOR.
- C. Testing and inspection required due to substitution or change of materials requested by the CONTRACTOR shall be at the CONTRACTOR's expense.

### **2.2 CEMENT**

- A. Cement shall be the type as indicated on the Plans or as specified.
1. Type I and IA, conforming to ASTM C150, air-entraining Portland cement when special properties are not specified.
  2. Type III and IIIA, conforming to ASTM C150, air-entraining Portland cement for use when high-early strength is specified.

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3. Type IS and IS-A, conforming to ASTM C595, air-entraining Portland blast-furnace slag cement for use in general concrete construction.
4. Type IP and IP-A, conforming to ASTM C595, air-entraining Portland-Pozzolan cement for use in general construction. The addition of suffix (MS) signifies that moderate sulfate resistance is specified. The addition of suffix (MH) signifies that moderate heat of hydration is specified.

### 2.3 AGGREGATES

- A. Washing will be required to eliminate the dust, clay, or silt coating. Aggregates which have been washed shall not be used sooner than 24 hours after washing, unless approved by the DESIGN PROFESSIONAL.
- B. Coarse aggregate shall be Type A stone or gravel, as specified in PennDOT Section 703.2.
- C. Gravel shall consist of hard, clean, durable particles of rock or pebbles and shall be free from lumps of clay.
- D. Crushed rock shall consist of angular fragments of crushed hard heads or boulders or crushed igneous rock free from weathered rock and of uniform quality.
- E. All sieve and screen analyses determination of clay, silt, and dust content and percentages of objectionable particles will be based on dry weights and conform to PennDOT Specifications, Standard sizes of coarse aggregate and shall conform to the physical requirements specified in PennDOT Specifications.
- F. Fine aggregate shall conform to PennDOT Section 703.1 and to the grading requirements stated therein.

### 2.4 ADMIXTURES

- A. Admixtures shall be used to achieve concrete as indicated on the Plans or specified herein.
- B. Concrete admixtures must be sourced from a manufacturer listed in PennDOT Bulletin 15, and conform to the requirements set forth in PennDOT Section 711.3.

### 2.5 JOINT FILLER

- A. Joint Filler must be sourced from an approved manufacturer listed in PennDOT Bulletin 15, and conform to the requirements specified in PennDOT Section 705.

### 2.6 WATER

- A. Water to be used for mixing and curing concrete shall conform to ASTM C1602 and that is reasonably clean, free from vegetable matter, oil, acid, alkali, sugar, or other substances injurious to the finished product.

## CAST-IN-PLACE CONCRETE

### 2.7 CURING COMPOUND

- A. Shall be adequate to prevent checking, cracking and loss of moisture, conforming to ASTM C309.
- B. Curing Compound must be sourced from a manufacturer listed in PennDOT Bulletin 15, and conform to the requirements set forth in PennDOT Section 711.2.

### 2.8 MIXES

- A. Concrete shall consist of a mixture of air-entraining Portland cement, coarse and fine aggregate, Type C or Type F Fly Ash and water with admixtures if required.
- B. Admixtures shall not be used without the ENGINEER's review.
- C. Concrete shall be classified and proportioned on the basis of minimum compressive strength at 28 days when cured in a moist room at a temperature within the range of 65 degrees to 75 degrees F (18° to 24° C). The desired strength of the concrete shall be shown on either the Plans or in the Specifications.
- D. Aggregates shall be proportioned by weight, except for small structures and for incidental Work requiring less than ten (10) cubic yards (7 m<sup>3</sup>) of concrete, in which case they may be proportioned by volume when approved by the ENGINEER.
- E. Cement in bulk, when permitted, shall be proportioned by weight.
- F. When proportioned by volume, the amount of each aggregate required for a single batch shall be measured separately and accurately. Shovel methods of measuring will not be permitted. The unit of volumetric measurement shall be one (1) cubic foot or one (1) cubic meter.
- G. When proportioned by weight, the amount of each aggregate required for a single batch shall be weighed in a separate container. The equipment for weighing shall be of an approved type, and of such accuracy that there shall not be an error of more than one (1) percent in any one (1) batch.

### 2.9 BATCHING ADMIXTURES

- A. The batching of admixtures to achieve and maintain production of the mix design of concrete shall be in accordance with ACI 212.
- B. If the air content is found to be less or greater than the specified amount, the CONTRACTOR shall immediately discontinue Work and correct the air content.
- C. Decreasing the air content may be accomplished by blending air-entraining Portland cement with Portland cement, manufactured at the same mill, in a ratio which will reduce the air content to a value within the specified limits, this blending shall be reviewed by the ENGINEER.

## CAST-IN-PLACE CONCRETE

- D. Increasing the air content may be accomplished by adding to each batch a sufficient amount of air-entraining admixture to bring the air content up to the designed amount.
- E. Pozzolan and ground granulated blast furnace slag shall be proportioned based on the mix design approved by the ENGINEER per Article 1.9 of this Section to produce watertight concrete.
- F. Water Reducer can be used to reduce the water requirement of concrete to obtain consistency of slump, modify workability, increase strength or any other approved use.

### 2.10 TEMPERATURE LIMITS OF MIXTURE

- A. The temperature of the cement, at the time of delivery to the mixer, shall not exceed 165 degrees F (74°C). It may be required that it be stored at the CONTRACTOR's expense until cooled to that temperature.
- B. The temperature limits of aggregates and water entering the mixer shall be as follows:

Mix Components	Minimum	Maximum
Water	75°F (24°C)	140°F (60°C)
Fine Aggregate	65°F (18°C)	140°F (60°C)
Coarse Aggregate	65°F (18°C)	110°F (43°C)
Concrete (resulting)	60°F (15°C)	90°F (32°C)

### 2.11 MIXERS AND MIXING

- A. Concrete mixing operations shall be in accordance with ACI 304, current PennDOT specifications, and shall be subject to random inspection during the progress of the Work at no charge to the CONTRACTOR.
- B. Plant Mixed Cement Concrete
  - 1. Concrete proportioned and mixed in either a stationary, commercial, and central plant or a stationary plant located near the project. Concrete is delivered to the work site by truck, agitator truck, or mixer truck.
- C. Truck Mixed Cement Concrete
  - 1. Concrete prepared by dry batching in a proportioning plant and placing the dry ingredients in a truck mixer. Measured water is then added to the truck drum from the plant water system and the concrete is mixed in the truck at the plant. Mixing is not allowed enroute to or at the work site.
- D. Volumetric Mixed Cement Concrete
  - 1. Concrete proportioned and mixed in a truck-mounted mobile mixer. The unit is capable of proportioning concrete ingredients from self-contained bins and

## **CAST-IN-PLACE CONCRETE**

mixing the materials with measured water in a self-contained mixer. The concrete is mixed and discharged at the work site.

### **2.12 CHANGE OF MIXTURE**

- A. If the CONTRACTOR requests a change or substitution of approved batch proportioning, mixing, or delivery operations additional testing and/or inspection shall be at the CONTRACTOR's expense.

## **PART 3 EXECUTION**

### **3.1 VERIFICATION OF FORMWORK, REINFORCING, AND SUBGRADES**

- A. The CONTRACTOR shall inspect formwork, reinforcement and subgrades to confirm compliance with the related Work specified elsewhere.

### **3.2 EMBEDDED ITEMS**

- A. The CONTRACTOR shall verify the location, from certified vendor or applicable engineering drawings, of all embedded items including anchor bolts, wall sleeves, wall casting, railing post sleeves and miscellaneous pipes and conduits and shall install the items accurately at the locations determined.

### **3.3 BUILDING IN OTHER WORK**

- A. The CONTRACTOR shall make all necessary provisions in concrete Work for other Work installed by this or other contractors, and build in all required steel beams, frames, curbs, expansion joints, pipes, pipe trench covers and frames, and all other Work furnished by either this or other contractors.

### **3.4 SPECIAL CONCRETE**

- A. The CONTRACTOR shall verify the use and/or locations of watertight concrete and/or high-early strength concrete.

### **3.5 PREPARATION**

- A. The CONTRACTOR shall notify the ENGINEER two (2) working days prior to placement of concrete.
- B. Before depositing new concrete on or against existing concrete the existing concrete shall be roughened, thoroughly cleaned of foreign matter and laitance and saturated with water. The cleaned and saturated surface of the hardened concrete, including vertical and inclined surfaces, shall be coated with a bonding agent or slushed with a minimum 2-inch (50 mm) thick coating of concrete without coarse aggregate grout against which the new concrete shall be placed before the mixture has attained its initial set.

## CAST-IN-PLACE CONCRETE

- C. Before concrete is placed in any unit, the forms and the placing and fixing of all steel and incidental items shall be complete, and the forms, steel and adjacent concrete shall be thoroughly cleaned and wetted down.
- D. No concrete shall be deposited in any unit until the area has been completely dewatered in accordance with Section 31 23 19, Dewatering, and not until after the CONTRACTOR has made satisfactory provisions to eliminate all possibility of water entering or flowing through the concrete while it is being poured or is taking its set. No concrete shall be placed under or on water.

### 3.6 CONVEYING

- A. The concrete handling equipment shall be of such a nature and shall be so located that the concrete after leaving the mixer will reach its destination with a minimum lapse of time, with no segregation, and loss of slump.
  - 1. The use of drop chutes, except at or in the forms, is prohibited.
- B. The interior hopper slope of concrete buckets shall be not less than 60 degrees from the horizontal, the minimum dimension of the clear gate opening shall be at least five (5) times the nominal maximum size aggregate and the area of the gate opening shall be not less than two (2) square feet (0.2 m<sup>2</sup>). The maximum dimension shall not be greater than twice the minimum dimension.
  - 1. The bucket gates shall be essentially grout tight when closed and may be manually, pneumatically or hydraulically operated except for buckets larger than two (2) cubic yards (1.5 m<sup>3</sup>) shall not be manually operated.
  - 2. The design of the bucket shall provide means for positive regulation of the amount and rate of deposit of concrete in each dumping position.
- C. Belt conveyors shall be designed and operated to assure a uniform flow of concrete from mixer to final place of deposit without segregation of ingredients or loss of mortar and shall be provided with positive means for preventing segregation of the concrete at the transfer points and the point of placing.
- D. Concrete may be conveyed by positive displacement pump when authorized by the ENGINEER.
  - 1. The pumping equipment shall be piston or squeeze pressure type.
  - 2. The pipeline shall be rigid steel pipe or heavy duty flexible rubber hose.
  - 3. The inside diameter of the pipe shall be at least three (3) times the nominal maximum size coarse aggregate in the concrete mixture to be pumped.
  - 4. The maximum size coarse aggregate shall not be reduced to accommodate the pumps.
- E. The distance to be pumped shall not exceed limits recommended by the pump manufacturer. The concrete shall be supplied to the pump continuously.
- F. When pumping is completed, concrete remaining in the pipeline shall be ejected without contamination of concrete in place.

## CAST-IN-PLACE CONCRETE

- G. After each operation, equipment shall be thoroughly cleaned, and flushing water shall be wasted outside of the forms.

### 3.7 PLACING

- A. All concrete shall be so deposited as to maintain the top surface level, unless otherwise shown on the Plans, and also as to avoid any appreciable flow in the mass.
- B. Where placing operations involve dropping the concrete more than three (3) feet (1 m) in the forms, it shall be deposited through sheet metal or other approved spouts or pipes.
  - 1. These spouts or pipes shall have suitable receiving hoppers at the upper ends, and the lower ends shall be kept within six (6) inches (150 mm) of the newly placed concrete so as to prevent segregation and avoid spattering the reinforcing steel with mortar.
  - 2. Under no circumstances shall concrete that has partly hardened be deposited in the Work.
- C. Each layer of concrete shall be plastic when covered with the following layer and the forms shall be filled at a rate of vertical rise of not less than two (2) feet (600 mm) per hour.
  - 1. Concrete vibrators shall penetrate the initial layer when placing the following layer.
  - 2. Vertical construction joints shall be provided as necessary to comply with these requirements.
- D. Concrete shall be placed and compacted in wall or column forms before any reinforcing steel is placed in the system to be supported by such walls or columns.
  - 1. The portion of any wall or column placed monolithically with a floor or roof slab shall not exceed six (6) feet (1.8 m) of vertical height.
  - 2. Concrete in walls or columns shall set at least two (2) hours before concrete is placed in the structural systems to be supported by such walls or columns.
- E. Concrete shall be set when top finished. All laitance, debris, and surplus water shall be removed from concrete surfaces at tops of forms by screeding, scraping, or other effective means. Wherever the top of a wall will be exposed to weathering, the forms shall be overfilled and after the concrete has settled, the excess shall be screeded off.
- F. No concrete shall be placed in contact with frozen ground.
- G. Time between charging and placement of concrete shall not exceed 1-1/2 hours.
- H. Concrete shall be compacted by continuous vibrating, tamping, spading or slicing. Mechanical vibration shall be employed.

## CAST-IN-PLACE CONCRETE

1. Care shall be taken to eliminate all voids and to provide full bond on reinforcing steel and embedded fixtures.
  2. Concrete shall be compacted and thoroughly worked with suitable tools combined with the use of vibrators applied internally and providing a frequency not less than 7,000 revolutions per minute.
  3. All such vibrating, including the methods and equipment, shall be subject to the review of the ENGINEER.
- I. The time of vibrating in any area shall only be sufficient to get efficient compaction, but shall in no case be carried to the point where there is segregation of the fine and coarse materials of the mix.
1. There shall be an absolute minimum of direct vibration of the steel or forms during the process of vibrating.
  2. Vibrators shall be inserted and withdrawn from the concrete at numerous locations, from 18 to 30 inches (450 to 750 mm) apart, but shall not be used to transport concrete within the forms.
  3. The CONTRACTOR shall have a stand by vibrator on the job site during all concrete pouring operations.

### 3.8 FINISHING UNFORMED SURFACES

- A. The unformed surfaces of all concrete shall be screeded and given an initial float finish followed by steel troweling.
- B. Screeding shall provide a concrete surface conforming to the proper elevation and contour with all aggregates completely embedded in mortar.
1. All screeded surfaces shall be free of surface irregularities with a height or depth in excess of 1/4 inch (5 mm) as measured from a 10-foot (3 m) straightedge.
- C. Screeded surfaces shall be given an initial float finish as soon as the concrete has stiffened sufficiently for proper working.
1. Any piece of coarse aggregate which is disturbed by the float or which causes a surface irregularity shall be removed and replaced with mortar.
  2. Initial floating shall produce a surface of uniform texture and appearance with no unnecessary working of the surface.
  3. Floating shall be performed with hand floats or suitable mechanical compactor floats.
- D. Troweling shall be performed after the second floating when the surface has hardened sufficiently to prevent an excess of fines being drawn to the surface. Troweling shall produce a dense, smooth, uniform surface free from blemishes and trowel marks.
1. The top surface of driveways, and sidewalks shall be given a broomed finish after troweling.

## CAST-IN-PLACE CONCRETE

- E. Unless specified to be beveled, exposed edges of floated or troweled surfaces shall be edged with a tool having 1/4 inch (5 mm) corner radius.

### 3.9 FINISHING FORMED SURFACES

- A. After removal of forms, the finishing of all concrete surfaces shall be started as soon as its condition will permit. Grind all seams, fins or projections flush with the concrete surface.
  - 1. Fill and point all honeycomb, tie holes and voids.
  - 2. Dampen the surface with water and apply a cement and silica sand slurry to the entire surface to fill small defects and air voids.
  - 3. Remove excess slurry from concrete. Surfaces to be finished shall receive an application of dry Portland cement which shall be rubbed into the slightly dampened surface with a suitable cloth.
- B. After pointing and removal of projections as specified herein, exposed surfaces of concrete, including walls, columns, beams, pilasters and the undersides of slabs, shall be given a rubbed surface finish.

### 3.10 EXPANSION JOINTS

- A. Expansion joints shall have removable polystyrene joint caps secured to the top thereof and shall be accurately positioned and secured against displacement to clean, smooth concrete surfaces.
- B. The joint caps shall be of the size required to install filler strips at the desired level below the finished concrete surface and to form the groove for the joint sealant to the size shown on the Plans.
- C. The joint caps shall not be removed until after the concrete curing period.
- D. Materials shall conform to PennDOT's current specifications.

### 3.11 CONCRETE CURING

- A. All concrete shall be cured for a period not less than seven (7) consecutive days.
- B. The CONTRACTOR shall have adequate equipment and curing material on the job site before concrete placement begins, and it shall be adequate to prevent checking and cracking and loss of moisture from all the surfaces of the concrete.
  - 1. The concrete shall be protected from rain, flowing water, wind and the direct rays of the sun.
  - 2. Openings in concrete shall be sealed to prevent drying of the concrete during the curing period.
- C. Curing compounds shall not be used on surfaces to which additional concrete or other material are to be bonded.

## CAST-IN-PLACE CONCRETE

- D. Curing compounds when used shall be applied in strict accordance with the manufacturer's recommendations.
- E. Concrete cured with water shall be kept wet by covering with ponded water or fog spraying to keep all surfaces continuously wet.
- F. Burlap used for curing shall be treated to resist rot and fire and free of sizing or any substances that are injurious to Portland cement or cause discoloration.
  - 1. Strips shall be lapped by half widths.
  - 2. The burlap shall be saturated with water after placement and during the curing period.
- G. Straw or hay shall be in a layer no less than six (6) inches (150 mm) thick and held in place by screens, wire or other means to prevent dispersion by the wind.
  - 1. Care shall be observed to avoid discoloration of the concrete surface from the vegetable fibers and for the flammability of the material.
  - 2. The straw shall be saturated with water after placement and during the curing period.

### 3.12 ENVIRONMENTAL CONDITIONS

- A. The CONTRACTOR shall provide cold or hot weather protection in accordance with ACI and as specified herein. There shall be no additional cost for hot or cold weather protection of the concrete.
- B. Cold Weather Protection
  - 1. When placing concrete in cold weather, the CONTRACTOR shall plan and prosecute his Work in a manner which shall assure results free from damage through freezing, contraction, and loss of concrete strength.
  - 2. No concrete shall be poured when the surrounding temperature is below 40 degrees F (4° C), unless the aggregates and water are properly heated.
    - a. Concrete which has been poured at higher temperatures but has not attained a strength equal to 75% of the required strength of the class of concrete involved, shall be housed and protected in accordance with the provisions of this Section whenever the surrounding temperature falls below 40 degrees F (4° C).
  - 3. Application of heat to the materials shall be made in a manner which will keep these materials clean and free from injurious substances.
  - 4. Aggregates may be heated only by steam coils or steam jets, except in the case of small quantities of concrete when other methods may be approved by the ENGINEER. A sufficient quantity of properly heated aggregates shall be on hand prior to starting the pouring of any unit.

## CAST-IN-PLACE CONCRETE

5. Concrete shall be properly housed with canvas, burlap, or other windproof material in such a manner that any necessary removal of the forms or finishing of the concrete can proceed without undue damage to the concrete from the elements.
  - a. Heating of the housing shall be done in a manner which will maintain a temperature between 50 degrees F and 70 degrees F (10° and 20° C), at all times for at least five (5) days after the pour is complete and 12 hours before the pour begins.
  - b. All supplemental heating units shall have exhaust vented to the exterior and shall not cause deleterious reactions or deposits to occur to concrete.

### C. Hot Weather Protection

1. Concrete deposited in hot weather shall not have a placing temperature that will cause difficulty from loss of slump, flash set, or cold joints. Concrete temperature shall be less than 90 degrees F (32° C).
2. In hot weather, suitable precautions shall be taken to avoid drying of the concrete prior to finishing operations. Use of windbreaks, sunshades, fog sprays, or other devices shall be provided.

### 3.13 ADDITION OF WATER

- A. To increase workability, adding water to the mix shall be limited to a one time addition of one (1) gallon of water per cubic yard of concrete (5 liters per cubic meter) and mixed with a minimum of 30 revolutions at a rate of 12 to 15 revolutions per minute. Addition of water shall be within the slump requirements.

### 3.14 CONCRETE DELIVERY TICKET

- A. A ticket system shall be used for recording the transportation of concrete from the batching plant to point of delivery. This ticket shall be issued to the truck operator at the point of loading and given to the ENGINEER upon delivery. The ticket shall as a minimum indicate the time of mixer charging, quantity of concrete, type of mixture including amount of cement, and the plant where the concrete was batched.

### 3.15 CONCRETE DELIVERY REJECTION

- A. Concrete not permitted for inclusion in the Work by the ENGINEER shall be removed from the site. Rejection of concrete will be determined through concrete testing and elapsed time from mixer charging to delivery.

### 3.16 CONCRETE TESTING AT PLACEMENT

- A. Tests shall be made of fresh concrete for each 50 cubic yards (40 m<sup>3</sup>), or whenever consistency appears to vary. The sampling and testing of slump, air content and strength will be performed at no cost to the OWNER.

## CAST-IN-PLACE CONCRETE

- B. Composite samples shall be secured in accordance with the Method of Sampling Fresh Concrete, ASTM C172.
- C. Slump Test
1. Slump Test shall be in accordance with ASTM C143. The CONTRACTOR shall use the least slump possible consistent with workability for proper placing of the various classifications of concrete.
  2. A tolerance of up to 1-inch (25 mm) above the indicated maximum slump shall be allowed for individual batches provided the average for all batches or the most recent ten (10) batches tested, whichever is fewer, does not exceed the maximum limit.
- D. Air Content
1. Air content of normal weight concrete will be determined in accordance with Method of Test for Air Content of Freshly Mixed Concrete by the Pressure Method, ASTM C231.
- E. Compressive Strength
1. A set of cylinders for compressive strength tests will consist of four cylinders per each set.
  2. Molding and curing specimens from each set shall be in accordance with Method of Making and Curing Concrete Test Specimens in the Field, ASTM C31. Any deviations from the requirements of this Standard shall be recorded in the test report.
  3. Testing specimens will be in accordance with Method of Test for Compressive Strength of Cylindrical Concrete Specimens, ASTM C39.
    - a. One (1) specimen shall be tested at seven (7) days for information and two (2) shall be tested at 28 days for acceptance. The acceptance test results shall be the average of the strengths of the two (2) specimens tested at 28 days.
    - b. If one (1) specimen in a test manifests evidence of improper sampling, molding or testing, it shall be discarded and the strength of the remaining cylinder shall be considered the test result.
  4. The strength level of the concrete will be considered satisfactory so long as the averages of all 28 day strength test results equal or exceed the specified 28-day strength and no individual strength test result falls below the specified 28-day strength by more than 500 psi (3.4 MPa).
  5. If the strength test is not acceptable, further testing shall be performed to qualify the concrete.
  6. The temperature of concrete sample will be determined for each strength test.

## CAST-IN-PLACE CONCRETE

### 3.17 TESTING OF CONCRETE IN PLACE

- A. Additional testing of materials or concrete occasioned by their failure by test or inspection to meet specification requirements shall be at the expense of the CONTRACTOR.
- B. Testing by impact hammer, sonoscope, or other nondestructive device may be permitted by the ENGINEER to determine relative strengths at various locations in the structure as an aid in evaluating concrete strength in place or for selecting areas to be cored. Such tests, unless properly calibrated and correlated with other test data, shall not be used as a basis for acceptance or rejection.
- C. When required by the ENGINEER, cores at least two (2) inches (50 mm) in diameter shall be obtained and tested in accordance with Methods of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete, ASTM C42.
  - 1. If the concrete in the structure will be dry under service conditions, the cores shall be air dried (temperature 60 degrees to 80 degrees F (15° - 25°C), relative humidity less than 60%) for seven (7) days before test and shall be tested dry.
  - 2. If the concrete in the structure will be more than superficially wet under service conditions, the cores shall be tested after moisture conditioning in accordance with ASTM C42.
- D. At least three (3) representative cores shall be taken from each member or area of concrete in place that is considered potentially deficient.
  - 1. The location of cores shall be determined by the ENGINEER so as to least impair the strength of the structure.
  - 2. If, before testing, one or more of the cores shows evidence of having been damaged subsequent to or during removal from the structure, it shall be replaced.
- E. Concrete in the area represented by a core test will be considered adequate if the average strength of the cores is equal to at least 85% of and if no single core is less than 75% of the specified 28-day strength.
- F. Core holes shall be filled by low slump concrete or mortar.

### 3.18 DEFECTIVE CONCRETE

- A. If, in the opinion of the ENGINEER, the defects in the concrete are of such a nature as to warrant condemnation, that portion of the pour may be ordered replaced in its entirety and the CONTRACTOR shall promptly replace same without additional compensation.
- B. Defective concrete shall be repaired by cutting out the defective area and placing new concrete which shall be formed with keys, dovetails or anchors to attach it securely in place.

**CAST-IN-PLACE CONCRETE**

END OF SECTION

**SECTION 03 60 00  
GROUT**

**PART 1      GENERAL**

1.1 SCOPE

- A. This section covers grouting as indicated on the drawings. Unless otherwise specified, all grouting shall be done with non-shrinking grout.
- B. This section also covers epoxy grouting of studs, dowels, and anchor bolts to be installed in hardened concrete.

1.2 GENERAL

A. Reference Standards

- 1. ANSI – American National Standard Institute
- 2. ASTM – ASTM International
- 3. PennDOT – Pennsylvania Department of Transportation, Standard Specifications for Construction, latest edition
- 4. ACI – American Concrete Institute

B. Governing Standards

- 1. ASTM C882, “Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.”
- 2. ASTM D638, “Test Method for Tensile Properties of Plastics.”
- 3. ASTM D695, “Compressive Properties of Rigid Plastics.”
- 4. ASTM D790, “Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.”

1.3 QUALITY ASSURANCE

- A. Perform Work per ACI 301 and ACI 304R.

1.4 SUBMITTALS

A. Drawings and Data.

- 1. Submit product data describing the grout, including recommended mixing, and placing instructions.

B. Certifications.

- 1. Provide copies of material certificates signed by material producer and CONTRACTOR, certifying that each material item complies with or exceeds specified requirements.

## **GROUT**

### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Grout shall be stored under cover and on pallets.
- B. In cold weather, store in a warm place for at least 24 hours; 70 degrees F (21 degrees C) is preferred.
- C. In hot weather, store in a relatively cool shaded area.

## **PART 2      PRODUCTS**

### 2.1 NONSHRINKING GROUT

- A. Pre-mixed non-shrink grout shall conform to the requirements of PennDOT Section 1080.2 (c).
- B. Must meet all performance criteria of most current version of ASTM C 1107 at a flowable, plastic, and stiff consistency.

### 2.2 EPOXY GROUT FOR STUDS, DOWELS, AND ANCHOR BOLTS

- A. Epoxy grout for studs, dowels, and anchor bolts shall conform to PennDOT Section 1080.2 (c), except use Type C fine aggregate.
- B. The CONTRACTOR may use premixed grout. Obtain a grout, which passes a No. 8 sieve, from a manufacturer listed in PennDOT Bulletin 15. Mix according to the manufacturer's instructions.

### 2.3 WATER

- A. Water used for grout shall conform to ASTM C1602 that is reasonably clean, free from vegetable matter, oil, acid, alkali, sugar, or other substances injurious to the finished product.

## **PART 3      EXECUTION**

### 3.1 PREPARATION

- A. Nonshrinking Grout
  - 1. Shall be furnished factory premixed so that only water is added at the jobsite. Grout shall be mixed in a mechanical mixer. (No more water shall be used than is necessary to apply product.)
  - 2. Surface Preparation: Steel and concrete surfaces shall be free of dirt, oil, grease or other contaminants.

## GROUT

3. All surfaces should be roughened to remove laitance and expose sound concrete. When dynamic, shear or tensile forces are anticipated, concrete surfaces should be chipped with a "chisel point" hammer to a roughness of (plus or minus) 3/8 inch.
4. Concrete surfaces should be rough and saturated (ponded) with clean water for 24 hours just prior to grouting.
5. Bolt holes must be grouted before the major portion of grout is placed. Shade the foundation from sunlight 24 hours before and 24 hours after grouting. All free-standing water must be removed from the foundation and bolt holes prior to grouting.
6. Forms should be liquid-tight and non-absorbent. Seal forms with grout, putty or caulking compound. Side and end forms should be a minimum 1 inch horizontally away from the object being grouted to permit expulsion of air and any remaining saturation water as the grout is placed. Provide sufficient bracing to prevent the grout from leaking. Large non-supporting grout areas should be eliminated wherever possible. Forms should extend a minimum of 1 inch higher than the bottom of the equipment being grouted.
7. Temperatures for the foundation and plates, mixing water and grout should be 45°F minimum, 50 to 80° F preferred, and 90° F maximum.
8. Combine dry materials in the mixer, then agitate to mix. Add water slowly and mix for 3 minutes or less, or according to the manufacturer's instructions.
9. Mix as closely as possible to the site of the work and use each batch within 20 minutes. Do not retemper.
10. Mold daily test cylinders according to PTM No. 521. Test cylinders according to PTM No. 604.

### B. Epoxy Grout

1. Epoxy grout shall consist of a two-component liquid epoxy adhesive of viscosity appropriate to the location and application, and an inert aggregate filler component, if recommended by the adhesive manufacturer. Components shall be packaged separately at the factory and shall be mixed immediately before use. Proportioning and mixing of the components shall be done in accordance with the manufacturer's recommendations.
2. Epoxy grout should be placed only on properly cured foundations. The concrete surface must be chipped to expose sound aggregate and to ensure that all laitance and weak float is removed. The concrete base shall be clean, dry, and free of oil, wax, and other contaminants.

## GROUT

3. If an anchor bolt sleeve is to be filled, be sure all water is removed. If the anchor bolt sleeve is to be left ungrouted, seal the bolt hole with felt, foam rubber or other means.
4. Cover all shims, anchor bolts and leveling screws with putty or clay to keep the grout from adhering. Use model clay, glazing putty or anything of a putty consistency which will stick but not harden. Shade the foundation from sunlight for at least 24 hours before and 48 hours after grouting.
5. Where indicated on the drawings, anchor bolts, threaded rod anchors, and reinforcing bars shall be epoxy grouted in holes drilled into hardened concrete. Diameters of holes shall be as follows:
  - a. For Reinforcing Bars and Threaded Rod Anchors - Diameter shall be 1/8 inch larger than the outside diameter of the bar or the rod
  - b. For Headed Anchor Bolts - Diameter shall be bolt diameter plus 2 inches (5.08 cm)
6. The embedment depth for epoxy grouted anchor bolts, threaded rod anchors, and reinforcing bars shall be at least 15 bolt, rod, or bar diameters, unless otherwise indicated on the drawings.
7. Holes shall be prepared for grouting as recommended by the grout manufacturer.
8. Since the grout will come up at least 1/2 to 3/4 inch onto the equipment, protect above this area with masking tape.
9. To permit easy clean up, wax or cover all surfaces where the grout may splash.
10. Forms should extend a minimum of 3/4 inch higher than the bottom of the equipment being grouted. Large non-supporting grout areas should be eliminated wherever possible. Protect the foundation and equipment from rain or moisture.
11. Areas not to be grouted must be sealed off.
12. Forms must be liquid tight. They may be sealed with putty or caulking. Seal wood forms to vertical concrete surfaces by applying putty or caulk below top of concrete, then press form into place.
13. Place forms within a maximum of 6 inches and a minimum of 1 inch (2.54 cm) from the edge of each individual base, rail or sole plate being grouted.
14. Where a deep pour is necessary, 1/2 inch rebar on 12 to 18 inches centers shall be used to minimize stress cracking. The top tier should be located about 2 inches below the equipment base. A bottom tier should be located about 2

## GROUT

inches above the foundation surface. Additional tiers, if required, should be spaced equal distances in the grout pour with vertical supports as required.

15. Contractor shall use clean and dry mortar mixer (3 to 6 cubic foot size), wheelbarrow, and buckets or shovels for transporting the grout. Have plenty of clean rags for wiping hands and tools. Ready a pail of solvent (T-430, Xylol, Lacquer Thinner, or equal) for cleaning hands and tools. Use rubber gloves.
16. During mixing, do not add solvent, water or any other material to the grout. Do not alter the liquid hardener proportions. Pour the hardener into a pail of grout liquid and stir until well mixed (approximately three minutes). Pour the mixed liquid and hardener into the mixer. Add the grout aggregate one bag at a time and mix until completely wet.

### 3.2 INSTALLATION

#### A. Nonshrinking Grout

1. Grout should always be placed from only one side of the equipment to prevent entrapment of air or water beneath the equipment.
2. After placement, trim the surfaces with a trowel and cover the exposed grout with clean wet rags and maintain this moisture for 5 to 6 hours.
3. The grout should offer stiff resistance to penetration with a pointed mason's trowel prior to removing the grout forms or cutting back excessive grout.
4. Cure all exposed grout with an approved membrane curing compound such as Master Builders Masterkure-N-Seal HS immediately after the wet rags are removed to further minimize the potential moisture loss within the grout.
5. Do not vibrate grout. Steel straps inserted under the plate may be used to aid in movement of the grout.
6. Unless otherwise specified or indicated on the drawings, grout shall be 1-1/2 inches thick. Grout shall be placed in strict accordance with the directions of the manufacturer so that all spaces and cavities are completely filled, without voids.
7. Forms shall be provided where structural components will not confine the grout.
8. In all locations where the edge of the grout will be exposed to view, the grout shall be finished smooth after it has reached its initial set. Except where shown to be finished on a slope, the edges of grout shall be cut off flush.
9. Nonshrinking grout shall be protected against rapid loss of moisture by

## GROUT

covering with wet cloths or polyethylene sheets. After edge finishing is completed, the grout shall be wet cured for at least 7 days and then an acceptable membrane curing compound shall be applied.

### B. Epoxy Grout

1. When grouting closed areas, start at one end of the form and fill the cavity completely as you advance toward the other end to prevent air entrapment.
2. Low foundation and ambient temperatures decrease flowability. Strapping will assist movement of grout in low clearance applications.
3. Do not vibrate grout.
4. Check frequently for leaks. Leaks do not self-seal. If not stopped, they will cause voids.
5. Anchor bolts, threaded rod anchors, and reinforcing bars shall be clean, dry, and free of grease and other foreign matter when installed.
6. The bolts, rods, and bars shall be set and positioned and the epoxy grout shall be placed and finished in accordance with the recommendations of the grout manufacturer.
7. Care shall be taken to ensure that all spaces and cavities are filled with epoxy grout, without voids.
8. During assembly of all threaded stainless steel components, anti-seize thread lubricant shall be liberally applied to the threaded portion not embedded in concrete.

END OF SECTION

**SECTION 31 11 00  
CLEARING AND GRUBBING**

**PART 1 GENERAL**

1.1 SCOPE OF WORK

- A. This section includes all clearing and grubbing work indicated on the Plans and as required, complete with cutting and removal of trees, shrubs, vegetation, stumps, logs, brush, roots and undergrowth, and disposal of materials.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01 57 13: Temporary Erosion and Sediment Control
- B. Section 01 89 00: Site Construction Performance Requirements
- C. Section 31 23 13: Subgrade Preparation

1.3 REFERENCE STANDARDS

- A. PennDOT – Pennsylvania Department of Transportation, Standard Specifications for Construction, latest edition

1.4 SOIL EROSION AND SEDIMENTATION CONTROL

- A. The CONTRACTOR, at his expense, shall provide, maintain and remove such temporary and/or permanent soil erosion and sedimentation control measures as specified on the Plans or as determined by the ENGINEER.
- B. The measures shall prevent surface runoff from carrying excavated materials into the waterways, to reduce erosion of the slopes, and to prevent silting in of waterways downstream of the Work.
- C. The measures should include provisions to reduce erosions by the wind of all areas stripped of vegetation, including material stockpiles.
- D. Comply with requirements of Section 01 57 13, Temporary Erosion and Sediment Control.

**PART 2 PRODUCTS**

2.1 PROTECTIVE FENCE

- A. Install protective fence as indicated on the plans, at the direction of the ENGINEER, and as specified in PennDOT Section 811 before clearing and grubbing operations.

**PART 3 EXECUTION**

3.1 CLEARING

- A. All trees, stumps, brush, hedges, and other vegetation shall be cut off flush with the ground, as indicated on the Plans or as directed by the ENGINEER.

## **CLEARING AND GRUBBING**

### **3.2 CLEARING AND GRUBBING**

- A. All trees, stumps, brush, shrubs, hedges, roots, corduroy, logs, matted roots, other vegetation and debris as defined on the Plans or as directed by the ENGINEER, shall be completely removed.
- B. Depth of removal shall be as specified in PennDOT Section 201, as indicated on the Plans, or as directed by the ENGINEER.

### **3.3 DEPTH OF REMOVAL IN EXCAVATION AREA**

- A. The trees, stumps, and roots shall be removed as specified in PennDOT Section 201.3, as indicated on the Plans, or as directed by the ENGINEER.

### **3.4 DEPTH OF REMOVAL IN EMBANKMENT AREAS**

- A. Remove organic matter and topsoil within embankment areas to a depth of 8 inches below the existing ground surface as specified in PennDOT Section 201.
- B. Remove remaining topsoil over 8 inches in depth, when directed by ENGINEER, as specified in PennDOT Section 203.
- C. Stockpile removed soil as specified in PennDOT Section 801.

### **3.5 REMOVAL OF TREES, STUMPS, AND OTHER VEGETATION**

- A. Where trees cannot be felled without danger to traffic or injury to other trees, structures or property, they shall be cut down in sections. The removal of stumps and roots may be accomplished by the use of a shredding machine, meeting the approval of the ENGINEER.
- B. The burial of trees, stumps and other vegetation, will not be permitted.
- C. Material shall be disposed of as specified in Section 01 89 00, Site Construction Performance Requirements.

### **3.6 HOLES AND TRENCHES**

- A. All holes and trenches remaining after the clearing or grubbing operations in embankment areas, shall have the sides broken down or leveled, and shall be refilled with acceptable material, specified in PennDOT Section 206.2.
- B. The material shall be moistened and properly compacted in layers by tampers or rollers to 98% of its maximum unit weight.
- C. The same construction procedure shall be applied to all holes and trenches remaining in excavation areas where the depth of holes exceeds the depth of proposed excavation. See Section 02 32 13, Exploratory Excavation, for backfill requirements.

## CLEARING AND GRUBBING

### 3.7 Salvaging Timber

- A. Trees and shrubs required to be removed belong to the property owner. When such material is placed outside of the right-of-way, the CONTRACTOR shall obtain and provide the ENGINEER with written permission from the OWNER of the property on which the timber is to be placed.
- B. Dispose of the trees and shrubs if the owner refuses to accept the wood, as per PennDOT Section 201.3.
- C. Timber from 4 to 12 inches (100 to 300 mm) in diameter may be left in full tree lengths or cut to commercial lengths, at the option of the CONTRACTOR. Timber 12 inches (300 mm), or more, in diameter shall be cut into commercial lengths and piled separately from other timber.

END OF SECTION

**SECTION 31 23 13**  
**SUBGRADE PREPARATION**

**PART 1**      **GENERAL**

1.1 SCOPE

- A. This Section includes preparing subgrade for pavement construction complete with excavation, embankments, proof rolling, subgrade undercut and backfill, subgrade stabilization fabric, subbase, right-of-way ditching, right-of-way restoration, field quality control, and appurtenances.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01 57 13: Temporary Erosion and Sediment Control
- B. Section 01 89 00: Site Construction Performance Requirements
- C. Section 31 11 00: Clearing and Grubbing
- D. Section 31 35 00: Slope Protection
- E. Section 31 23 19: Dewatering
- F. Section 32 31 00: Fences and Gates
- G. Section 32 90 00: Planting
- H. Section 32 92 19: Seeding
- I. Section 32 92 23: Sodding

1.3 REFERENCE STANDARDS

- A. Unless otherwise specified, the Work for this Section shall conform to the applicable portions of the following Standard Specifications:
  - 1. ASTM-ASTM International
  - 2. AASHTO- American Association of State Highways and Transportation Officials
  - 3. PennDOT- Pennsylvania Department of Transportation, Standard Specifications for Construction, latest edition.

1.4 ALLOWABLE TOLERANCES

- A. Correct surface irregularities exceeding 1/2 inch by loosening the surface and removing or adding material as required. Compact the corrected area and surrounding surface by rolling. Recheck the corrected subgrade area for grade and shape.

1.5 SUBMITTALS

- A. Test Reports
  - 1. The testing lab shall provide the ENGINEER with two (2) certified copies of the sieve analysis of the backfill material. The testing of the material and the certification of the test results shall be performed by a testing laboratory approved by the ENGINEER.

## **SUBGRADE PREPARATION**

2. The testing lab shall provide the ENGINEER with two (2) certified copies of the compaction and moisture tests of the backfill and subgrade materials. The testing of the materials and the certification of the test results shall be performed by a testing laboratory approved by the ENGINEER.

### **1.6 PRODUCT DELIVERY STORAGE AND HANDLING**

- A. Geotextile fabric shall be furnished and stored in a wrap that will protect the geotextile from ultraviolet radiation and abrasion. The geotextile shall be covered with the aggregate base as per plan within two (2) weeks of its placement.

### **1.7 SOIL EROSION AND SEDIMENTATION CONTROL**

- A. The CONTRACTOR shall provide, maintain and remove such temporary and/or permanent soil erosion and sedimentation control measures as specified on the Plans or as determined by the ENGINEER.
- B. The measures shall prevent surface runoff from carrying excavated materials into the drain, to reduce erosion of the slopes, and to prevent silting in of drain downstream of the Work. Also, the measures should include provisions to reduce erosion by the wind of all areas stripped of vegetation, including material stockpiles.
- C. Comply with requirements of Section 01 57 13, Temporary Erosion and Sediment Control.

## **PART 2      PRODUCTS**

### **2.1 GRANULAR MATERIALS**

- A. The granular material gradation shall conform to the grading requirements for granular material as specified in PennDOT, Section 703.

### **2.2 AGGREGATE MATERIALS**

- A. Aggregate materials, used for undercut backfill shall be crushed limestone, natural aggregate, blast furnace slag, or crushed concrete, meeting the requirements of PennDOT Section 703.
- B. Crushed concrete shall be free of all steel and other deleterious materials.
- C. Aggregate used in pavement subbase shall be PennDOT 2A.

### **2.3 GEOTEXTILE**

- A. Geotextile, Class 4, Type A, as specified in PennDOT Section 212.
- B. Material must be chosen from PennDOT Bulletin 15.

## SUBGRADE PREPARATION

### **PART 3**      **EXECUTION**

#### 3.1 REMOVING STRUCTURES

- A. Structures and sewers to be removed shall be called for on the Plans or as determined by the ENGINEER. Removal or abandonment of structures shall be in accordance with Section 01 89 00, Site Construction Performance Requirements.

#### 3.2 HOLES

- A. Earth removed during any phase of the excavation or removal operations, resulting in a hole or void, shall be replaced by backfilling to the proposed subgrade with a suitable granular material approved by the ENGINEER. The material shall be compacted to 98% of its maximum unit weight.
- B. The furnishing, placing and compacting of the backfill material shall be at the CONTRACTOR's expense.

#### 3.3 SALVAGING AND STOCKPILING TOPSOIL

- A. Topsoil, within the grading limits for cuts, and where the fill is less than five (5) feet (1.5 m) in height to the top of proposed road, shall be removed to a depth and width specified on the Plans. Topsoil from peat and muck areas shall not be removed. Topsoil salvaged in excess of that required by the Plans will be disposed of by the CONTRACTOR at his expense.
- B. Do not compact and do not stockpile topsoil in a wet or frozen condition.

#### 3.4 PREPARING ROADWAY SUBGRADE

- A. All muck, peat and other unsuitable material within the roadway shall be removed, displaced or otherwise treated, as shown on the Plans or as directed by the ENGINEER. All deposits of frost heave material within lines two (2) feet (0.6 m) outside the proposed roadbed shall be removed to a depth of three (3) feet (0.9 m) below the surface of the earth grade, unless otherwise shown on the Plans or as determined by the ENGINEER. All ice and snow shall be removed from the surface of the ground before the embankment is placed.
- B. Old road surfacing or gravel, crushed stone, or other nonrigid type surfacing, occurring within the area of the roadbed and underlying proposed embankment less than 1-foot in depth, and which is not to be salvaged and incorporated in the new Work, shall be plowed or scarified full depth, spread and compacted to form a uniform foundation, before any new embankment is placed.
- C. Old pavement and other rigid structures, occurring within the area of the roadbed and underlying the proposed embankment less than 1 foot in depth and which are not to be incorporated into the new Work, shall be broken up and removed.

## **SUBGRADE PREPARATION**

### **3.5 SUBGRADE**

- A. The area to be paved shall be excavated and smoothed to the line, grade and cross section as indicated on the Plans.
- B. The subgrade between the lines two (2) feet (0.6 m) on either side of the proposed edge of pavement or curb shall be compacted to 98% of the maximum unit weight for a depth of seven (7) inches (175 mm), by rolling with a roller weighing not less than ten (10) tons (9000 kg).
- C. The subgrade shall be completed ahead of placing forms or paving a distance equal to the distance of one day's average paving operation. Prior to the paving operation, the subgrade shall be shaped and compacted to the Plan cross section by approved mechanical means.
- D. Subgrade shall meet all requirements set forth in PennDOT Section 210.

### **3.6 PAVEMENT EXCAVATION**

- A. Pavement excavation shall consist of all Work required to construct the earth grade and its appurtenances true to the lines, grades, and cross sections called for on the Plans and in accordance with these Specifications. Excavation shall consist of the following items, any of which or all of which may be included or incidental to it; removing trees, stumps, hedges, roots, culverts, sewers, miscellaneous structures, roadway excavation, removing of all asphalt or concrete pavements, curbs, curb and gutters, sidewalks, end headers, removing aggregate surfaces, salvaging and stockpiling topsoil, subgrade undercut, excavation for structures, trimming and finishing earth grade, fine grading, right-of-way ditching and restoration, and the disposal of all unsuitable material.
- B. All large stones, trees, stumps, brush, shrubs, logs, matted roots, other vegetation and debris occurring between lines three (3) feet (0.9 m) outside the grading limits or as otherwise shown on the Plans shall be completely removed and properly disposed of as specified in Section 31 11 00, Clearing and Grubbing.
- C. All earth and other existing materials shall be excavated for the full depth and width of the cross section as shown on the Plans. Material shall be excavated sufficiently for setting of forms or slip-form equipment. Excavation shall be limited to 3,000 linear feet (900 m) of right-of-way unless additional lengths are requested in writing and approved by the ENGINEER.
- D. Excess excavated material shall be removed from the project by the CONTRACTOR along approved routes to disposal sites approved by the OWNER. Disposal of excess excavation and maintenance of the dump sites shall be considered incidental to the price paid for excavation and shall be as specified in Section 01 89 00, Site Construction Performance Requirements.

## **SUBGRADE PREPARATION**

### **3.7 BORROW EXCAVATION**

- A. Materials which are secured from locations outside of the project limits for the purpose of completing embankments and other items, will be considered as borrow excavation. All borrow pits and the materials to be removed therefrom shall be subject to the inspection of the ENGINEER and shall be secured by the CONTRACTOR, unless otherwise provided.
- B. Borrow excavation will be measured by volume in cubic yards compacted in place, based on the neat lines called for on the Plans or as authorized by the ENGINEER. To facilitate the accurate measurement of borrow quantities, unless otherwise specified in the Contract Documents, the CONTRACTOR shall perform all the regular excavation and grading with existing materials for any designated area and the ENGINEER will cross section these areas prior to the CONTRACTOR furnishing and placing the required borrow material. The ENGINEER will then resection the completed area and compute the volume of borrow material in its compacted-in-place state. Any borrow material placed beyond the neat lines called for on the Plans or which is not authorized by the ENGINEER in writing will not be measured and computed as borrow excavations. Measurement of borrow material by truck count will not be acceptable.
- C. Public and private roads used by the CONTRACTOR between the source of borrow and the Project shall be maintained by the CONTRACTOR, at his expense, including repairs of any damage caused by his operations. Also included is the application of a dust palliative when necessary, as determined by the ENGINEER.

### **3.8 EMBANKMENTS**

- A. Provide material meeting one of the material classification requirements listed in PennDOT Section 206. Material of maximum size that can be placed within, and does not interfere with the proper compaction of, compacted 6 inch layers, except as specified.
- B. Prepare the embankment foundation area as specified in PennDOT Section 201, and perform embankment construction in accordance with PennDOT Section 206.

### **3.9 ROUGH GRADING**

- A. CONTRACTOR shall rough grade as close as possible to finished subgrade leaving a minimum to be removed in fine grading.
- B. Any excavated material removed during grading and stored along the line of Work between curb and sidewalk on improved lawns shall not be left longer than 48 hours. Lawns or otherwise improved areas shall be left in a neat and clean state within the specified 48 hours.
- C. During the excavation operation, including the placing of the subbase, the Work area shall be kept free of water. A dewatering system shall be provided and maintained by the CONTRACTOR at his expense. The dewatering system shall remain in operation until the paving is completed.

## SUBGRADE PREPARATION

### 3.10 PROOF ROLLING

- A. Seal all subgrade surfaces that have been constructed or disturbed at the end of each workday with a smooth drum steel wheel roller in the static mode to promote continuous positive drainage and to minimize infiltration of surface water.
- B. Maintain and protect completed subgrade. When the completed subgrade has been in place for more than 60 days or at least one winter season, compact and proof roll the entire subgrade surface as specified in PennDOT Section 206.3(a)1 before placing the Class 4, Type A geotextile separator and subbase. Promptly reshape and recompact, or remove and replace, damaged or unsatisfactory areas before placement of the geotextile, at the discretion of the ENGINEER, at no additional cost to the OWNER.

### 3.11 SUBGRADE UNDERCUT EXCAVATION

- A. Unsuitable subgrade excavation shall be the operation of:
  - 1. removing unsuitable soils as determined by the ENGINEER, below the level of the ground after topsoil has been stripped in fill areas where the embankment is to be five (5) feet (1.5 m) or less in height to plan grade, or
  - 2. the removal of unsuitable soils below the subgrade elevation, as determined by the ENGINEER in cut areas after the subgrade has been established.
- B. In fill areas, after topsoil has been stripped in accordance with Article 3.03 of this Section, the ENGINEER will inspect the embankment area to certify the adequacy of the native soils and to determine the extent of any additional excavation of unsuitable soils prior to placing the first lift of the embankment.
- C. In cut areas after the subgrade elevation has been established by the mass grading operation, the ENGINEER will inspect the subgrade to determine the extent of any additional excavation of unsuitable soils.
- D. The areas excavated of unsuitable material, unless otherwise specified in the Contract Documents, shall be backfilled with nonfrost heaving material similar to the adjacent soil. However, in areas as determined by the ENGINEER where free water due to seepage is present, the excavation shall be backfilled with Granular Material, Class II, and drainage shall be provided. The backfill shall be compacted to not less than 95% of the maximum unit weight, unless otherwise specified.

## SUBGRADE PREPARATION

### 3.12 GEOTEXTILE

- A. Prepare the surface and remove any object that may puncture the geotextile.
- B. Roll out the geotextile over the prepared surface. Place fabric in a loose and unstretched condition, but without folds or wrinkles. Do not drag the geotextile on the ground during placement and handling.
- C. Overlap fabric roll-ends and edges a minimum of 6 inches with adjacent material. Fabric shall be placed so that the upper strip will overlap the next lower strip.
- D. Place cover material by back dumping then spread the cover material ahead of all equipment. Do not make abrupt turns with tracked equipment that would result in pulling, folding, or tensioning of the fabric.
- E. Steel pins, as specified in PennDOT Section 212.2, may be used to secure the fabric before placement of the cover material to prevent lifting of the fabric by wind.
- F. Do not allow the fabric to be exposed for more than 2 weeks before covering with subbase.
- G. Compact the cover material as specified in PennDOT Section 206.3.
- H. Should the geotextile be damaged during construction, the torn or punctured section shall be repaired by placing a piece of fabric that is sufficiently large to cover the damaged area plus two feet (0.6 m) to adjacent undamaged geotextile in all directions, at the expense of the CONTRACTOR.

### 3.13 TRIMMING AND FINISHING EARTH GRADE

- A. After the earth grade has been constructed to the required grade, all stones and rocks more than three (3) inches (75 mm) in diameter, appearing on the surface of the subgrade shall be removed.
- B. The earth grade and the subgrade shall be trimmed to the grade called for on the Plans. The subgrade, where a subbase or base course is required, shall be trimmed to the established grade within  $\pm 0.1$  foot (30 mm). Where a subbase or base course is not required, the subgrade shall be trimmed to the established grade within  $\pm 3/4$  inch (20 mm).
- C. The earth grade outside the subgrade shall be trimmed, all irregularities made smooth and the entire site or roadway completed to the required lines, grades, and cross sections.
- D. Where trees or other restrictions do not interfere, the tops of backslopes, bottoms of fill slopes and all other angles in the lines of the cross section shall be rounded to form vertical curves as shown on the Plans or as determined by the ENGINEER. All

## **SUBGRADE PREPARATION**

transitions in length of vertical curves shall be gradual and shall present a uniform and attractive appearance. When ditches are constructed in peat, vertical curves may be omitted.

### **3.14 SUBBASE**

- A. PennDOT 2A material for subbase shall be evenly spread and compacted as specified in PENNDOT Section 350.
- B. The subbase shall be constructed to the alignment, grade and cross section shown on the Plans.
- C. Should the subgrade at any time prior to or during the placing of the subbase become soft or unstable so that rutting occurs in the subgrade, or if the subgrade material is forced up into the subbase material, the operation shall immediately cease and the mixed material shall be removed and disposed of. The subgrade shall be corrected and new subbase material placed and compacted. This Work shall be considered incidental to the construction of the Project.

### **3.15 SCARIFY, RE-GRADE AND COMPACT EXISTING SUBGRADE**

- A. The existing subgrade (base) shall be scarified to a depth of 9-inches to the limits as shown on the plans. The subgrade shall then be re-shaped to the cross section as shown on the plans and compacted. The subgrade shall then be compacted to 98% of the maximum unit weight by rolling with a roller weighing not less than ten (10) tons (9000 kg).

### **3.16 ROADWAY DITCHING**

- A. Ditching shall be constructed at the locations called for on the Plans or as determined by the ENGINEER. The ditch may be shaped by "Machine Grading" or another method approved by the ENGINEER to achieve the cross section, line and grade shown on the Plans.
- B. The excess material from the ditch construction shall be disposed of by the CONTRACTOR at his expense.
- C. The ditch section shall be graded to receive either topsoil and seed or topsoil and sod. The topsoil, seed, sod, fertilizer and mulch shall conform to the requirements specified on the Plans and in Section 32 92 19, Seeding or Section 32 92 23, Sodding.
- D. The CONTRACTOR, at his expense, shall furnish, place and compact any additional material needed to construct the ditch at the location and cross sections called for on the Plans.

### **3.17 RIGHT-OF-WAY RESTORATION**

- A. The right-of-way shall be restored in accordance with the type and location specified on the Plans. The right-of-way may be shaped by "Machine Grading" or another

## **SUBGRADE PREPARATION**

method approved by the ENGINEER to achieve the cross section, line and grade shown on the Plans.

- B. The excess material from the right-of-way restoration operation shall be disposed of by the CONTRACTOR at his expense, as specified in Section 01 89 00, Site Construction Performance Requirements.
- C. The right-of-way shall be graded to receive either topsoil and seed or topsoil and sod. The topsoil, seed, sod, fertilizer and mulch shall conform to the requirements specified on the Plans and in Section 32 92 19, Seeding or Section 32 92 23, Sodding.
- D. The CONTRACTOR, at his expense, shall furnish, place, and compact any additional fill, meeting the approval of the ENGINEER, needed to construct the right-of-way to the cross sections called for on the Plans.

### **3.18 MACHINE GRADING**

- A. The Work of machine grading shall consist of light grading of such character that, in general, the excavation from ditches and roadbed will be utilized in shaping shoulders and adjacent shallow fills and the work can be performed by a blade grader or similar equipment. Machine grading shall apply on the sections shown on Plans or specified in the Proposal.
- B. The Work shall include all necessary scarifying, plowing, discing, moving and shaping the earth to develop the cross section shown on Plans. Ditches shall be in reasonably close conformity with the line and grade as shown on the Plans or as directed and must drain runoff waters to outlets shown on the Plans or designated by the ENGINEER. The roadbed shall be finished to grade with a blade grader or equivalent equipment. All intersections, approaches, entrances, and driveways shall be graded as shown or as directed, except that loading and hauling of earth will not be required as part of this Work.

### **3.19 MAINTENANCE AGGREGATE**

- A. The CONTRACTOR shall furnish and install maintenance aggregate to maintain pedestrian and traffic access, per PennDOT standards. Aggregate shall be placed and compacted to maintain access in areas as determined by the ENGINEER. Maintenance aggregate will be incidental to the Project unless otherwise specified in the Contract Documents.

### **3.20 TESTING**

- A. During the course of the Work, the ENGINEER may require testing for compaction, sieve analysis and moisture content of the backfill and subgrade materials. The taking of samples and the testing required shall be performed by a testing laboratory suitable to the OWNER and approved by the ENGINEER. The ENGINEER shall determine the location and number of samples to be made. The testing laboratory shall furnish the ENGINEER with two (2) certified copies of the results of all tests.

## **SUBGRADE PREPARATION**

Testing procedures shall conform to current PennDOT Standards for Construction. The cost for testing and sampling shall be at the expense of the CONTRACTOR.

- B. The maximum unit weight when used as a measure of compaction or density of soils shall be understood to mean the maximum unit weight per cubic foot (or cubic meter) as determined by ASTM D1557, Method D, modified to include all the material passing the 1-inch (25 mm) sieve.

### **3.21 DEFECTIVE WORK**

- A. Any portion of the backfill, subbase or subgrade which is deficient in the specified density shall be corrected by methods meeting the approval of the ENGINEER.
- B. Any extra testing or sampling required by the ENGINEER, because of deficiencies, shall be at the CONTRACTOR's expense.

END OF SECTION

## **SECTION 31 23 19 DEWATERING**

### **PART 1      GENERAL**

#### **1.1 SCOPE OF WORK**

- A. This Section includes all dewatering work complete with design of dewatering systems, construction and operation of dewatering systems, abandonment of dewatering systems, protection of personnel and structures, environmental protection and restoration.

#### **1.2 RELATED WORK SPECIFIED ELSEWHERE**

- A. Section 01 57 13: Temporary Erosion and Sediment Control
- B. Section 01 89 00: Site Construction Performance Requirements
- C. Section 03 30 00: Cast-In-Place Concrete
- D. Section 31 23 33: Trenching and Backfilling

#### **1.3 DESIGN OF DEWATERING CONSTRUCTION**

- A. Interpretations of any data and reports, performing any additional investigations, and obtaining additional data for construction purposes is the responsibility of CONTRACTOR.
- B. CONTRACTOR shall be responsible for the complete design of structures and methods proposed for dewatering the project site, including the implementation of all materials, tools and equipment proposed for use in the Work. Temporary wiring associated with the dewatering shall comply with applicable portions of the National Electrical Code.
- C. Provide monitoring wells as necessary to determine the groundwater levels along the alignment and shaft locations.

#### **1.4 SOIL EROSION AND SEDIMENTATION CONTROL**

- A. Dewatering systems design and construction shall conform to PA DEP Chapter 102 regulations, current PennDOT Specifications , and Section 01 57 13 - Temporary Erosion and Sediment Control.
- B. Where applicable, CONTRACTOR shall obtain and pay for all permits and inspections for dewatering construction in accordance with all local and state government agencies having jurisdiction. No additional claim for compensation shall be allowed because of CONTRACTOR's failure to obtain or pay for such permits and inspections.
- C. CONTRACTOR, at his expense, shall provide, maintain and remove such temporary and/or permanent soil erosion and sedimentation control measures as specified on the Plans or as determined by ENGINEER.
- D. Measures shall prevent surface runoff from carrying excavated materials into the waterways, to reduce erosion of the slopes, and to prevent silting in of waterways

## **DEWATERING**

downstream of the Work. Also, the measures should include provisions to reduce erosion by the wind of areas stripped of vegetation, including material stockpiles.

### **1.5 FEDERAL, STATE, AND LOCAL REGULATIONS**

- A. Dewatering operations shall conform to the requirements of federal, state, and local agencies having jurisdiction.
- B. Dewatering water discharged to streams, drains or sewers may require permits from federal, state or local agencies having jurisdiction. CONTRACTOR shall comply with water quality requirements prior to discharging dewatering water.
- C. CONTRACTOR shall be responsible for all testing and treatment required to meet water quality requirements prior to discharge. No discharges to sanitary sewers will be allowed without prior approval of local agencies with jurisdiction for the sanitary sewers.

### **1.6 PROTECTION**

- A. Take steps necessary, during the Work of this Section, to protect surrounding property and adjacent buildings, private water supplies, roads, drains, sewers, structures and appurtenances. Adequate measures shall be taken to protect such property and construction from the effects of the dewatering operations.

### **1.7 SUBMITTALS**

- A. Submit detailed plans indicating proposed type and location of dewatering wells, type and location of collection/conveyance piping, and point of disposal of pumped water. Do not begin any dewatering work until submittals and supporting data have been reviewed by ENGINEER.
- B. Dewatering system shall be designed by a professional with a minimum of seven years documented experience in the installation and design of dewatering systems. Submittal shall be signed and sealed by a registered professional engineer, stating that the proposed dewatering method is adequate to perform the required tasks.

## **PART 2 PRODUCTS (NOT USED)**

## **PART 3 EXECUTION**

### **3.1 GENERAL**

- A. Provide electrical power from local utility. Provide stand-by power and any other required auxiliary dewatering equipment to assure continuous dewatering capability.
- B. Dewatering, where required, shall be continuous. Dewatering will not be stopped during work stoppage without approval of ENGINEER.
- C. Coordinate construction operations to minimize duration and extent of dewatering required.

## DEWATERING

- D. Dewatering wells are to use properly designed filters to prevent the migration of soil fines into the well.

### 3.2 MONITORING AND CONTROL

- A. During dewatering operations, monitor ground water level with piezometers to ensure the design or specified groundwater elevation is maintained.
- B. Install monitoring wells at minimum 200-foot interval between wells with screens below the excavation level as required. Provide access to monitoring wells by ENGINEER.
- C. Modify dewatering operation if geotechnical instrumentation or survey measurements indicates movement of structures, sheeting or embankments, or inability to lower groundwater as specified.
- D. Inspect wells and lines on a daily basis to ensure integrity and watertightness. Keep fittings and connections watertight to ensure release of sulfide to atmosphere from groundwater does not occur.

### 3.3 EXISTING DRAINAGE CONDITIONS

- A. Prior to beginning any work, verify in the field the location, type and capacity of existing drainage facilities and conditions which will affect the Work of this Section. No allowances shall be made for conditions found during the progress of the dewatering operations because of CONTRACTOR'S failure to verify such conditions.

### 3.4 EXISTING STRUCTURES AND UTILITIES

- A. CONTRACTOR shall make field verification of all existing structures and utilities at the site of the Work which are scheduled to remain, and which may be affected by the Work of this Section. CONTRACTOR shall be responsible for any damage to existing structures and/or utilities caused because of his Work and shall repair such damage at his expense to the satisfaction of ENGINEER or utility owner.

### 3.5 DRAINAGE OF EXCAVATIONS

- A. CONTRACTOR shall maintain all finished excavation work free of water during the preparation of the subgrade and until the completion of the Work. No ground or surface water shall be discharged into any existing sanitary sewer. No unit of Work shall be constructed under water except as otherwise determined by ENGINEER. Provide and maintain adequate dewatering equipment to remove and dispose of all surface or groundwater entering excavations, trenches or other parts of the Work. Each excavation shall be kept dry during subgrade preparation and continually thereafter until the construction is complete.
- B. Excavations which extend down to or below the static groundwater elevation shall be dewatered by lowering and maintaining the groundwater level beneath such

## DEWATERING

excavations a distance of not less than 12 inches (300 mm) below the bottom of the excavation.

- C. Drainage system methods shall not cause any damage to wells or adjacent property.
- D. Outlet drainage piping and conduit shall be kept clean and free from sediment.
- E. CONTRACTOR shall be held responsible for the condition of all existing pipes, conduits and structures which he may use for drainage.

### 3.6 DEWATERING SUMPS AND PUMP WELLS

- A. Sumps and pump wells used as a part of the dewatering system shall be strongly sheathed and braced to protect the construction while in use.
- B. Tops of well casings must be covered to prevent animals and debris from entering and shall be 2 to 3 feet (0.6 to 0.9 m) above ground.
- C. Sumps and wells, when abandoned, shall be backfilled and compacted to the satisfaction of ENGINEER.

### 3.7 DRILLING

- A. Methods used in drilling wells associated with dewatering systems shall be the responsibility of CONTRACTOR and shall be acceptable to ENGINEER.
- B. Drilling methods shall ensure proper placement of well materials and shall not involve displacement of earth formations.
- C. Drilling shall be done with first-class equipment of proper type and in good condition, acceptable to ENGINEER.

### 3.8 PUMPING

- A. Equipment for pumping and pumping methods associated with dewatering systems shall be the responsibility of CONTRACTOR and shall be acceptable to ENGINEER.
- B. CONTRACTOR shall construct or furnish adequate discharge piping to conduct and dispose of the water as to prevent damage to existing structures or property.
- C. Pumping equipment shall be first class, acceptable to ENGINEER, of proper type and size for the Work and in good condition.
- D. Provide anchors and supports for pumping equipment.

### 3.9 FILLING AND GRADING

- A. Upon completion of dewatering Work for the Project, abandon and/or fill holes, trenches, ditches and other earth excavations created by the Work of this Section

## **DEWATERING**

and not scheduled to remain. Do all filling, backfilling and grading to restore excavations and earth banks to the lines and levels indicated on the Plans and as determined by ENGINEER. Earth fills shall be compacted to a density equal to that of the surrounding undisturbed earth.

END OF SECTION

**SECTION 31 23 33  
TRENCHING AND BACKFILLING**

**PART 1   GENERAL**

1.1    SCOPE OF WORK

- A.    This Section includes open trench construction for utility installation, complete with trenching, sheeting, bracing, bedding, bedding materials, backfilling, backfill materials, and compaction.

1.2    RELATED WORK SPECIFIED ELSEWHERE

- A.    Section 01 57 13: Temporary Erosion and Sediment Control
- B.    Section 01 89 00: Site Construction Performance Requirements
- C.    Section 31 11 00: Clearing and Grubbing
- D.    Section 31 23 19: Dewatering
- E.    Section 33 30 00: Sanitary Utility Sewerage Piping
- F.    Section 33 41 00: Storm Utility Drainage Piping

1.3    REFERENCE STANDARDS

- A.    Unless otherwise specified, the Work for this Section shall conform to the applicable portions of the following Standard Specifications:
  - 1.    ASTM -     ASTM International
  - 2.    AASHTO -   American Association of State Highway Transportation Officials
  - 3.    PennDOT-   Pennsylvania Department of Transportation, Standard Specifications for Construction, latest edition

1.4    TEST REPORTS

- A.    The testing laboratory shall provide the ENGINEER with two (2) certified copies of the test results of the compaction of the backfill.
- B.    The testing for compaction and the certification of the test results shall be performed by a testing laboratory approved by the ENGINEER.

1.5    MIX DESIGN

- A.    Submit mix designs for any concrete or flowable fill mixtures to be used on the Project.
- B.    Include certified test results for 7-day and 28-day strengths, together with any technical information for admixtures.

## **TRENCHING AND BACKFILLING**

### **1.6 SOIL EROSION AND SEDIMENTATION CONTROL**

- A. The CONTRACTOR, at his expense, shall provide, maintain and remove such temporary and/or permanent soil erosion and sedimentation control measures as specified on the Plans or as determined by the ENGINEER.
- B. Measures shall prevent surface runoff from carrying excavated materials into the drain, to reduce erosion of the slopes, and to prevent silting in of drain downstream of the Work.
- C. Measures should include provisions to reduce erosions by the wind of all areas stripped of vegetation, including material stockpiles.
- D. Comply with requirements of Section 01 57 13, Temporary Erosion and Sediment Control.

## **PART 2 PRODUCTS**

### **2.1 CEMENT**

- A. Type I, IP, IS, or II
  - 1. If using Type IP cement, adjust the quantity of flyash in the design as necessary.
  - 2. If using Type IS cement, adjust the quantity of slag cement in the design as necessary.
  - 3. Comply with PennDOT Section 701 and from a source listed in PennDOT Bulletin 15.

### **2.2 FLY ASH**

- A. Type F or C flyash, per PennDOT Section 724, except as follows:
  - 1. Flyash conforming to AASHTO M295 (or ASTM C618) Table 1 requirements except maximum loss on ignition is 16%, and excluding the requirements of Table 1A, 2, or 2A.
  - 2. From a source listed in PennDOT Bulletin 15 or tested and approved before incorporating into the flowable backfill mix.

### **2.3 SLAG CEMENT**

- A. Conform to the requirements of PennDOT Section 724.3, from a source listed in Bulletin 15.

### **2.4 FINE AGGREGATE**

- A. Type A, B, or C per PennDOT Section 703.1, except, having a maximum loss of 20% in the Soundness Test, PTM No. 510.

## TRENCHING AND BACKFILLING

- B. May be natural sand, manufactured sand, or foundry sand meeting PennDOT Section 703.1.
- C. From a source listed in PennDOT Bulletin 14.

### 2.5 COARSE AGGREGATE

- A. Type A, B, or C per AASHTO 10 and PennDOT Section 703.2, except, having a 10% maximum for material finer than the No. 200 sieve.
- B. From a source listed in PennDOT Bulletin 14.

### 2.6 BOTTOM ASH

- A. Coal ash having a maximum loss of 20% in the Soundness Test, PTM No. 510, and conforming to the following dry sieve gradation requirements:

Sieve Size	% Passing
1/2 Inch	100%
No. 200	0-10

- B. From a source listed in PennDOT Bulletin 14.

### 2.7 WATER

- A. Use water conforming to ASTM C1602 that is reasonably clean, free from vegetable matter, oil, acid, alkali, sugar, or other substances injurious to the finished product.

### 2.8 ADMIXTURES

- A. Conform to the requirements of PennDOT Section 711.3.

### 2.9 AIR ENTRAINING ADMIXTURES

- A. From a manufacturer listed in PennDOT Bulletin 15, specifically for flowable backfill.

### 2.10 GEOTEXTILE

- A. Geotextile, Class 4, Type A, per PennDOT Section 735.

### 2.11 MIX DESIGN

- A. Submit a mix design and test results to ENGINEER at least 3 weeks before construction.
- B. Flowable fill mix must meet all requirements in PennDOT Section 220.
- C. Use Table A, PennDOT Section 220.2 (k), as a guideline for the mix design.

## **TRENCHING AND BACKFILLING**

### **2.12 FORMS**

- A. Use plywood at least 5/8 inch thick or other accepted material made for formwork, if approved by ENGINEER.
- B. For final exposed concrete surfaces, use smooth material, free of knots, holes, bulges, and depressions.

## **PART 3 EXECUTION**

### **3.1 DEWATERING**

- A. The area within the vicinity of the trenching operation shall be dewatered in accordance with Section 31 23 19, Dewatering prior to the trenching operation.
- B. The depth of the dewatering shall be sufficient to allow the trench excavating operation including backfilling and compacting to proceed in a dry condition.

### **3.2 TRENCH EXCAVATION**

- A. Open cut trench excavation shall include the site clearing and grubbing, the excavating of all materials encountered, the supporting and protecting of all structures and/or utilities encountered above and below the ground surface, and the removal of water from the construction site.
- B. The trenching operation shall commence at the downstream or outlet end of the new Work and proceed upstream, unless otherwise specified on the Plans or directed by the ENGINEER.
- C. The trench shall be excavated in reasonably close conformity with the lines and grades specified on the Plans or as established by the ENGINEER.
- D. The excavated materials shall be temporarily stored along the trench in a manner that will not cause damage to trees, shrubs, fences, improvements, utilities, private property, public property or traffic. The excavated materials shall not be placed at such locations that will endanger the trench banks by imposing loads thereon.
- E. The trench shall be of sufficient width to provide adequate working space to permit the installation of the pipe and the compaction of the bedding material under and around the pipe.
- F. For flexible pipe, remove the topsoil to a width equal to 5 outside diameters of the pipe. Undercut for the depth of the bedding, minimum of 6". Construct the embankment to 4'-0" above the top of pipe or to the subgrade elevation, whichever is less. Excavate the trench to the width of the outside diameter of the pipe barrel, plus 4'-0".
- G. If unsuitable material is found, undercut as directed by ENGINEER and backfill with suitable material to bottom of bedding elevation.

## TRENCHING AND BACKFILLING

- H. When, through the CONTRACTOR's construction procedure or because of unsuitable existing ground conditions, it becomes impossible to maintain alignment and grade properly, the CONTRACTOR, at his expense, shall excavate below the normal trench bottom grade and shall fill the void with a large size aggregate or 3,000 psi (21 MPa) concrete as approved by the ENGINEER to insure that the pipe when laid in the proper bedding will maintain correct alignment and proper grade.
- I. All trench excavations, including those for shafts and structures, shall be adequately braced and/or sheeted where necessary to prevent caving or squeezing of the soil.

### 3.3 SHEETING, SHORING, AND BRACING

- A. The CONTRACTOR shall furnish, place and maintain at all times such sheeting, shoring, and bracing of the trench and/or shaft as may be required for safety of the workmen and for protection of the new Work or adjacent structures, including pavement, curbs, sidewalks, pipe lines, conduits next to or crossing the trench, and the protection and safety of pedestrian and vehicular traffic.
- B. The CONTRACTOR shall be responsible for the complete design of all sheeting, shoring and bracing Work.
  - 1. The design shall be appropriate for the soil conditions, shall be of such strength, quality, dimension and spacing as to prevent caving or loss of ground or squeezing within the neat lines of the excavation, and shall effectively restrain movement of the adjacent soil.
  - 2. Prior to installing the sheeting, shoring or bracing, the CONTRACTOR shall submit Plans for this Work to the ENGINEER for informational purposes only.
- C. Sheeting, shoring, bracing, and excavation shall conform to the current federal or state regulations for safety.
- D. Where indicated on the Plans and where necessary in the Work, install and leave sheeting, shoring, and bracing in place. No extra compensation shall be paid to CONTRACTOR for sheeting, shoring or bracing left in place.
- E. Supports for pipes, conduits, etc., crossing the trench shall conform to the requirements of the owners of such facilities, and if necessary, shall be left in place.
- F. The furnishing, placing, bracing, maintaining, and removing of sheeting, shoring, and trenching materials shall be at the CONTRACTOR's expense.
- G. The CONTRACTOR shall not remove the trench sheeting, shoring and bracing unless the pipe has been properly bedded, and the trench backfilled to sufficiently support the external loads.
- H. The sheeting, shoring, and bracing material shall not come in contact with the pipe, but shall be installed so that no concentrated loads or horizontal thrusts are transmitted to the pipe.

## TRENCHING AND BACKFILLING

### 3.4 PIPE BEDDING

- A. Pipe bedding shall be installed per PennDOT Section 220.3, 601.3, and RC-30M.
- B. Compact and proof roll the bottom of the trench as specified in PennDOT 601.3 (f)1 before placement of the bedding material.
- C. Place 6" minimum of 2A bedding for thermoplastic pipes.
- D. Do not compact the bedding material.
- E. Place 2A coarse aggregate material, in 4-inch lifts, adjacent to the lower haunches to a height of 12-inches above the top of pipe. Compact to 98% SPD.
- F. Test the backfill material and continue embankment in accordance with PennDOT Section 601.

### 3.5 BACKFILLING TRENCHES

- A. Backfill material shall be placed on sections of bedded pipes only after such pipe bedding and backfill materials have been approved by the ENGINEER.
- B. Backfill the trench as shown on the Flowable Backfill Detail in PennDOT's Standard Drawings, and as specified in PennDOT Section 220.3.
- C. The trench backfilling shall follow the pipe laying as closely as possible. However, at no time shall the pipe laying in any trench precede backfilling of that trench by more than 100 feet (30 m), unless otherwise directed by the ENGINEER.
- D. Backfilling shall not be done in freezing weather, except by permission of the ENGINEER.
- E. The following trench backfill specifications are for use in that portion of the trench beyond the scope of the pipe bedding requirements which normally stops at a point 12 inches (300 mm) above the top of pipe.
  - 1. Backfill material to be placed above pipe bedding shall be free of debris, organic matter, frozen material, large stones with a diameter greater than one-half of the thickness of the compacted layers being placed, or other extraneous materials which in the opinion of the ENGINEER, are unsuitable.
- F. Trench backfill shall be compacted to 98% of the maximum unit weight, unless otherwise specified on the Plans, or authorized by the ENGINEER.
- G. Compact the top 3'-0" of subgrade to 100% in accordance with PennDOT Section 206.3.

## TRENCHING AND BACKFILLING

### 3.6 CLEANUP

- A. Immediately following the placing and compacting of the backfill, the excess material shall be removed and disposed of by the CONTRACTOR, at his expense, as specified in Section 01 89 00, Site Construction Performance Requirements. The construction area shall be leveled and left in a neat workmanlike condition.
- B. The disturbed area shall be raked, having topsoil placed thereon, fertilized and seeded per the requirements of Section 32 92 19, Seeding, or sodded in accordance with Section 32 92 23, Sodding.

### 3.7 FIELD TESTING

- A. During the course of the Work, the ENGINEER may require testing for compaction or density of the backfill. The taking of samples and the testing required shall be performed by a testing laboratory suitable to the OWNER and approved by the ENGINEER. The cost for testing and sampling shall be at the expense of the CONTRACTOR.
- B. The maximum unit weight, when used as a measure of compaction or density of soils, shall be understood to mean the maximum unit weight per cubic foot or per cubic meter as determined by ASTM D1557, Method D.
- C. PennDOT Section 704.1(d)1, Section 704.1(d)2, Section 704.1(d)4, and as follows:
  - 1. Test flowable backfill slump, according to AASHTO T 119, test air content according to AASHTO T 152 (do not apply an aggregate correction factor) or T 196, and for yield, according to AASHTO T 121, ASTM C136.
  - 2. Test flowable backfill for proper flowability using the slump cone. Conduct slump tests as often as necessary (at least once daily or every 200 cubic yard) to maintain the correct flowability at placement and if requested by the ENGINEER. The CONTRACTOR may add water on-site to maintain flowability as needed.
  - 3. Test flowable backfill for yield at least once daily, or one test for every 200 cubic yard of material. Record all test results and submit to the ENGINEER.

### 3.8 DEFECTIVE WORK

- A. Any portion of the trench backfill which is deficient in the specified density shall be corrected by methods meeting the approval of the ENGINEER.
- B. Any extra testing or sampling required because of deficiencies shall be at the CONTRACTOR's expense.

END OF SECTION

**SECTION 32 11 23**  
**AGGREGATE BASE COURSES**

**PART 1**      **GENERAL**

1.1      SCOPE OF WORK

- A.      This Section includes aggregate base courses complete with aggregate materials constructed in preparation for paving or aggregate surfacing.

1.2      RELATED WORK SPECIFIED ELSEWHERE

- A.      Section 01 89 00: Site Construction Performance Requirements
- B.      Section 31 23 13: Subgrade Preparation
- C.      Section 32 12 16: Bituminous Paving
- D.      Section 32 13 13: Concrete Paving

1.3      REFERENCE STANDARDS

- A.      Unless otherwise specified, the Work for this Section shall conform to the applicable portions of the following Standard Specifications:
  - 1.      ASTM- ASTM International
  - 2.      AASHTO- American Association of State Highways and Transportation Officials
  - 3.      PennDOT- Pennsylvania Department of Transportation, Standard Specifications for Construction, latest edition

1.4      ALLOWABLE TOLERANCES

- A.      For surface irregularities exceeding ½ inch, immediately correct as specified in PennDOT 312.3 (i).

1.5      TEST REPORTS

- A.      The testing lab shall provide the ENGINEER with two (2) certified copies of the test results of the thickness of the compacted aggregate.
- B.      The core drilling, testing for thickness and the certification of the test results shall be performed by a testing laboratory approved by the ENGINEER.

1.6      STOCKPILING AGGREGATE

- A.      Aggregate shall be deposited in stockpiles in such a manner that the material may be removed from the stockpile by methods which will provide aggregate having a uniform gradation.

## **AGGREGATE BASE COURSES**

- B. Stockpiling of aggregate, in excess of four (4) feet (1.2 m) in depth, on the completed subbase or aggregate surface will not be permitted, except with the approval of the ENGINEER.

### **1.7 ENVIRONMENTAL REQUIREMENTS**

- A. Comply with the requirements for aggregate base or surfacing installations due to outside ambient air temperatures specified under Article 3.8 of this Section.

## **PART 2      PRODUCTS**

### **2.1 DENSE GRADED AGGREGATE**

- A. The dense graded aggregate gradation shall conform to PennDOT Section 312.
  - 1. Type A or Type B, per PennDOT Section 703.2. Crush the gravel, if used, as required for asphalt surface courses.
  - 2. Acceptable granulated blast-furnace slag, as specified in PennDOT Section 350.2, meeting the gradation requirements specified in Table A, may be used.

### **2.2 CALCIUM CHLORIDE ADDITIVES**

- A. Shall conform to ASTM D98 and as specified in PennDOT Section 721.

### **2.3 WATER**

- A. Use water conforming to ASTM C1602 that is reasonably clean, free from vegetable matter, oil, acid, alkali, sugar, or other substances injurious to the finished product.

## **PART 3      EXECUTION**

### **3.1 EXCAVATION VERIFICATION**

- A. Prior to the placing of any aggregate material, examine the excavation for the grades, lines, and levels required to receive the new Work. Ascertain that all excavation and compacted subgrades or subbases are adequate to receive the new Work. Correct all defects and deficiencies before proceeding with the Work.

### **3.2 SUBGRADE CONDITIONS**

- A. Prior to the placing of any aggregate material, examine the subgrade or subbase to ascertain that it is adequate to receive the aggregate to be placed. If the subgrade or subbase remains wet after all surface water has been removed, the ENGINEER may require the installation of edge drain.

## AGGREGATE BASE COURSES

### 3.3 EXISTING IMPROVEMNETS

- A. Investigate and verify locations of existing improvements, including structures, to which the new Work will be in contact. Necessary adjustments in line and grade, to align the new Work with the existing improvements must be approved by the ENGINEER, prior to any changes.

### 3.4 PREPARATION OF SUBGRADE OR SUBBASE

- A. The subgrade or subbase shall be fine graded to the cross section indicated on the Plans, and shall be thoroughly compacted prior to the placing of the aggregate material.

### 3.5 INSTALLATION – GENERAL

- A. Installation procedure shall comply with PennDOT Section 312.
- B. The width, thickness, and type of aggregate materials shall be indicated on the Plans or as directed by the ENGINEER.
- C. No aggregate material shall be placed until the subgrade, or subbase, or existing aggregate surface has been approved by the ENGINEER.

### 3.6 INSTALLATION OF AGGREGATE BASE COURSES

- A. The aggregate base course shall be placed by a mechanical spreader or other approved means, in uniform layers to such a depth that when compacted, the course will have the thickness shown on the Plans.
- B. The depth of any one layer, when compacted, shall not be more than six (6) inches, and no less than three (3) inches. If the required compaction cannot be obtained for the full depth of the aggregate course spread, the thickness of each course shall be reduced or, with the approval of the ENGINEER, adequate equipment shall be used to compact the aggregate to the required unit weight.
- C. The subgrade or subbase shall be shaped to the specified crown and grade and maintained in a smooth condition. If hauling equipment causes ruts or holes in the subgrade or subbase, the hauling equipment will not be permitted on the subgrade or subbase, but shall be operated on the aggregate base course behind the spreader.

## **AGGREGATE BASE COURSES**

- D. The aggregate shall be compacted to at least 98% of maximum unit weight by the use of approved pneumatic tired compaction equipment or vibratory compactors.
- E. The optimum moisture content shall be maintained until the prescribed unit weight is obtained and each layer shall be compacted until the maximum unit weight is attained before placing the succeeding layer.
- F. When approved by the ENGINEER, additional water may be applied by an approved means, to the aggregate to aid in the compaction and shaping of the material.
- G. Motor graders, trimmers or other approved equipment shall be used to shape the aggregate base course and maintain it until the surface course is placed.
- H. When hauling material over the base course, subbase or subgrade, the CONTRACTOR shall limit the weight and speed of his equipment to avoid damage to the subgrade, subbase or aggregate base course. If the subgrade, subbase or aggregate base course becomes rutted due to the CONTRACTOR's operation, the subgrade, subbase or base course shall be removed and replaced, acceptable to the ENGINEER, at the CONTRACTOR's expense.
- I. With the approval of the ENGINEER, chloride additives may be used by the CONTRACTOR to facilitate his compaction and maintenance of the aggregate surface. The amount and method of combining the chloride additives are at the option of the CONTRACTOR and are at his expense.

### **3.7 MAINTENANCE DURING CONSTRUCTION**

- A. The aggregate base course and aggregate surface shall be continuously maintained in a smooth and firm condition during all phases of the construction operation.
- B. The CONTRACTOR, at his expense, shall provide additional materials needed to fill depressions or bind the aggregate.

### **3.8 TEMPERATURE LIMITATIONS**

- A. Aggregate materials shall not be placed when there are indications that the mixtures may become frozen before the maximum unit weight is obtained.
- B. In no case shall the aggregate be placed on a frozen subgrade or base course unless otherwise directed by the ENGINEER.

### **3.9 TESTING**

- A. During the course of the Work, the ENGINEER may require testing for compaction or density and for thickness of material. The testing and coring required shall be

## AGGREGATE BASE COURSES

performed by a testing laboratory acceptable to the OWNER and approved by the ENGINEER. The cost for testing and coring shall be at the expense of the CONTRACTOR.

- B. When thickness tests are done, a minimum of one depth (thickness) measurement will be made every 400 linear feet (120 m) per traffic lane. The lane width shall be as indicated on the Plans or as determined by the ENGINEER. If two (2) lanes are constructed simultaneously, only one test is necessary to represent both lanes. For areas such as intersections, entrances, cross-overs, ramps, widening strips, acceleration and deceleration lane, at least one depth measurement will be taken for each 1,200 square yards (1000 m<sup>2</sup>) of such areas or fraction thereof. The location of the depth measurement will be at the discretion of the ENGINEER.
- C. The maximum unit weight shall be understood to mean the maximum unit weight per cubic foot (or cubic meter) as determined by ASTM D1557, Method D.

### 3.10 DEFECTIVE WORK

#### A. Thickness

1. Measurements of aggregate base course thickness will be made to the nearest 1/4 inch (5 mm).
2. Remove and replace any area in which the depth is 1/2-inch or more deficient. Additional test holes may be required, if directed by ENGINEER, to determine the limits of replacement areas. Additional test holes and replacements will be paid for by CONTRACTOR.
3. Locations of the depth measurements will be as specified herein unless otherwise directed by the ENGINEER. Sections found to be deficient in depth shall be corrected by the CONTRACTOR using methods approved by the ENGINEER.

END OF SECTION

**SECTION 32 12 16  
BITUMINOUS PAVING**

**PART 1      GENERAL**

1.1    SCOPE

- A.    This Section includes bituminous paving complete with bituminous materials; bituminous mixtures; installation of bituminous base course, bituminous wearing course, and bituminous curbs; construction of bituminous pavement, cold milling and pulverizing existing pavements.

1.2    RELATED WORK SPECIFIED ELSEWHERE

- A.    Section 01 89 00: Site Construction Performance Requirements
- B.    Section 31 11 00: Clearing and Grubbing
- C.    Section 31 23 13: Subgrade Preparation
- D.    Section 32 11 23: Aggregate Base Courses
- E.    Section 32 17 23: Pavement Markings

1.3    REFERENCE STANDARDS

- A.    Unless otherwise specified, the Work for this Section shall conform to the applicable portions of the following Standard Specifications:
  - 1.    ASTM – ASTM International
  - 2.    AASHTO – American Association of State Highway and Transportation Officials
  - 3.    PennDOT – Pennsylvania Department of Transportation, Standard Specifications for Construction, latest edition
  - 4.    City of Monessen Ordinance

1.4    ALLOWABLE TOLERANCES

- A.    Following the final rolling, the surface will be tested longitudinally using a 10 foot (3 m) straightedge at locations selected by the ENGINEER. The variation of the surface from the testing edge of the straightedge between any two (2) contacts with the surface shall at no point exceed the following limits:
- B.    For Bituminous Base Course Mixtures:
  - 1.    Multiple Courses:
    - a.    3/8 inch (9 mm) for top course
    - b.    3/4 inch (20 mm) for lower course
- C.    For Bituminous Surface Course Mixtures:

## **BITUMINOUS PAVING**

1. Multiple Courses:
  - a. 1/8 inch (3 mm) for top course
  - b. 1/4 inch (5 mm) for lower courses
- D. Single Course:
  1. 1/4 inch (5 mm)
- E. Variations in excess of the specified tolerance shall be corrected as determined by the ENGINEER.

### **1.5 MATERIAL REPORTS**

- A. At the request of the ENGINEER, the CONTRACTOR shall provide the ENGINEER with certification that the various materials to be used conform to the ASTM Standards referred to in the Specifications.
- B. The CONTRACTOR shall provide the ENGINEER, or his authorized representative, with the certified batch plant delivery tickets prior to the placing of the materials.
- C. The CONTRACTOR shall supply the ENGINEER with a certified job mix design for each type of bituminous mixture used on this Project.

### **1.6 TEST REPORTS**

- A. The testing lab shall provide the ENGINEER with two (2) certified copies of the test results of the mix design and the thickness of the bituminous paving material.
- B. The core drilling, testing for mix design and thickness, and the certification of the test results shall be performed by a testing laboratory approved by the ENGINEER.

### **1.7 ENVIRONMENTAL REQUIREMENTS**

- A. Comply with the requirements for bituminous concrete installation due to outside ambient air temperatures specified under Article 3.22 of this Section.

## **PART 2      PRODUCTS**

### **2.1 AGGREGATE**

- A. Provide aggregate from sources listed in Bulletin 14. Aggregate and RAM must conform to the quality requirements for Superpave Asphalt Mixture Design

## BITUMINOUS PAVING

according to Bulletin 27. For wearing courses, provide aggregate with at least the SRL designation specified. To achieve the specified SRL, the Contractor may provide a blend of two aggregates if the blend has an SRL designation equal to or better than that specified. Blends are 50% by mass (weight) of each aggregate. Blend the aggregates using an approved method. Do not use 4.75 mm asphalt mixtures in applications that require an SRL designation higher than L.

### B. FINE AGGREGATE

1. PennDOT Section 703.1, except Table A gradation does not apply and as follows:
  - a. Determine the uncompacted void content according to AASHTO T 304, Method A, or use the value listed in Bulletin 14, and ensure the uncompacted void content conforms to AASHTO M 323, Table 6.
  - b. Determine the sand equivalent value according to AASHTO T 176 and ensure the sand equivalent value conforms to AASHTO M 323, Table 6.

### C. COARSE AGGREGATE

1. PennDOT Section 703.2, Type A, except Table C gradation does not apply and revise the following quality requirements of Table B:
  - a. Abrasion, Maximum Percent according to PennDOT Bulletin 27, Chapter 2A, Table 6A
  - b. Thin and Elongated Pieces, Maximum Percent according to AASHTO M 323, Table 6, for Flat and Elongated
  - c. Crushed Fragments, Minimum Percent, according to AASHTO M 323, Table 6, for Fractured Faces, Coarse Aggregate

## 2.2 MINERAL FILLER

- A. The mineral filler gradation shall conform to AASHTO M17.

## 2.3 ANTI-FOAMING AGENTS

- A. The anti-foaming agents shall conform to PennDOT Section 413.

## 2.4 ASPHALT PRIME COAT

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- A. The asphalt prime coat shall conform to PennDOT Section 461.

### **2.5 EMULSIFIED ASPHALT (BOND COAT)**

- A. Emulsified asphalt for use in pavement construction shall conform to ASTM D244, and as specified in PennDOT Section 460.

### **2.6 LIQUID ASPHALTS**

- A. Liquid asphalts for use in pavement construction shall conform to ASTM D2026, D2027, and D2028, AASHTO M81 and M82, and as specified in PennDOT Pub. 408.

### **2.7 ASPHALT JOINT AND CRACK SEALING**

- A. Asphalt Rubber Sealing Compound, per PennDOT Section 705.4(g)
- B. Rubberized Joint Sealing Material, per PennDOT Section 705.4(c)
- C. Asphalt Wearing Course 4.75 mm, per PennDOT Section 413.2

### **2.8 COMPOSTITION OF MIXTURES**

- A. Bituminous mixtures shall be mixed and placed in accordance with applicable requirements specified in PennDOT Section 413, except as otherwise specified in this Section.
- B. The bituminous mixture specified on the Plans or in the Proposal, when tested, shall meet the requirements as specified in PennDOT Section 413. Mixtures failing to meet the requirements will be rejected and the CONTRACTOR will be required to submit additional samples of bituminous mixtures until a combination of material is found which will produce a mixture meeting the stated requirements.
- C. If there is a change in source of any of the aggregates, a new job-mix formula will be required.
- D. After the job-mix formula (JMF) is established, the aggregate gradation and the asphalt binder content of the bituminous mixture furnished for the Work shall be maintained within the tolerances of PennDOT Section 413.
- E. Aggregate gradation tests will be made on aggregate extracted from samples of bituminous mixture taken from the trucks as directed by the ENGINEER. As a general guideline, samples will be taken at initial start of production and at other times when tests indicate that the aggregate gradation is fluctuating, truck samples will be taken at a frequency of one (1) sample per 250 Tons (225 metric tons) of

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mixture, but not more than four (4) samples per day. During other periods where tests indicate the aggregate gradation is stable, truck samples will be taken at a frequency of one (1) sample per 500 Tons (450 metric tons) of mixture, but no more than two (2) samples per day.

- F. Any mixture exceeding the maximum tolerances or not meeting the standards specified in PennDOT's current specifications will be rejected and the CONTRACTOR may be required to remove and replace any bituminous pavements which the ENGINEER determines were constructed with mixtures in the excess of these tolerances.
- G. Exact mixture proportions will be based on composite samples of aggregate and the particular bituminous material called for on the Plans and in the Proposal.

### 2.9 SUPERPAVE MIXTURE DESIGN

- A. PennDOT Section 413.2, using the procedure and volumetric tolerances for the 9.5 mm nominal maximum aggregate size mixture and modified as follows:
  - 1. (e) Virgin Material Mixtures. Submit a JMF meeting all of Bulletin 27 requirements for a 9.5 mm nominal maximum aggregate size mixture, except the JMF must have a minimum percent passing the No. 8 sieve of 47% and a maximum percent passing the No. 8 sieve of 67%.
  - 2. Depth of 1.5" per City of Monessen Ordinance.

### 2.10 SUPERPAVE BITUMINOUS CONCRETE BASE COURSE

- A. 3" of 25 mm asphalt base course, per PennDOT Section 313 and the City of Monessen Ordinance.

## **PART 3**      **EXECUTION**

### 3.1 EXCAVATION

- A. Prior to the installation of any bituminous concrete pavement, examine the excavation for the grades, lines, and levels required to receive the new Work. Ascertain that all excavation and compacted subgrades are adequate to receive the bituminous pavement to be installed. Correct all defects and deficiencies before proceeding with the Work.

### 3.2 SUBGRADE AND BASE COURSE CONDITIONS

- A. Prior to the installation of any bituminous pavement, examine the subgrade and base course to ascertain that it is adequate to receive the bituminous concrete pavement to be installed. If the subgrade remains wet after all surface water has been removed, the ENGINEER may require the installation of edge drain.

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### 3.3 EXISTING IMPROVEMENTS

- A. Investigate and verify location of existing improvements, including structures, to which the new Work is to be connected. Adjustments in line and grade to align the new Work with the existing improvements must be approved by the ENGINEER, prior to any changes.

### 3.4 EQUIPMENT REQUIREMENTS

- A. The CONTRACTOR shall furnish sufficient equipment for completing the Work in a timely and efficient manner. The equipment shall be on the job site and ready for normal operation before the placing of material is started. All equipment shall be in good working order. The equipment shall be subject to inspections and testing during construction. The equipment shall be of sufficient capacity that the operation can be continuous and a rate of production obtained which insures good workmanship, and eliminates overloading of the equipment or frequent interruptions or delays. The equipment shall conform to the requirements as specified in PennDOT's current specifications, and as specified herein.
- B. Pavers
  - 1. The paver shall be an approved self powered machine capable of spreading and finishing the mixture in a uniform layer at the desired thickness and cross section and ready for compaction. The use of any machine in poor mechanical or worn condition, will not be permitted. The paver shall be of such design that the supporting wheels, treads, or other devices ride on the prepared base. The full width of surface being applied shall be screeded by an oscillating or vibrating screed.
  - 2. The paver shall at all times produce a uniformly finished surface, free from tearing or other blemishes that would require hand work. The screed shall be adjustable to provide for tilting to secure the proper dray or compressive action necessary to produce the desired surface texture.
  - 3. The paver shall be equipped with a hopper and an automatic material depth control device so that each distributing auger and corresponding feeder shall respond automatically to provide for a constant level of mix ahead of the screed unit to the full width of the lane being paved.
  - 4. In order to ensure that adequate material shall be fed to the center portion of the lane being paved, reverse pitch augers or paddles shall be installed at the inside of one or both ends of the auger shafts to force the mix to the middle portion of the lane. If necessary to prevent segregation of the mix as it drops off the feed conveyor, baffle plates shall be installed at the required location.

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5. When extensions are added to the paver, they shall be provided with the same vibrating screed or tamper action as the main unit of the paver, except for paving variable width areas. The extensions shall also be equipped with a continuation of the automatically controlled spreading augers. The screed and any extensions shall be provided with an approved method of heat distribution.
6. Unless specified otherwise, bituminous pavers shall be equipped with an automatically controlled and activated screed and strike off assembly capable of grade reference and transverse slope control. A manufacturer approved grade referencing attachment, not less than 30 feet (9 m) in length, shall be used for all lower courses and the first lane of the wearing course. After the first lane of the wearing course has been placed, a 10 foot (3 m), or longer, grade referencing attachment may be substituted for constructing subsequent adjacent lanes of wearing course mixture.
7. A self propelled mechanical spreader capable of maintaining the proper width, depth, and slope without causing segregation of the material, may be used for base courses and for surface courses less than eight (8) feet (2.4 m) in width.
8. When surfacing ramps or shoulders, or when the grade of a concrete gutter or other existing installation must be met, the manner of use of the automatic grade reference and slope control devices shall be determined by the ENGINEER.
9. Whenever a breakdown or malfunction of the automatic controls occurs, the equipment may be operated manually for the remainder of the normal working day, provided this method of operation will produce results meeting the specification requirements.

### C. Crushing Equipment

1. The crushing equipment for pulverizing existing bituminous base course shall be an approved rotary reduction machine having positive depth control adjustments in increments of ½ inch (10 mm) and capable of reducing material which is at least six (6) inches (150 mm) in thickness.
2. The machine shall be of a type designed by the manufacturer specifically for reduction in size of pavement material, in place, and be capable of reducing the pavement material to the specified size.
3. The cutting drums shall be enclosed and shall have a sprinkling system around the reduction chamber for pollution control.
4. The rate of forward speed must be positively controlled in order to ensure consistent size of reduced material.
5. The machine must be equipped with an accurate tachometer which is mounted in full view of the operator.
6. The crushing equipment shall meet the approval of the ENGINEER.

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### D. Cold Milling Machine

1. Cold Milling machine for removing concrete or bituminous surfaces shall be equipped with automatically controlled and activated cutting drums that are capable of grade reference, transverse slope control, and produce a uniformly textured surface.
2. An approved grade referencing attachment, not less than 30 feet (9 m) in length shall be used.
3. Equipment for removing the concrete or bituminous surface shall be capable of accurately removing the surface, in one or more passes, to the required grade and cross section.

### E. Joint Heaters

1. Joint heaters shall be infrared or other approved heaters, equipped with an automatic ignition and extinguishing system to ensure that the heater operates only when the paver is moving.
2. It shall be of sufficient length and heating capacity to adequately soften the edge of the mat.
3. The heater shall be oriented parallel to the joint edge.
4. The bituminous pavement shall not be heated by a direct open flame.

### F. Rollers

1. Steel wheel rollers shall weight at least eight (8) Tons (7 metric tons) and shall be self propelled, vibratory or static, tandem rollers or shall be self propelled static 3 wheel rollers. Steel wheel rollers shall be free from backlash, faulty steering mechanism, or worn king bolts. The steering device shall respond readily and permit the roller to be directed on the alignment desired. Rollers shall be equipped with wheel sprinklers and scrapers. Roller wheels shall be smooth and free from openings or projections which will mark the surface of the pavement.
2. Vibratory rollers shall have a shutoff to deactivate the vibrators when the roller speed is less than 0.5 mph (.8 km/hr) and shall have provisions to lock in the manufacturer's recommended speed, the vibration per minute, and the amplitude of vibration (dynamic force) for the type of bituminous mixture being compacted.
3. The pneumatic tired roller shall be of the self propelled type with a total weight, including ballast, not greater than 30 tons (27 metric tons). It shall be equipped with a minimum of seven (7) wheels situated on the axles in such a way that the rear group of tires will not follow in the tracks of the forward group, but will be so spaced that a minimum tire path overlap of 1/2 inch (10 mm) is obtained. The tires shall be smooth and shall be

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capable of being inflated to or adapted to achieve a pressure necessary to provide ground contact pressures of at least 80 pounds per square inch (550 kPa). The tire pressures shall not vary by more than five (5) pounds per square inch (35 kPa) between individual tires. The CONTRACTOR shall furnish a tire gage which shall be available at all times to enable the ENGINEER to check the tire pressures. The CONTRACTOR shall furnish the ENGINEER charts or tabulations showing the contact areas and the contact pressures for the full range of tire inflation pressures and tire loadings for the type and size roller used.

4. The roller shall be equipped with a mechanism capable of reversing the motion of the roller smoothly. The roller shall be equipped with wheel sprinklers and scrapers or mats.
5. Rollers shall be of sufficient size to compact the bituminous mixture to the required density without tearing, displacing, or cracking the mat.

### G. Chip Spreader

1. The chip spreader shall be self propelled and shall be equipped with pneumatic tires.
2. The spreader shall be equipped with a screen mounted below the metering gage.
3. The spreader shall be capable of spreading the cover material uniformly at widths of 3 to 12 feet (1 to 3.5 m), or separate spreaders shall be provided for the specific widths required.
4. The rate of discharge of the spreader shall be adjustable to spread uniform layers of 10 to 50 pounds per square yard (5 to 27 kg/m<sup>2</sup>).

### H. Bituminous Concrete Curbing Machine

1. The bituminous concrete curbing machine shall be self propelled and shall be capable of laying and satisfactorily compacting curved and straight line curb to the cross section specified on the Plans.
2. It shall be equipped with templates for the cross sections required.

## 3.5 PREPARATION OF FOUNDATIONS

- A. For bituminous base course mixtures required to be placed directly on the subgrade, the density, grade and cross section shall meet the approval of the ENGINEER at the time of placement of any mixture.
- B. Prior to placing any bituminous mixture, the surface of the existing pavement including joints and cracks shall be thoroughly cleaned of all dirt and debris.

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- C. All existing structures within the limits of the new Work shall be adjusted as specified in the Plans, or as directed by the ENGINEER.

### **3.6 PREPARATION OF AGGREGATE BASE**

- A. Prior to the placing of any prime coats or any bituminous mixtures, the density, grade and cross section of the aggregate base shall meet the approval of the ENGINEER at the time of placement of any material.
- B. Surfaces that have become too wet or too dry shall be reworked to provide the required density.

### **3.7 PREPARATION OF EXISTING PAVEMENT**

- A. This Work consists of preparation of the existing concrete road for resurfacing. All broken pavement or pavement not bonded to the base pavement, and loose bituminous surfacing or patches shall be removed.
- B. All longitudinal and transverse joints and cracks shall be cleaned in accordance with Article 3.14, Joint Cleanout.
- C. Butt joints at the end of surfacing sections and at intersections of adjoining streets shall be made in accordance with Article 3.8. The vertical face of the cut shall be maintained true, straight and undamaged until installation of wearing course.

### **3.8 BUTT JOINTS**

- A. If butt joints are specified on the Plans, or by the ENGINEER, the old surface shall be cut back for at least five (5) feet (1.5 m) to a depth of at least 1-inch (25 mm), for the full width of the joint. The vertical face of the cut shall be maintained true, straight and undamaged until installation of wearing course.

### **3.9 EDGE TRIMMING**

- A. Trimming and truing the edge of an existing bituminous surface shall be performed as required to give a straight, sharp edge at the proper elevations.
- B. The existing base under the bituminous surface shall be left undisturbed.

### **3.10 REMOVING BITUMINOUS SURFACING**

- A. When removing an existing bituminous pavement, the edges of the area to be removed shall be cut along straight lines, either perpendicular or parallel to the

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direction of travel, for the full depth of the bituminous surfacing with the cut edge a minimum of 18 inches (450 mm) back from the disturbed edge of pavement.

- B. The cutting of the edges and the breaking up of the bituminous material within the removal area, and the removing and disposing of the unsuitable material are included in the Work of removing bituminous surfacing.

### 3.11 REMOVING BITUMINOUS PATCHES

- A. Where the removal of bituminous patching material is specified on the Plans or as directed by the ENGINEER, it shall be saw cut along the edges of the patched area to prevent the tearing of the adjoining pavement surfaces during the removal operation.
- B. The cutting, removing and disposing of bituminous surfacing and unsuitable materials are included in the Work of removing bituminous patches.

### 3.12 PULVERIZATION AND SHAPING OF EXISTING BITUMINOUS BASE COURSE

- A. This Work consists of scarifying, pulverizing, milling, crushing, adding new material if required, shaping, rolling, compacting, and proof rolling the crushed base to the proper elevation and slope.
- B. Additional materials required to fill holes and voids shall be furnished at the CONTRACTOR's expense. Additional aggregate, if required, shall be PennDOT 2A.
- C. The material shall be scarified and uniformly pulverized to a maximum size of two inches (50 mm), in addition, 95 to 100 percent of the material shall have a particle size of 1-1/2 inches (40 mm) or smaller.
- D. The material shall be scarified and uniformly pulverized, in one or more passes, to the depth specified on the Plans or as determined by the ENGINEER.
- E. The maximum length or width of roadbed to be scarified and pulverized at any one time shall be as specified on the Plans or as determined by the ENGINEER.
- F. The crushed material shall be rough graded to within 3/4 of an inch (20 mm) of the grade called for on the Plans, or as directed by the ENGINEER. Additional aggregate shall be placed, if necessary, to attain the required cross sections.
- G. After the material has been balanced, it shall be thoroughly mixed. In restrictive areas, the material to be mixed may be bladed into a windrow to provide working room for the mixer.
- H. The mixed material shall be shaped and compacted in reasonably close conformity with the lines, grades, and cross sections shown on the Plans or as established by

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the ENGINEER. Excess material shall be removed and disposed of by the CONTRACTOR at his expense.

- I. Finished rolling shall be done with a vibratory steel wheel roller.
- J. The aggregate-bituminous pavement mixture shall be compacted to not less than 98 percent of the unit weight obtained by the AASHTO T180 test method. The test shall be made on the aggregate-bituminous mixture at the field moisture content existing during the compacting operation. Required density shall be maintained until the material has been surfaced.
- K. Prior to the placing of any surface courses, the pulverized material shall be proofrolled. Proofrolling shall be accomplished with an 18,000 pound (82 000 kg) single axle load. Unstable areas shall be removed and backfilled.

### 3.13 HAND PATCHING

- A. Where the filling of holes and depressions in the base or the replacing of the patches is specified on the Plans or as directed by the ENGINEER, the filler material shall be an approved bituminous mixture.
- B. The mixture selected will be dependent on the depth and size of the patch and the type of mixture and performance grade of the asphalt binder required.
- C. The patches shall be compacted to the required grade by use of a machine vibrator or approved roller.

### 3.14 JOINT CLEANOUT

- A. Where joint cleanout is specified on the Plans or as directed by the ENGINEER, the joint sealants and foreign material shall be removed to a minimum depth of 1 inch (25 mm) by approved mechanical or hand methods.
- B. The removal and disposal of unsuitable materials and the removal and disposal of bituminous surface patches adjacent to joints are included in the Work for joint cleanout.
- C. Clean the pavement for 4 inches to 6 inches on either side of the joint or crack. Immediately before sealing, use a compressed air stream of at least 100 pounds per square inch measured at the source, or a hot compressed air lance to clean and dry damp cracks in asphalt pavements. If using the hot compressed air lance, do not damage the surrounding pavement area from overheating. Clean, dry, and remove debris and loose material from cracks, joints, and adjacent pavement surfaces.

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### 3.15 REPAIRING PAVEMENT JOINTS

- A. Where existing pavement joints and cracks are to be repaired, as specified on the Plans or as directed by the ENGINEER, the existing bituminous surface and any loose or spalled concrete around the joints and cracks shall be removed.
- B. Each joint or crack shall be cleaned and shall be filled with an approved mixture and the mixture shall be compacted with a vibratory machine or by an approved method.
- C. Seal joints and cracks from 1/4 inch to 1 inch wide with asphalt sealant and fill joints and cracks over 1 inch wide with Asphalt Wearing Course 4.75 mm, per PennDOT Section 469.
- D. If using asphalt sealant, fill prepared joints and cracks level with the pavement surface. Wipe the sealant flush with the pavement surface, leaving a thin film of sealant from 1/32 inch to 1/16 inch thick and from 1 inch to 3 inches wide, per PennDOT Section 469.
- E. After wiping the joint or crack, remove and dispose of excess sealant. Unless allowed with written approval by ENGINEER, do not place sealant when the air temperature is below 40F or above 90F.

### 3.16 COLD MILLING CONCRETE OR BITUMINOUS PAVEMENT

- A. Where cold milling concrete or bituminous pavement is specified, the pavement shall be milled to the shape and cross section as shown on the plans.
- B. Immediately after cold milling, the surface shall be cleaned. The CONTRACTOR shall remove and dispose of any resulting debris.
- C. When allowed by the ENGINEER, milling materials may be used for temporary wedging. Prior to placing pavement, temporary wedging materials shall be removed and disposed of. Wedging with milled materials is incidental to the Project.

### 3.17 GENERAL BITUMINOUS PAVEMENT INSTALLATION REQUIREMENTS

- A. The width, thickness and type of bituminous paving improvement shall be specified on the Plans, indicated in the Proposal or as determined by the ENGINEER.
- B. At street intersections, curb drops conforming to the current rules and regulations of PennDOT Publication 72M, as amended, shall be provided for the construction of sidewalk ramps. In addition, curb drops for sidewalks and driveway

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approaches shall be provided in locations called for on the Plans or as determined by the ENGINEER.

- C. Existing improvements, including structures, shall be protected to prevent their surfaces from being discolored during application of bituminous materials.

### 3.18 BITUMINOUS PRIME COAT OR BOND COAT

- A. Asphalt prime coat shall be installed per PennDOT Section 461.
- B. The prepared foundation shall be treated with bituminous material for prime coat or bond coat as specified. A bond coat shall be applied to each layer of bituminous mixture before the succeeding layer is placed.
- C. The bituminous material shall be applied uniformly by means of a pressure distributor, and only in such areas as may be inaccessible to the regular distributor operation shall the bituminous material be applied by means of the hand spraying apparatus of the distributor. Where necessary to accommodate traffic, the surface shall be treated half width or as recommended by the ENGINEER. The foundation shall be free from moisture when the treatment is applied. Under no circumstances shall pools of bituminous material be allowed to remain on the surface.
- D. The amount of prime coat to be applied per square yard shall be 0.05 gal/s.y (250 ml/m<sup>2</sup>) unless otherwise specified on the Plans or recommended by the ENGINEER.
- E. When prime coat is applied, the surface course shall not be placed until the prime coat has been properly cured. No blotting of the prime coat with aggregate in lieu of proper curing will be permitted.
- F. The prime coat may be omitted or reduced when authorized by the ENGINEER.
- G. The bond coat shall be applied at the rate specified by PennDOT Section 460.
- H. The bond coat material shall be applied ahead of the paving operation for a distance of at least 1,500 feet (450 m), depending on traffic conditions, as determined by the ENGINEER. The surfacing shall not be placed until the bond coat has cured.

### 3.19 TRANSPORTATION OF MIXTURES

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- A. The transportation of the mixtures as specified shall be in accordance with PennDOT's current Specifications.
- B. Haul the mixtures in tightly sealed vehicles that do not contain petroleum oils, solvents, or other materials that adversely affect asphalt mixture.
- C. Provide covers of sufficient size and quality to protect the entire load under all conditions.
- D. Maintain the proper and uniform placement temperature as specified in PennDOT Section 413.3(h)1.
- E. Provide insulation on all sides of the truck body, a doublewalled truck body, or a heated truck body when the air temperature is below 50 F from October 1 to April 30.
- F. Provide a 3/8-inch diameter hole near the center and approximately two-thirds the distance down from the top of the vehicular box, on both sides, to allow for asphalt mixture temperature checks.

### 3.20 PLACING BITUMINOUS MIXTURES

- A. Place mixture per PennDOT Section 413.3 using the test procedures, limits, and tolerances for a 9.5 mm nominal maximum aggregate size mixture except where procedures, limits and tolerances are specifically indicated for a 9.5 mm fine-graded nominal maximum aggregate size mixture and as modified as follows:
  - 1. Revise Table G to include 9.5 mm Fine Grade Wearing Course as follows:

<b>Table G</b>	
<b>Mixture Minimum Compacted Depths</b>	
<b>Mixture</b>	<b>Minimum Depth</b>
9.5 mm Fine Grade Wearing Course	1.5 inch

- B. Pavers will be required to have an automatically controlled and activated screed and strike-off assembly except when placing mixtures for:
  - 1. variable width sections;
  - 2. sections of pavement less than 1,000 feet(300 m) in length;
  - 3. placing the first course of a base course mixture on an earth grade or on a sand subbase; or,
  - 4. placing base course mixtures in widths less than eight (8) feet (2.5 m).

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- C. Bituminous base course mixtures shall not be placed in lifts exceeding three (3) inches (75 mm), unless otherwise approved by the ENGINEER. Approval to place lifts in excess of three (3) inches (75 mm) will be based on the ability of the CONTRACTOR to place and compact the base course to the required cross section and within the specified tolerances.
- D. For lifts of 2-1/2 inches (65 mm) or greater, a berm of shoulder material shall be banked against the outside edge of each layer of mixture placed unless the sequence of operations is such that the edges of the material are adequately confined and supported in some other manner. The width of material placed shall be twice the height of the bituminous layer being placed but in no case less than a 6-inch (150 mm) width.
- E. When the application rate for a bituminous wearing course exceeds 220 pounds per square yard (120 kg/m<sup>2</sup>), the pavement shall be constructed in two (2) or more courses, unless otherwise specified on the Plans or as authorized by the ENGINEER.
- F. The bituminous mixture shall be placed by an approved self-propelled mechanical paver to such a depth that when compacted, it will have the thickness specified. The mixture shall be dumped into the center of the hopper and care shall be exercised to avoid overloading the paver and spilling the mixture upon the base. The paver speed shall be adjusted at the discretion of the ENGINEER to that speed which, in his opinion, gives the best results for the type of paver being used and which coordinates satisfactorily with the rate of delivery of the mixture to the paver to provide a uniform rate of placing the mixture without intermittent operation of the paver.
- G. When delays result in slowing paving operations such that the temperature of the mat immediately behind the screed falls below 170 degrees F (75° C), paving shall be stopped and a transverse construction joint placed.
- H. Bituminous mixture shall be placed in two (2) or more layers as called for on the Plans or as approved by the ENGINEER. To take out irregularities in the existing road surface, wedging with bituminous mixture shall be done by placing several layers with the paver. Corrections to the foundation by wedging with bituminous material shall be made by placing, compacting, and allowing the material to cool prior to paving.
- I. Bituminous mixtures shall be placed using two (2) pavers in echelon or one (1) paver equipped with an approved joint heater. The ENGINEER may omit the use of the joint heater if the temperature of the previously placed mat does not fall below 170 degrees F (75° C) prior to placement of the adjacent course.

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- J. Echelon paving will be permitted when allowed by the ENGINEER.
- K. Cold joints will be permitted along acceleration and deceleration lanes, lanes less than full width, irregularly shaped sections, and at transverse joints. The edges of the initial mat for all cold joints shall be painted with bituminous material before the bituminous mixture is placed in the adjacent section. In placing the bituminous mixture adjacent to all joints, hand raking or brooming will be required to provide a dense smooth connection.
- L. Connections with existing surfaces at the beginning and ending of resurfacing sections and at intersections shall be made by feathering out the mix, by constructing a butt joint, or as approved by the ENGINEER.
- M. When placing the bituminous mixture in a lane adjoining a previously placed lane, the mixture shall be placed such that it uniformly overlaps the first lane by two (2) to four (4) inches (50 to 100 mm) and is placed at a height above the cold mat equal to the breakdown roller depression on the hot mat. The overlapping material shall be bumped, back onto the hot lane so that the roller will compress the excess material into the hot side of the joint. If, in the opinion of the ENGINEER, the overlap is excessive, the excess material shall be trimmed so as to leave an edge having a uniform thickness. The excess material shall be discarded, it shall not be spread across the surface course.
- N. If the lanes are being constructed with two (2) or more pavers in echelon, the loss depths of bituminous material from each paver shall match at the longitudinal joints.

### 3.21 ROLLING AND COMPACTING OF BITUMINOUS MIXTURE

- A. Compact mixture as specified in PennDOT Section 413.3 (i).
- B. Each layer of bituminous mixture shall be compacted with approved rollers. At least two (2) rollers will be required when the mixture lay-down rate exceeds 800 square yards (650 m<sup>2</sup>) per hour.
- C. Steel 3-wheel rollers may be used for initial compaction immediately following the paver.
- D. The final rolling operation on each layer of bituminous mixture shall be accomplished by use of tandem steel-wheel rollers or by use of vibratory rollers operated in the static mode.
- E. Roller wheels shall be kept properly moistened with water.

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- F. Pneumatic-tired rollers shall be operated in a competent manner and shall not mark or rut the surface or displace the pavement edges. The pneumatic-tired roller shall be ballasted to obtain the required ground-contact pressures as directed by the ENGINEER. To obtain a uniformly textured mat and the desired pavement density, the ENGINEER may recommend the CONTRACTOR to raise or lower tire pressures at any time during the rolling operations. The roller operations shall be conducted in such a manner as to prevent scuffing or chatter marks in the pavement surface. The number of passes made by the pneumatic-tired roller shall not be less than two (2) round trip passes over each area.
- G. Rolling of the mixture shall begin as soon after placing without undue displacement, picking up the mat, or cracking. Rolling shall start longitudinally at the extreme sides of the lanes and proceed toward the center of the pavement, overlapping on successive trips by at least half the width of the drive wheel of the roller. Alternate trips of the roller shall be of slightly different lengths. The maximum roller speed shall not exceed the manufacturer's recommended speed for the type of mixture or thickness of layer being placed.
- H. When compacting an adjoining lane, the longitudinal joint shall be rolled first with the roller supported mainly on the cold lane with only three (3) to six (6) inches (75 to 150 mm) of the roller extending onto the freshly placed bituminous material.
- I. Finish rolling shall continue until all roller marks are eliminated.
- J. Pneumatic-tired rollers will not be permitted on wearing courses.
- K. Areas too narrow to be rolled directly by standard 8-Ton (7 metric ton) tandem rollers shall be compacted by self-propelled trench rollers of suitable width, approved by the ENGINEER, and weighting not less than 300 pounds per inch of width (5500 kg/m).
- L. Skin patching on an area that has been rolled will not be permitted. Any mixture that becomes mixed with foreign material or is in any way defective shall be removed and replaced at the CONTRACTOR's expense.
- M. See Article 3.29 of this Section for compaction test.

### 3.22 WEATHER AND SEASONAL LIMITATIONS

## BITUMINOUS PAVING

- A. Bituminous mixtures shall not be placed nor the prime coat or bond coat applied when rain is threatening or when the moisture on the existing surface would prevent satisfactory bonding.
- B. Do not place asphalt paving mixtures when the air or surface temperature is 50F or lower, and from October 16 to March 31.

### 3.23 HEATING BITUMINOUS MATERIALS

- A. Bituminous material which requires heating before application shall be heated in such a manner as to insure a uniform temperature throughout the entire mass with efficient and positive control at all times. It shall be heated to a temperature consistent with the type of material used and only to such temperature as will insure the necessary fluidity. Excessively high temperatures shall be avoided. A thermometer shall be provided to enable the ENGINEER to observe the temperature at any time. Any bituminous material which has been overheated will be rejected.
- B. Asphalt emulsion shall be circulated continuously when heated above atmospheric temperature so as to prevent it from separating. The heating of asphalt emulsion to the required temperature for application shall be done entirely in the distributor unless a uniform temperature is maintained in the storage tank by means of a circulating heater. Any asphalt emulsion which has been damaged by continuous heating for too long a time or by alternate heating and cooling will be rejected.

### 3.24 PATCHING

- A. Asphalt patching shall be per PennDOT Section 450.

### 3.25 CHIP SEAL

- A. Asphalt tack coat shall be installed per PennDOT Section 460.
- B. Asphalt emulsion shall be TACK or NTT/CNTT and aggregate shall be Fine Aggregate (For Blotting), per PennDOT Section 413.3(g).
- C. Seal coating shall consist of two (2) or more applications of bituminous material applied to the prepared surface and one (1) or more coverings of coarse or fine aggregate applied to the bituminous material.
- D. Cover materials used for seal coating shall be sufficiently dry when it comes in contact with bituminous material. The moisture content shall not exceed three (3) percent by weight, dry basis. Satisfactory means shall be provided for the

## BITUMINOUS PAVING

protection of the coating materials against excessive moisture by covering stockpiles, by aeration or through manipulation.

- E. The bituminous material specified for surface coat shall be uniformly applied by means of the pressure distributor in the number of applications provided and in the amount per square yard as determined by the ENGINEER. Each application of bituminous material shall cure sufficiently to prevent displacement or pickup by traffic or construction equipment before a succeeding application of bituminous material is made.
- F. Following the application of surface coat bituminous material, the cover material shall be uniformly spread over the surface by means of approved mechanical spreaders, in the amount per square yard as specified or as determined by the ENGINEER. Truck wheels shall ride on spread cover material and not on bituminous material.
- G. Any irregularities or deficiencies in the uniformity of the cover aggregate on the surface shall be corrected by hand spreading and dragging.
- H. Following the spreading of each course of cover material, the surface shall be rolled by means of approved rollers.
- I. Rolling shall immediately follow the placing of cover material before the bituminous material has set. At no time shall there be more than 300 feet (90 m) of unrolled cover material. No cover material shall be left unrolled for more than five (5) minutes.
- J. Sufficient rolling shall be done to embed the cover material in the bituminous material without crushing the aggregate.
- K. For areas deficient in cover material after completion of the surface treatment, additional cover material shall be added. For areas with excessive cover material, the excess cover material shall be removed before the next seal is applied. The final application of cover material shall be swept with a power broom.
- L. The completed surface shall be maintained with a drag, broom or other approved equipment to keep the material well distributed on the road until all cover material possible has been embedded in the bituminous material. The length of time required for this maintenance will be from two (2) to five (5) days, as determined by the ENGINEER, depending on the weather and the materials used.

### 3.26 BITUMINOUS CONCRETE CURB

- A. The bituminous concrete curb shall be constructed to the design specified on the Plans or as approved by the ENGINEER and shall include the conditioning and treating of the surface on which the curb is to be placed.
- B. The materials used in the construction and installation of bituminous concrete curbing shall meet the requirements as specified in PennDOT, Section 636.

## BITUMINOUS PAVING

- C. Bituminous concrete curb mixture shall be Asphalt Cement, Class PG 64S-22 or PG 58S-28, in accordance with PennDOT, Section 636, unless otherwise approved by the ENGINEER.
- D. The bituminous mixture shall be thoroughly compacted by a curbing machine to the cross section shown on the Plans, or as determined by the ENGINEER. The curb shall be formed to the density to produce a tight surface texture. Curbs showing segregation, slumping, or misalignment shall be removed and replaced at the CONTRACTOR's expense.
- E. When specified on the Plans or as directed by the ENGINEER, an application of asphalt emulsion or other approved bituminous coating shall be applied to the finished curb at the joint of the curb and pavement, or to the inside face of the curb, or to both, as a protective seal.
- F. Backfilling behind the curb shall not commence until the bituminous mixture has cured.
- G. The backfill material shall be placed and thoroughly tamped and compacted to the satisfaction of the ENGINEER, without disturbing the curb, and shall be left in a neat and workmanlike condition.

### 3.27 BITUMINOUS SHOULDERS

- A. This Work shall consist of constructing a bituminous surface course as specified on the Plans, or as approved by the ENGINEER. The bituminous surface course shall be placed on a prepared foundation.
- B. The bituminous materials used shall be as specified on the Plans, or as approved by the ENGINEER. Materials and procedures are specified in PennDOT Sections 651-657 for bituminous shoulders.
- C. The existing pavement or aggregate base shall be prepared to receive the bituminous surface course as specified in this Section.
- D. The bituminous prime and bond coats used shall meet the requirements specified in this Section. Care shall be taken to prevent spreading of bituminous material on adjoining surfaces. When approved by the ENGINEER, the prime coat may be omitted.
- E. The bituminous mixture shall be placed to the thickness specified on the Plans or as determined by the ENGINEER.

## BITUMINOUS PAVING

- F. Placing the bituminous mixture shall conform to this Section.
- G. When approved by the ENGINEER, the paver used for placing bituminous approaches and sidewalks will not be required to have an automatically controlled or activated screed or strike off assembly or the corresponding grade referencing equipment. Also, with approval from the ENGINEER, only one (1) roller may be used with each paver.

### 3.28 CLEANUP

- A. The area adjacent to the new Work shall be backfilled with sound earth of topsoil quality.
- B. The backfill shall be compacted, leveled and left in a neat, workmanlike condition. At a seasonally correct time the disturbed area shall be raked, have topsoil placed thereon, fertilized and seeded per the requirements of Section 32 92 19, Seeding, or sodded in accordance with Section 32 92 23, Sodding.

### 3.29 TESTING

- A. During the course of the Work, the ENGINEER may require testing for mix designs, aggregate gradation, and physical properties, bitumen content, compaction or density, and thickness of material. The testing and coring required shall be performed by a testing laboratory approved by the ENGINEER. The cost for testing and coring shall be at the expense of the CONTRACTOR. The testing laboratory shall furnish the ENGINEER with two certified copies of the results of all tests.
- B. Testing procedures shall conform to current PennDOT Standards for Construction and Bulletin 27.
- C. Rolling shall proceed until the required compaction is attained and the amount of rolling required shall be based on the test results of a nuclear gage or on using a specified minimum number of rollers. When the total tonnage for the Project is in excess of 1,000 Tons (900 metric tons), the nuclear gage method will be used to govern the compactive requirements.
- D. The control density for the bituminous mixture to be placed, will be determined by use of a modified Marshall Test.
- E. Control Density
  - 1. During the CONTRACTOR's start up operations, a rolling procedure to attain the control density will be established. The rolling procedure will be

## BITUMINOUS PAVING

based on the number and type of rollers used and the rolling pattern. The goal of the compactive effort will be to establish a rolling procedure which will achieve 100% of the control density but in any case, the density achieved shall not be less than 98% of the control density. Density values less than 98% will be sufficient cause for the ENGINEER to require an adjustment in the number or type of rollers being used or in the rolling pattern.

2. Once the procedure has been established on the start up section, the procedure shall be used for the remainder of the mixture to be placed, unless subsequent tests indicate a need to change the number of rollers or the rolling pattern.
3. If difficulties are encountered or if there is a significant change in aggregate or bitumen content, the ENGINEER will determine the control density for the new mixture and require the CONTRACTOR to again establish the number and type of rollers and the rolling pattern required on the new mixture to attain the control density. The compactive procedures thus determined shall be used when placing the remainder of that mixture.
4. Density checks will be made at the discretion of the ENGINEER to determine if the compactive procedure being used is achieving the required density, or if a change in procedure is necessary.
5. Each layer of bituminous mixture shall be compacted to at least 98% of the control density, using the established procedure.

### 3.30 PRICE ADJUSTMENTS

- A. Samples of asphalt binder may be taken prior to incorporation into the mixture and from the bituminous mixture. Where results of tests on these samples deviate from specification requirements, the affected material will be subject to price adjustments on the following basis:
- B. When the test results deviate from the limits specified by PennDOT, by ten (10) percent or more, the mixture produced will be evaluated by the ENGINEER and if in his judgment the defective pavement warrants removal, the CONTRACTOR shall remove and replace the affected area at his expense. If it is determined that the removal is not required, the Contract unit price of the affected mixture will be reduced by ten (10) percent.
- C. Core samples may be taken on the completed Work. If the results from testing of the core samples indicates a deficiency in the completed Work, the ENGINEER will evaluate the test results and will recommend removal and replacement or a credit to the OWNER.

**BITUMINOUS PAVING**

END OF SECTION

## **SECTION 32 13 13 CONCRETE PAVING**

### **PART 1      GENERAL**

#### **1.1 SCOPE**

- A. This Section includes both plain and reinforced Portland cement concrete paving complete with concrete material admixtures, joints, forms, equipment requirements, field quality control and appurtenances required to complete the Portland cement concrete paving Work indicated on the Plans.

#### **1.2 RELATED WORK SPECIFIED ELSEWHERE**

- A. Section 31 23 13: Subgrade Preparation
- B. Section 31 23 19: Dewatering
- C. Section 32 11 23: Aggregate Base Courses
- D. Section 32 17 23: Pavement Markings
- E. Section 32 92 19: Seeding
- F. Section 32 92 23: Sodding

#### **1.3 REFERENCE STANDARDS**

- A. Unless otherwise specified, the Work for this Section shall conform to the applicable portions of the following Standard Specifications.
  - 1. ASTM - ASTM International
  - 2. AASHTO - American Association of State Highway and Transportation Officials
  - 3. ACPA - American Concrete Paving Association
  - 4. PennDOT - Pennsylvania Department of Transportation, Standard Specifications for Construction, latest edition.

#### **1.4 MATERIAL REPORTS**

- A. At the request of the ENGINEER, the CONTRACTOR shall provide the ENGINEER with certification that the various materials to be used conform to the Standards referred to in the Specifications.
- B. The CONTRACTOR shall submit a list of his source of material supply to the ENGINEER for review prior to placing any order.
- C. The CONTRACTOR shall provide the ENGINEER, prior to the actual delivery of the ready-mixed concrete, the mix design as required by PennDOT Publication 408, latest edition.

#### **1.5 THICKNESS AND COMPRESSIVE STRENGTH REPORTS**

- A. The testing lab shall provide the ENGINEER with two (2) certified copies of the test results of the thickness and compressive strength of the concrete. The core drilling, testing for thickness and compressive strength, and the certification of the test results shall be performed by a testing laboratory approved by the ENGINEER.

## **CONCRETE PAVING**

### 1.6 ENVIRONMENTAL REQUIREMENTS

- A. Comply with the requirements for concrete installation due to outside ambient air temperatures specified under Article 3.21 and 3.22 of this Section.
- B. Comply with the requirements for protecting new Work against damage from rain, as specified under Article 3.20 of this Section.
- C. Comply with the requirements for protecting new Work against damage from cold weather, as specified under Article 3.21 of this Section.

## **PART 2      PRODUCTS**

### 2.1 CEMENT

- A. Cement shall be low alkali, air-entraining Portland cement conforming to PennDOT, Section 701.1, and Bulletin 15.

### 2.2 FINE AGGREGATES

- A. The fine aggregate shall be Type A, and as specified in PennDOT, Section 703.1, and Bulletin 14.

### 2.3 COARSE AGGREGATE

- A. The coarse aggregate shall be Type A, and as specified in PennDOT Sections 703.2 and 704.1.

### 2.4 WATER

- A. Water to be used for mixing and curing concrete shall conform to ASTM C1602 and that is reasonably clean, free from vegetable matter, oil, acid, alkali, sugar, or other substances injurious to the finished product.

### 2.5 CONCRETE ADMIXTURES

- A. Concrete admixtures shall conform to the requirements of PennDOT Section 711.3.

### 2.6 CONCRETE CURING COMPOUNDS

- A. White membrane curing compound for curing concrete shall conform to ASTM C309, Type 2, and as specified in PennDOT Section 711.2.
- B. Transparent membrane curing compound for curing base course concrete shall conform to ASTM C309, Type 1-D, and as specified in PennDOT Section 711.2.

## CONCRETE PAVING

### 2.7 LANE TIE BARS

- A. Bar reinforcement for pavement tie bars shall conform to ASTM A615, Bulletin 15, and PennDOT Section 709.1.

### 2.8 STEEL WELDED WIRE FABRIC

- A. Welded steel wire fabric for concrete mesh reinforcement shall conform to ASTM A1064, Grade 70, Bulletin 15, and PennDOT Section 709.3.

### 2.9 DOWEL BARS

- A. Dowel Bars for Transverse expansion and contraction joints shall be ASTM A615 Grade 40 and conform to PennDOT Section 705.

### 2.10 STEEL HOOK BOLTS

- A. Hook bolts shall conform to ASTM A706, or Grade 60 of ASTM A615, A616-96a, or A617-96a. Hook bolts shall be 5/8 inch (16 mm) diameter. Along the edge of existing concrete, expansion anchored hook bolts shall be used.

### 2.11 JOINT FILLERS

- A. Premolded expansion joint filler shall be cork, sponge rubber, fiber joint fillers, or polypropylene foam from a manufacturer listed in Bulletin 15, and as specified in PennDOT 705.1.

### 2.12 JOINT SEALANTS

- A. Low modulus, non-sag-silicone joint sealing material in a nonacid curing, one part formulation, from a manufacturer listed in Bulletin 15, and as specified in PennDOT 705.4.
- B. Rubberized joint sealing material conforming to ASTM D6690, Type IV, and as specified in PennDOT 705.4.

### 2.13 CONCRETE MIX

- A. Compute and prepare concrete mix designs in accordance with ACI 211.
- B. Concrete mix materials shall be per PennDOT 704.1 and conform to Part 2 materials listed above.
- C. Roadway pavement concrete mix designs shall use class HES concrete, and sidewalk pavement concrete mix designs shall use Class S concrete per PennDOT 704.1 Table A.
- D. Design cement concrete to have an air content of 6.0% in the plastic state.

## **CONCRETE PAVING**

- E. The ENGINEER shall be provided with the mix design for review and approval, prior to the actual delivery of the concrete.

### **PART 3 EXECUTION**

#### **3.1 VERIFICATION OF EXCAVATION AND FORMING**

- A. Prior to the installation of any concrete, examine the excavation and forms for the grades, lines, and levels required to receive the new Work. Ascertain that all excavation and compacted subgrades are adequate to receive the concrete to be installed.
- B. Correct all defects and deficiencies before proceeding with the Work.

#### **3.2 VERIFICATION OF SUBGRADE CONDITIONS**

- A. Prior to the installing of any concrete, examine the subgrade to ascertain that it is adequate to receive the concrete to be installed. If the subgrade remains wet after all surface water has been removed the ENGINEER may require the installation of edge drain.

#### **3.3 EXISTING IMPROVEMENTS**

- A. Investigate and verify location of existing improvements, including structures, to which the new Work is to be connected. Make necessary adjustments in line and grade to align the new Work with the existing improvements after approval by the ENGINEER.

#### **3.4 BATCH PLANT**

- A. An adequate site for the batch plant shall be obtained by the CONTRACTOR, at his expense. The site shall be maintained, and the plant operated in accordance with the conditions and requirements established by the community in which the plant is located.

#### **3.5 FINE GRADING**

- A. The subgrade shall be fine graded to the cross section shown on the Plans and shall be thoroughly compacted prior to the placing of forms or concrete.

#### **3.6 INSTALLATION – GENERAL**

- A. The width, thickness, and type of concrete pavement shall be specified on the Plans or as approved by the ENGINEER.
- B. At street intersections, curb drops, conforming to the current rules and regulations of PennDOT Publication 72M, shall be provided for the construction of sidewalk ramps. In addition, curb drops for sidewalk and driveway approaches shall be provided as specified in locations called for on the Plans or as approved by the ENGINEER.

## CONCRETE PAVING

- C. Construction operations shall be restricted to the existing right-of-way. If additional area is required, the CONTRACTOR shall furnish the ENGINEER with written permission from the property owner for any part of the operation he conducts outside the established right-of-way.
- D. The CONTRACTOR shall maintain traffic access at all intersections. Vehicle access shall also be maintained to all commercial and public properties and elsewhere as designated by the ENGINEER.

### 3.7 PLACEMENT OF FORMS

- A. Forms shall be placed and checked for line and grade at least 500 feet (150 m) in advance of placing concrete.
- B. Forms shall be adequately staked and braced to resist the pressure of concrete and the thrust of the equipment.
- C. Forms shall have uniform bearing on the subgrade throughout their entire length and width.
- D. After setting the forms to grade, thoroughly tamp both the inside and outside with an approved mechanical form tamper.
- E. Forms shall be thoroughly cleaned before they are placed.
- F. Forms shall be neatly and tightly joined, and shall be securely staked by at least three (3) stakes per form.
- G. Forms shall be oiled before concrete is placed against them.
- H. Forms shall be checked for line and grade, after being set.
- I. Forms showing a variance from the staked line by more than 1/4 inch (5 mm) or from the staked grade by more than 1/8 inch (3 mm) in ten (10) feet (3 m) shall be adjusted.
- J. Where the use of flexible forms are required, sufficient back bracing shall be provided to prevent undue deflection of the forms during placement of the concrete.

### 3.8 PLACING CONCRETE

- A. Placing of concrete should not commence or continue until the condition of the subgrade has been approved by the ENGINEER.
- B. The concrete shall be spread or distributed as soon as placed. If a mechanical spreader is not used, the concrete shall be deposited in a manner that requires a minimum of re-handling to avoid segregation and separation of materials. The concrete shall be deposited to a height sufficiently above grade so that when consolidated and finished it shall conform to the required finished grades.

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- C. Concrete along the faces of forms and adjacent to joints shall be consolidated and compacted to fill all voids.
- D. Forms shall not be vibrated to consolidate the concrete.
- E. When the pavement is placed in two (2) layers, the first layer may be cast three (3) to six (6) inches (75 to 150 mm) narrower on each side than the proposed pavement slab, so that the full depth of pavement, at the edges, will be cast with the second layer. The equipment shall vibrate concrete placed full depth for the complete width and depth of the pavement being placed. For concrete placed in two (2) layers, only the second layer will be required to be vibrated.
- F. The placing of concrete shall be continuous as much as possible between transverse joints.
- G. Whenever a temporary halt in operation occurs, the concrete and unfinished end of the slab shall be covered with wet burlap or plastic.
- H. If the interruption of Work continues for more than 20 minutes, a construction joint shall be placed, provided the proposed construction joint is 15 feet (4.5 m) or more from the last joint for reinforced pavement and at least ten (10) feet (3 m) or more from the last joint in plain concrete pavement. Sections of pavement shorter in lengths will not be permitted and, if constructed, shall be removed and replaced at the CONTRACTOR's expense.
- I. Integral curbs, where specified or required, shall be constructed monolithic with the pavement slab. The curb material shall be placed before the pavement has started its initial set and shall be of the same mix as the concrete pavement.
- J. Base and back forms will be required when constructing straight curbs, and back forms with templates of the required curb shape shall be used when constructing rolled and mountable curbs. The curb concrete shall be spaded sufficiently to eliminate all voids and tamped to bring the mortar to the surface, after which the curb shall be given a final finish to match the texture of the pavement.
- K. After removing forms, any visible areas of honeycomb or minor defects shall be immediately filled with mortar, having one part of Portland cement and two parts fine aggregate, and shall be applied with a wooden float.
- L. Where adjacent pavement lanes are constructed in separate pours, no equipment shall be operated upon recently placed concrete until the pavement has attained at least 85% of the design strength as determined by testing cores taken from the project, or until the pavement is 14 days old, at the option of the ENGINEER.
- M. Any equipment wheels operating on the pavement shall operate at least one foot (300 mm) from the edge of the pavement. The equipment wheels shall be rubber-tired.
- N. The paver shall not be permitted on the new slab until the pavement has attained full design strength. The paver shall not operate on any new slab without using wood

## CONCRETE PAVING

mats having an approved thickness and width to ensure that the pavement will not be marked or structurally damaged.

- O. Pavers are not permitted to operate on residential streets.
- P. If the curing compound is damaged, it shall be repaired by spraying additional curing compound on the damaged areas as soon as the Work is completed.
- Q. The filler strip on pavement widening projects shall be poured as soon as possible but not later than the first working day following the placing of the slab.
- R. At all intersections and where access is required to property along the Project, construction shall be completed by gapping the proposed pavement. Load transfer, contraction, of end-of-pour joint devices shall be placed at the gapped ends of the pavement.
- S. In lieu of pavement gapping, the CONTRACTOR may elect to place a temporary bridge, of a design approved by the ENGINEER, to provide access. Furnishing, placing, maintaining, and removing the bridge shall be at the CONTRACTOR's expense.

### 3.9 PLACING PAVEMENT REINFORCING

- A. Where reinforcement is required, the sheets or mats shall be placed at the depth below the surface of the finished pavement, as shown on the Plans.
- B. Pavement reinforcement shall be shipped and delivered to the Work in flat sheets or mats.
- C. Adjacent sheets or mats shall be lapped, as indicated on the Plans, and shall be fastened to each other in no less than two (2) places in each pavement lane.
- D. Where the width of pavement varies, the reinforcement requirements shall be the same as called for on the Plans. Split sheets or mats may be used to conform to the particular pavement configuration. Side laps shall not be less than the spacing of the longitudinal wires or bars.
- E. Reinforcement shall be installed by one of the following methods:
  - 1. Chairs upon which reinforcement is to be mounted shall support the reinforcement and shall have such bearing on the base that there will be no undue penetration of the base. The maximum spacing of the chairs shall be sufficient to maintain the reinforcement at the specified depth. The reinforcement shall be placed directly from the hauling unit unto the chairs.
  - 2. When reinforcement is placed between two (2) layers of concrete, the first layer shall be mechanically spread and struck off to the required depth below the proposed finished surface. The reinforcement shall be placed directly from the carrier onto the struck off concrete.

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- F. Any area where the use of the mechanical spreader or mechanical strike-off is not feasible, the reinforcement shall be mounted on chairs.

### 3.10 JOINTS

- A. All longitudinal and transverse joints shall conform to the details and shall be constructed at the locations shown on the Plans or as directed by the ENGINEER.
- B. All joints shall be constructed true to line with their faces perpendicular to the surface of the pavement.
- C. Transverse joints shall be constructed at right angles to the centerline of the pavement, unless otherwise called for on the Plans or as determined by the ENGINEER. The joints shall not vary more than 1/4 of an inch (5 mm) from a true line.
- D. The surface of the pavement adjacent to all joints shall be finished to a true surface. Where indicated on the Plans, joints shall be edged to the radius shown or a minimum 1/4 inch (5 mm) radius. The surface across the joints shall be tested with a ten (10) foot (3 m) straightedge as the joints are finished and any irregularities shall be corrected before the concrete has hardened.
- E. When pavement is laid in partial width slabs, transverse joints in the succeeding slabs shall be placed in line with the like joints of the first slab. In the case of widening existing pavements, transverse joints shall be placed as shown on the Plans, or as directed by the ENGINEER.
- F. Keyways, where required, shall be accurately formed with templates of metal, wood, or paper securely pinned in place. The gauge or thickness of the material in the templates shall be such that the full keyway, as specified, is formed in the correct location.
- G. Longitudinal Joints
  1. Longitudinal joints shall be as specified in PennDOT Section 501.3.
  2. Place tie bars as indicated or directed. For non-standard slab lengths, ensure no tie bars are installed within 24 inches of a dowelled contraction joint. To minimize the development of shear cracking, eliminate one tie bar in each slab adjacent to joints where cracks have opened 1/8 inch or greater. In addition, when paving from October 1 to April 1, eliminate one tie bar in each slab adjacent to dominant joints.
  3. 15 tie bars from the first day's concrete placement will be selected according to PTM No. 1. Test each selected tie bar for pull-out resistance after the concrete has attained a compressive strength of 3,500 pounds per square inch. Use a center-pull hydraulic jack with a load measuring gage and bearing ring capable of testing each tie bar to 12,000 lbs. or to a 1/32 inch slippage. Record the gage reading at point of slippage or 12,000 lbs., whichever occurs first. Pullout resistance must comply with Table B in

## CONCRETE PAVING

Section 501.3. Replace failed tie bars or install additional tie bars until compliance with Table B is attained, at no additional cost to the Owner. Install additional tie bars from the center of slab out in an approved pattern. Do not install additional tie bars within 30 inches of a transverse joint. Do not construct adjacent lanes until the tie bars comply with Table B.

4. Saw tied, longitudinal contraction joints to prevent random cracking, as specified in Section 501.3(j)2. Thoroughly flush the joints to remove the slurry immediately after sawing. Continue curing and protect the joint until it is sealed.
5. If a longitudinal crack occurs within a lane, remove and replace slabs containing the crack at no additional cost to the Owner. If damage to the pavement surface occurs, repair in an approved method at no additional cost to the Owner. Join original and replacement pavements.

### H. Transverse Joints

1. In new multilane pavements, place transverse joints perpendicular to centerline to form a continuous joint across the entire pavement width and locate dowels as shown on the Standard Drawings, except where paving operations must cease temporarily because of unavoidable conditions.
2. Handle LTU assemblies with care to avoid damaging the corrosion protection barrier. Remove and replace dowels with damaged coating before placement of concrete.
3. Place and anchor LTU assemblies so that dowel misalignments before concrete placements do not exceed the following limits:
  - a. Vertical tilt or horizontal skew: 0.25 inch maximum displacement of each end of the dowel relative to the midpoint of the dowel.
  - b. Longitudinal translation: 1 inch maximum.
  - c. Horizontal translation: 1 inch.
  - d. Vertical translation: as shown on the standard drawings.
4. When LTU are used, secure them in place at the designated locations shown in advance of paving operations to prevent their movement during paving operations.
5. When constructing adjacent concrete pavement, shoulders, or structures after pavement construction, seal the ends of all transverse joints and cracks to prevent intrusion of cement mortar into the joints and cracks. In these cases, when saw cutting transverse joints in the newly constructed lane or shoulders, saw cut the existing transverse joint in the previously placed lane to ensure the removal of any mortar that might have intruded into the joint.
6. Construction Joints

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- a. If more than a 30-minute interruption occurs in concreting operations, construct a transverse joint using a bulkhead. Place dowels in bulkheads by drilling or inserting into fiberglass dowel sleeves. Do not construct a transverse joint within 10 feet of another transverse joint. If not enough concrete has been placed or mixed at the time of interruption to form a slab at least 10 feet long, remove concrete to the preceding joint and dispose of excess mix.

### 7. Contraction Joints

- a. Accurately mark using tacks or other approved methods the location for the center of the sawed transverse contraction joints. The sawed transverse joint must be located directly +/- 1 inch over the centerline of the dowel basket assemblies or the centerline of the mechanically implanted dowels. Saw joints with equipment having guides, a blade guard, water cooling system, and cut-depth control. Provide adequate and extra equipment and parts at the site, before placing concrete and during sawing operations.
- b. Saw joints as soon as concrete has sufficiently hardened to allow sawing without excessive raveling resulting from the sawing operation and to prevent random cracking. Saw joints to a depth of D/3 and a width of 1/8 inch. If initial saw cuts do not extend through the slab edge to avoid blowouts or edge damage of green concrete, extend these cuts through the edge as soon as it can be done without causing damage. If damage to the pavement occurs, repair in an approved method at no additional cost to the Owner.
- c. If the pavement is cured by means other than white membrane curing compound, remove curing materials from pavement, at the location where a joint is to be cut. Only remove sufficient covering to provide space necessary for sawing joints. Immediately after sawing the initial saw cut, thoroughly flush the joint to remove the slurry. Place oversized (width plus 50%) backer rod in the top of the sawed joint to maintain cure. Monitor the movement of the joint throughout the cure period and up to placement of permanent seal. If at any time the joint opens, remove and replace backer rod with appropriate oversized backer rod. The maximum time period allowed for curing covers to be removed for sawing is ½ hour. If white membrane curing compound is used, reapply curing compound as specified.
- d. In all concrete pavement where adjacent concrete pavement, shoulders, or structures are to be placed, mark all dominant joints within 48-hours of joint activation using a method approved by the Owner. Align the location of the first joints to be sawed in the adjacent concrete pavement, shoulder, or structure with the marked dominant joints to encourage dominant joint development in the adjacent concrete pavement, shoulder, or structure. Saw remaining joints before uncontrolled cracking occurs. Make the full required depth cut from edge to edge of the pavement. In formed paving, do

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this by loosening or removing the side forms or by other acceptable methods. When paving from October 1 to April 1, the use of early entry saws or another approved method is recommended to encourage dominant joint development in the adjacent lane at the same location of dominant joints in the previous lane.

- e. For second stage sawing of joints, saw the sealant reservoir 72 hours or more after placing the concrete.
- f. Thoroughly flush joints with pressurized water to remove slurry and all deleterious material immediately after sawing. Continue curing and protect joint until sealed.
- g. If a crack or spall occurs at any location and any time before final inspection and resolution of all issues regarding the condition of the pavement, repair the pavement according to Table A, Repair Procedures for Deficiency in New Concrete Pavement, at no additional cost to the Owner. Field coat the dowels with the bond-breaker lubricant as specified, where necessary as determined by the Owners Representative. Join original pavement to replacement pavement and test as specified in PennDOT Section 507; if Ride Quality and Incentive are not applicable, test as specified in PennDOT Section 501.3.
- h. Patch voids or spalls, in excess of the specified width, as specified in PennDOT Section 525.

### 8. Expansion Joints

- a. Place transverse expansion joints, where indicated. If existing concrete pavements are widened, align transverse expansion joints, if possible, with existing expansion joints. Conform to the dimensions and locations in adjacent concrete curb. Place expansion joint filler, as indicated or as directed.
- I. All transverse joints in a concrete pavement shall extend entirely through the integral curb. The material used to construct the joint in the curb shall be of the same kind as provided for the pavement.
  - J. Filler shall be used to construct the expansion joints in the integral curb of reinforced concrete pavements. The thickness of the filler material in the curb above the gutter shall be 1-inch (25 mm). The joint material shall be precut so as to conform to the geometric shape and cross-sectional area of the curb, and shall be placed in intimate contact with the filler material in the pavement.
  - K. The edges of all transverse joints in the integral curb shall be rounded with an approved finishing tool, having a radius of 1/4 inch (5 mm).

### 3.11 CONSOLIDATING AND FINISHING

- A. The sequence of operations after the placing of concrete shall be:

## CONCRETE PAVING

1. striking off and consolidating,
2. floating,
3. straightedge testing and surface correction,
4. and final finishing.

### B. Strike-Off and Consolidation

1. **Machine Method:** Immediately after placing, strike off and screed the concrete, with a finishing machine, as necessary to properly consolidate the concrete and to leave a uniform textured surface. Keep the top of forms free from accumulation of concrete or of foreign material. Maintain true machine travel on the forms without lift, wobble, or other variations that affect accurate finishing. Use equipment that does not groove the concrete pavement edges for a width greater than can be eliminated by edging tools. Use a rubber-tired wheel to support the spreader and a transverse finishing machine on the adjoining concrete pavement surface, keeping the wheel approximately 12 inches from the pavement edge. Maintain a uniform roll of concrete ahead of the finishing machine front screed for its entire length. Overlap the previously screeded concrete on the last pass. Place and vibrate concrete adjacent to joints and other areas, as specified in PennDOT Section 501.3, then bring the finishing machine forward. Operate the machine carefully to avoid damage, misalignment of joints, or concrete segregation. Do not add water or monomolecular film to the concrete surface to assist in finishing.
2. **Manual Method:** Unless otherwise directed, do not use manual strike-off methods, except to strike off concrete already deposited on the subbase if a breakdown of mechanical equipment occurs or on small turnout areas and patches up to 10 feet in length. If finishing manually, use screeds contoured to the pavement cross section. Provide screeds sufficiently rigid to retain their shape and at least 2 feet longer than the maximum slab width to be struck off. Operate the equipment in a manner to obtain consolidation and a uniform textured surface free of porous areas. Consolidate as specified in PennDOT Section 501.3.

### C. Floating

1. After the concrete has been struck off and consolidated, smooth and fill in open-textured pavement areas with a float, as necessary. Do not add water or monomolecular film to the surface to assist in finishing and do not over finish. Mechanical floats or long handled floats may be used. Do not use steel or Fresno floats.

### D. Straightedge Testing and Surface Correction

1. While concrete is still plastic, test the surface using a 12-foot straightedge, swung from handles 3 feet longer than one-half the slab width, as required. Hold the straightedge in contact with the surface in successive positions. Advance in successive stages of not more than 5 feet a stage. Immediately

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correct low areas, then strike off, consolidate, and refinish. Cut down high areas and refinish. Make sure the surface across joints meets requirements for smoothness as specified in PennDOT Section 501.3. Continue straightedge testing and surface corrections until the entire surface is free from observable departures from the straightedge and until the slab conforms to the required grade and cross-section.

### E. Final Finish

1. After floating, straightedge testing and surface corrections have been completed, all excess moisture has disappeared, and before concrete becomes non-plastic, provide initial texturing with a turf drag or broom device to produce striations parallel with centerline.
2. Longitudinal texture, transverse texture, and macrotexture shall be as specified in PennDOT Section 501.3.

## 3.12 CURING

- A. Apply curing materials after finishing and texturing, and within 30 minutes of the dissipation of bleed water. Maintain the curing materials until the pavement has achieved sufficient strength for opening to traffic as specified in PennDOT Section 501.3. Do not mar the concrete surface. After removing forms and correcting honeycombed areas, cure the sides with the same method as the surface. When using covers, secure over the entire surface and sides. The Representative will suspend concrete operations immediately if sufficient curing is not provided. Cure by the same method throughout the work unless directed to change by the Owners representative. Have material available for emergency curing.
- B. If normal curing is delayed, apply an intermediate monomolecular film curing compound to all cement concrete patches before normal curing. Apply the monomolecular film in a light-fog application, using a pressure spray tank with an adjustable nozzle. Use a water-to-curing agent ratio and rate of application both according to the manufacturer's recommendations. Agitate the solution before each application. Apply the curing compound in a continuous film, immediately after finishing and texturing operations are completed on any area. Do not provide any additional finishing after application of the monomolecular film. Apply additional applications as required, if surface drying is taking place and curing covers have not been placed. After application of the monomolecular film, provide normal curing as specified.
- C. For all accelerated strength concrete pavements, provide insulation or heating of pavements during the curing operation. Control the curing temperature and monitor at least hourly to ensure that the concrete pavement does not experience a curing temperature change in excess of 40F within any 1-hour period during the curing operation. If a change in curing temperature in excess of 40F occurs in the concrete pavement within any 1-hour period, the work will be considered defective.
- D. Additional curing methods are as specified in PennDOT Sections 501.3(l)1.a through 501.3(l)1.f.

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- E. If the forecasted air temperature during concrete curing is expected to fall below 50F, place high-low thermometers on the concrete surface and monitor concrete curing temperatures. Protect the pavement surface and sides to effectively maintain a temperature of not less than 40F until the pavement has achieved sufficient strength for opening to traffic as specified in Section 501.3. If at any time during this period the high-low thermometer falls between 40F and 35F, extend the cure period by an additional day. If at any time during the curing period the high-low thermometer temperature falls below 35F, the concrete will be considered defective. Remove and replace defective pavement as specified in Section 501.3 at no additional cost to the Owner. For applications less than 6 inches in normal depth, provide adequate insulating blankets to prevent rapid heat loss if the air temperature is 45F or less. Insulation may be removed when the air temperature exceeds 45F or when the pavement has achieved sufficient strength for opening to traffic as specified in Section 501.3. When insulation is used to protect the pavement, remove insulation in a manner such that the rate of temperature change at the concrete surface does not exceed 40F within any 1-hour period. Concrete that experiences a higher rate of temperature change will be considered defective. The application or removal of insulation covers may be controlled by the use of maturity method as specified in PennDOT Section 501.3, with full removal of insulation allowed after the minimum required degree-hours of curing has been accumulated at the top of the slab.

### 3.13 REMOVAL OF FORMS

- A. Do not remove forms from freshly placed concrete until it has set.
- B. Remove the forms carefully to avoid pavement damage.

### 3.14 SEALING JOINTS AND CRACKS

- A. Seal all joints widened with second stage saw cuts before opening any pavement section to construction equipment or traffic. The Contractor may open pavement to construction equipment or traffic provided second stage sawing has not occurred, a backer rod is installed and maintained near the surface, initial concrete strength is attained, and curing requirements are met. Provide construction equipment within vehicle code limits. Seal cracks as indicated or directed. If the pavement is to be overlaid as part of this work, do not widen the joints with second stage saw cuts and do not seal except for expansion joints.
- B. Thoroughly clean the joint and the joint reservoir of all scale, dirt, curing compound, temporary joint sealing material, and other foreign material using methods that will not damage the joint, but will be sufficient enough to remove all contaminants and debris on both faces of the joint. Media blast each joint reservoir sidewall to clean and roughen the surface to ensure proper bonding with sealant material. Immediately before placing bond breaker or joint sealing material, ensure the joint is free of moisture and other contaminants. Do not place joint sealing material until the faces are thoroughly clean and dry to the satisfaction of the OWNER's representative.

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### C. Poured in Place Seal

1. Do not place poured joint-sealing material if the air temperature is less than 40F, unless allowed.
  - a. For hot-poured seals, seal all joints with an approved hot-pour or silicone sealant material according to the manufacturer's recommendations. Use heating equipment of an indirect heating type, constructed as a double boiler. Provide positive temperature control and mechanical agitation. Determine the safe heating temperature range and recommended pouring temperature from the manufacturer's shipping container. Heat and maintain the material temperature within these recommended safe temperatures. Place the material as close as possible to the recommended pouring temperature. Do not maintain any single batch of material at the pouring temperature for more than 6 hours. Reheat according to the manufacturer's recommendations.
  - b. Fill the joint reservoir with sealing material to the level shown on the drawings. Do not allow sealing material to spread over the pavement surface.
  - c. When required, place the tape bond breaker and/or backer rods on the bottom surface of the joint reservoir before sealing. Do not extend tape up the reservoir face more than 1/8 inch. If necessary for support, install an acceptable joint backing material below the tape.

### D. Neoprene Seals

1. Install preformed neoprene seals as specified, using installation equipment capable of placement without cutting, nicking, twisting, or damaging the seal. Install seals with lubricant adhesive applied, according to manufacturer's recommendations, to the contact surfaces of the joint faces or sides of the seal. Install seal in one piece to the depth indicated unless approved. Do not elongate the seal more than 3% or compress longitudinally more than 2%.
2. Prepare and submit a QC Plan to the Representative at the start of the project, as specified in PennDOT Section 106.03(a)2. As a minimum include the following in the QC Plan: Contractor's and manufacturer's representatives; list of equipment and construction sequence; list of material, along with sampling and testing procedures; test section schedule; and procedure to replace unacceptable seals.
3. Before sealing joints, seal a minimum of three full-width pavement joints, according to the test section schedule specified in the QC Plan. Have the manufacturer's representative witness the test section(s) unless otherwise allowed in writing. The Representative will inspect the test section(s). Do not seal the remaining pavement joints until the Representative accepts an installation procedure. Conduct test(s) according to QC Plan when material is changed or seal installations are unacceptable.

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4. Replace seals exceeding 3% elongation or 2% compression, or otherwise not conforming to the specifications at no additional cost to the Owner. Patch pavement damaged by removing unacceptable seals and adhesive as specified in PennDOT Section 525.

### E. Silicone Seals

1. Prepare the joint and place silicone sealant material according to the manufacturer's recommendations.

## 3.15 TRAFFIC CONTROL

- A. Provide all measures necessary to protect and maintain traffic and to protect the Work in accordance with Section 01 50 00, Temporary Facilities Controls, and with the Pennsylvania Manual of Uniform Traffic Control Devices.

## 3.16 PROTECTION AGAINST RAIN

- A. The CONTRACTOR shall adequately protect the new concrete from the effects of rain before the concrete has sufficiently hardened. For this Work, the CONTRACTOR shall have available on the job site at all times enough burlap or 6-mil (150 µm) thick polyethylene film to cover and protect one day's Work. When rain appears eminent, all operations shall stop and personnel shall begin covering. As soon as the rain ceases, the concrete shall be uncovered and the surface burlap dragged where necessary. Curing compound shall be applied to any areas where the compound has been disturbed or washed away. Protection of the new concrete against rain shall be at the CONTRACTOR's expense.

## 3.17 COLD WEATHER PROTECTION

- A. Any time there is a danger of freezing temperatures, the CONTRACTOR shall have available on-site a sufficient amount of clean, dry straw or hay or polyethylene film or other approved materials to cover at least one (1) day's production. Cold weather protection shall be at the CONTRACTOR's expense. The source of the temperature shall be taken from forecasts prepared by the local weather bureau, recognized as the Official Weather Bureau for the area the new Work is being constructed. The predicted low temperature shall be that forecast to occur during the next 24 hours.
- B. Frozen material shall not be charged into the mixer at any time.
- C. Frost or ice shall be removed from the forms and any steel used in the pavement, prior to placing concrete.
- D. Concrete shall not be placed directly upon a frozen subgrade. The subgrade shall be covered with a layer of straw or hay 12 inches (300 mm) in thickness to protect it against freezing. The straw or hay shall be removed from the finished subgrade immediately ahead of paving operations and piled along the line of construction for use in covering the finished pavement. Prior to the placing of concrete, the subgrade shall be cleaned of loose straw and otherwise prepared in a manner

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satisfactory to the ENGINEER. Other covering materials as approved by the ENGINEER may be used to prevent subgrade freezing.

- E. To accelerate hardening of the concrete when the temperature of the air in the shade and away from artificial heat is between 45 degrees F and 40 degrees F (7° C to 4° C), calcium chloride shall be added to the mix at the rate approved by the ENGINEER. The calcium chloride shall be spread on the materials immediately before discharging into the drum of the mixer. A method approved by the ENGINEER, shall be used for measuring the amount of dry calcium chloride to be added to each batch of concrete. The calcium chloride shall not be placed in contact with the cement.
- F. Immediately after finishing of the concrete and as soon as hardening of the concrete will permit, the pavement shall be covered and the protective covering shall remain in place until the concrete has developed a compressive strength of not less than 3,000 pounds per square inch (21 MPa) or for a minimum period of 14 days or as approved by the ENGINEER.
- G. The protective covering shall be placed around and over the forms and it shall extend beyond the edge of the pavement for a distance at least equal to the depth of covering required.
- H. When removing forms, the protective covering should be removed for as short a time as possible and should be replaced promptly to prevent loss of heat.
- I. The mixing and placing of concrete shall stop in sufficient time each day to permit finishing of the concrete and the placing of the required protective covering during daylight hours.
- J. The requirements specified herein for the curing and protection of concrete in cold weather are minimum requirements, and the CONTRACTOR shall be responsible for the quality and strength of the concrete placed. Any concrete injured by frost action shall be removed and replaced at the CONTRACTOR's expense.
- K. Between October 1 and April 1, when the predicted low temperature is to be below 35 degrees F (2° C) at any time within 72 hours after placing the pavement, the pavement shall be protected and such protective covering shall remain in place until the concrete has developed a compressive strength of not less than 3,000 psi. (21 MPa), or for a minimum period of 14 days, unless otherwise authorized by the ENGINEER.
  - 1. Special Protection
    - a. No pavement may be placed between October 1 and April 1, unless it is specifically provided for in the Contract Documents, or authorized by the ENGINEER, except that in no case shall concrete be placed when the predicted high temperature is to be below 35 degrees F (2° C), without written permission of the ENGINEER. When paving is permitted during the period, the following requirements shall apply:

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- b. The temperature of the concrete at the time it is placed on the subgrade shall be not less than 50 degrees F (10° C), nor more than 85 degrees F (30 ° C).
  - c. In order to maintain a mix temperature between 50 degrees F (10° C) and 85 degrees F (30 ° C) the mixing water or the aggregates, or both, shall be heated as required by the ENGINEER. The water and the aggregates shall be heated to a temperature of not more than 150 degrees F (65° C). The heating of aggregates shall be done by the use of steam pipe under the aggregate piles, or by free steam discharged into the aggregate piles, or by steam pipe in the batching bins. The heating of the water and the aggregates shall be controlled so that there will not be any large differences in temperature from batch-to-batch.
  - d. When there is any danger of the predicted low temperature dropping below 35 degrees F (2° C) all the necessary materials for covering and protecting the concrete, equipment for heating the water and aggregates, when required, and calcium chloride shall be on the Project and available for immediate use for the required method of curing and cold weather protection before any pavement is placed.
  - e. For predicted low temperatures from 35 degrees F (2° C) to 25 degrees F (-4° C) either 1-layer of waterproof paper blankets or 1-foot (300 mm) of loose dry straw or hay shall be placed.
  - f. For predicted low temperatures of 20 degrees F (-7° C) to 25 degrees F (-4° C) 1-layer of waterproof paper blankets and 1-foot (300 mm) of loose dry straw or hay shall be placed.
  - g. For predicted low temperatures less than 20 degrees F (-7° C) the minimum requirement for cold weather protection will be 1-layer of waterproof paper blankets and 1-foot (300 mm) of loose dry straw or hay overlaid with a waterproof protective covering consisting of tarpaulins, paper blankets, polyethylene sheeting or other approved material.
- 2. When temperature are such that special protection is required as specified above, all concrete placed within the proceeding 72 hours shall be similarly protected.
  - 3. When special protection is started, it shall be continued until design strength is reached in accordance with the above requirements unless warmer temperatures prevail for a period of at least 48 hours. Permission to eliminate special protection for such a period shall be as approved by the ENGINEER.
- L. Protection of the new concrete against cold weather including ordinary and special protection shall be at the CONTRACTOR's expense.

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### 3.18 CONCRETE TEMPERATURE LIMITATIONS

- A. Concrete shall not be placed when the temperature of the concrete at the point of placement is above 90 degrees F (32° C).

### 3.19 CURB DROP

- A. Curb drops shall be provided for existing and future sidewalk ramps, for approaches for existing driveways and at other locations as determined by the ENGINEER.
- B. Curb drops for sidewalks shall be in accordance with the current rules and regulations of PennDOT Publication 72M, as amended. Curb drops for drive approaches shall be centered with the existing driveway at the property line.
- C. The width of the residential curb drop shall be equal to the width of the driveway determined at the property line plus four feet. Unless otherwise approved by the ENGINEER, the minimum width of the residential curb drop shall be 14 feet (4.5 m).

### 3.20 SHOULDERS

- A. The shoulders shall be constructed according to the lines, grades, and cross section shown on the Plans and as specified for the particular type of shoulder material required. The shoulders shall be done in such sequence with the surfacing operations that they will be completed not more than seven (7) days after the expiration of the curing period, unless otherwise directed by the ENGINEER.
- B. Aggregate shoulders, when called for, shall be constructed according to the requirements specified under Section 32 11 23, Aggregate Base Courses.

### 3.21 CLEANUP

- A. After the concrete has gained sufficient strength, but no sooner than within 12 hours, the fixed forms shall be removed and the spaces on both sides shall be immediately backfilled with sound earth of topsoil quality. The backfill shall be compacted, leveled and left in a neat, workmanlike condition. At a seasonally correct time approved by the ENGINEER, the disturbed area shall be raked, have topsoil placed thereon, fertilized and seeded per the requirements of Section 32 92 19, Seeding, or sodded in accordance with Section 32 92 23, Sodding.

### 3.22 OPENING PAVEMENT

- A. The ENGINEER reserves the right to require that curing operations be discontinued when the concrete has reached 85% of the design strength, and to require that the shoulders be completed and the slab be opened to traffic.

### 3.23 MONUMENT BOXES

- A. All government, plat, and street intersection monuments within existing or proposed pavement shall be preserved by enclosing in standard monument boxes. Monument box castings shall be furnishing and installed by the CONTRACTOR.

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- B. Existing monument boxes shall be adjusted to meet the proposed pavement elevation by removing the castings and resetting to the required elevation. Support for the monument box shall be concrete bedding, so constructed as to hold them firmly in place. The adjacent pavement, curb, or curb and gutter shall be replaced to the new elevation, condition and kind of construction, unless otherwise provided.

### 3.24 TESTING

- A. During the course of the Work, the ENGINEER may require the taking of standard test cores and cylinders, by a testing laboratory acceptable to the OWNER and approved by the ENGINEER. The cost of testing and coring shall be at the expense of the CONTRACTOR.
- B. For each lane of Work:
1. A minimum of one (1) cylinder for testing compressive strength shall be made for each 500 linear feet (150 m), or fraction thereof, or as determined by the ENGINEER.
  2. A minimum of two (2) cores for testing compressive strength and for checking thickness shall be drilled each 500 feet (150 m), or fraction thereof.
- C. The making of cylinders, the drilling of cores and testing shall be at the expense of the CONTRACTOR.
- D. Slump tests for consistency of Portland cement concrete shall be made in accordance with ASTM C143 and C172.
- E. In the event the test results on a core indicates a deficiency in either thickness or compressive strength or in the event the test results on a cylinder indicates a deficiency in compressive strength, the following adjustments in the unit price for concrete shall be made based on the average of three (3) cores:

1. Thickness

<u>Under Required Thickness</u>	<u>Percent of Reduction in Unit Price</u>
0" to 1/4"	None
by more than a 1/4", but not exceeding a 1/2"	20
by more than a 1/2", but not exceeding 1"	50
by more than 1"	Remove & Replace

## CONCRETE PAVING

### 2. Compressive Strength

<u>Under Required Compressive Strength</u>	<u>Percent of Reduction in Unit Price</u>
0 to 150 psi	None
by more than 150 psi, but not exceeding 300 psi	20
by more than 300 psi, but not exceeding 500 psi	50
by more than 500 psi	Remove & Replace

- F. Reduction in the unit price are additive, that is if an area is deficient by 3/8 of an inch (9 mm) and is under strength by 200 psi (1.4 MPa), the total reduction is 20% plus 20% or a reduction of 40%.
- G. The area of a deficient core shall be determined by the drilling and testing of two (2) additional cores, one (1) on each side of the deficient core and 20 feet (6 m) from it, when possible.
- H. The extra core drilling and testing shall be at the CONTRACTOR's expense.

END OF SECTION

**SECTION 32 13 15  
SIDEWALKS AND DRIVEWAYS**

**PART 1      GENERAL**

1.1 SCOPE

- A. This Section includes sidewalks, sidewalk ramps, driveways, and drive approaches complete with concrete materials, concrete curing compounds, joint materials, field quality control and appurtenances.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 31 11 00: Clearing and Grubbing
- B. Section 31 23 13: Subgrade Preparation
- C. Section 32 92 19: Seeding
- D. Section 32 92 23: Sodding

1.3 REFERENCE STANDARDS

- A. Unless otherwise specified, the Work for this Section shall conform to the applicable portions of the following Standard Specifications:
  - 1. ASTM-American Society of Testing and Materials
  - 2. AASHTO- American Association of State Highway and Transportation Officials
  - 3. PennDOT- Pennsylvania Department of Transportation, Standard Specifications for Construction, latest edition.

1.4 SUBMITTALS

- A. Written permission for the use of all local disposal sites shall be obtained and copies shall be furnished to the ENGINEER.
- B. At the request of the ENGINEER, the CONTRACTOR shall provide the ENGINEER with certification that the various materials to be used conform to the ASTM Standards referred to in the Specification.

1.5 TEST REPORTS

- A. The ENGINEER shall be provided with two (2) certified copies of the test results of the thickness and compressive strength of the concrete. The core drilling, testing for thickness and compressive strength and the certification of the test results shall be performed by a testing laboratory approved by the ENGINEER.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Comply with the requirements for concrete installation due to outside ambient air temperatures specified under Article 3.11 of this Section.

## **SIDEWALKS AND DRIVEWAYS**

### **1.7 PROTECTION**

- A. Comply with the requirements for protecting new Work against damage from rain and cold weather, as specified under Article 3.11 of this Section.

## **PART 2      PRODUCTS**

### **2.1 CONCRETE**

- A. Concrete shall be Class S Cement Concrete in accordance with PennDOT Section 704.

### **2.2 READY-MIXED CONCRETE**

- A. Ready-mixed concrete shall conform to ASTM C94, Alternate 2.

### **2.3 WATER**

- A. Water to be used for mixing and curing concrete shall be reasonably clean and free from oil, salt, acid, alkali, sugar, vegetable, or other substances injurious to the finished product. Waters from sources approved by the Pennsylvania State Department of Public Health as potable may be used without test.
- B. Water requiring testing shall be tested in accordance with the current Method of Test for Quality of Water to be Used in Concrete (AASHTO T26).

### **2.4 CONCRETE CURING COMPOUNDS**

- A. Concrete curing compound shall conform to PennDOT Section 711.2(a).

### **2.5 PREMOLDED JOINT FILLER**

- A. Premolded Expansion Joint filler shall conform to PennDOT Section 705.1.
- B. Filler shall be of the thickness, as specified herein, or on the Plans, or as approved by the ENGINEER.

### **2.6 REINFORCEMENT STEEL**

- A. Welded wire fabric reinforcement made of W4 or W4.5 wire at 6-inch centers transversely and longitudinally conforming to ASTM A1064 Steel Wire and Welded Wire Reinforcement, and PennDOT Section 709.3.

### **2.7 JOINT SEALANT**

- A. Joint Sealing Material as specified in PennDOT Section 705.4 (a), (b), or (c).

### **PART 3**      **EXECUTION**

#### 3.1 VERIFICATION OF EXCAVATION AND FORMING

- A. Prepare foundation per PennDOT Section 676.
- B. Prior to the installation of any concrete, examine the excavation and forms for the proper grades, lines, and levels required to receive the new Work. Ascertain that all excavation and compacted subgrades are adequate to receive the concrete to be installed.
- C. Correct all defects and deficiencies before proceeding with the Work.

#### 3.2 EXISTING IMPROVEMENTS

- A. Investigate and verify location of existing improvements to which the new Work is to be connected.
- B. Adjustments in line and grade to align the new Work with the existing improvements must be approved by the ENGINEER, prior to any change.

#### 3.3 FORMING

- A. The forms shall be of wood or metal, straight and free from warp, clean, and of sufficient strength to resist springing during the process of depositing concrete against them.
- B. The forms shall be the full depth of the concrete.

#### 3.4 SIDEWALKS, SIDEWALK RAMPS, DRIVEWAYS, AND DRIVEWAY APPROACHES

- A. Unless otherwise noted in the Contract Documents, all sidewalks and sidewalk ramps shall be four (4) inches (100 mm) thick, except at driveways, where the thickness of the sidewalks shall be six (6) inches (150 mm).
- B. Sidewalks shall be five (5) feet (1.5 m) wide unless otherwise noted on Plans, and shall slope 1/4 inch per foot (20 mm/m) towards the surface drainage side which in general will be towards the center of the road. Normally sidewalks will be located within the right-of-way, parallel the property lines, at a distance of 1-foot (300 mm) from the property line.
- C. Driveways and approaches shall be six (6) inches (150 mm) thick. The width of driveways and driveway approaches shall be as specified on the Plans or as determined by the ENGINEER. Construct driveways per PennDOT Section 676.3 (k).

## **SIDEWALKS AND DRIVEWAYS**

### **3.5 REMOVE CURB FOR CURB DROP**

- A. Construction of sidewalk ramps within street intersections where curbed pavement exists shall conform to the current rules and regulations of PennDOT Publication 72M and PennDOT Section 676.3 (j).
- B. Where there is no proper curb drop for the sidewalk ramp or driveway approach, the CONTRACTOR shall saw cut, to full depth of pavement, and remove a minimum of an 18-inch (450 mm) wide curb and gutter section. When mountable curbs are present, the CONTRACTOR shall remove a 24-inch (600 mm) wide curb and gutter section for the construction of sidewalk ramp, as specified above.
- C. The length of curb and gutter removal shall be determined by the ENGINEER in the field but shall be at least as wide as the proposed sidewalk ramp plus 1-foot (300 mm) on each side.
- D. The removed curb and gutter section shall be replaced with material, equal to what was removed and the joint sealed with hot poured rubber asphalt.
- E. Curbs may be cut or ground down with an approved concrete grinder when the final results will leave the cut or ground down curb in a smooth, clean condition acceptable to the ENGINEER. Any curbs that are cut or ground down that are not acceptable to the ENGINEER, shall be removed and replaced as specified above at no additional cost.

### **3.6 PLACEMENT OF FORMS**

- A. Wood forms, straight and free from warp, of nominal depth may be used for sidewalk sections less than 25 feet (7.5 m) in length.
- B. Forms shall be staked to line and grade in a manner that will prevent deflection and settlement.
- C. When unit slab areas are to be poured, slab division forms shall be so placed that the slab division joints will be straight and continuous.
- D. Forms shall be set for sidewalk ramps to provide a grade toward the centerline of the right-of-way in accordance with current standards. The grade shall be uniform, except as may be necessary to eliminate short grade changes.
- E. Forms shall be oiled before placing concrete. Forms shall remain in place at least 12 hours after the concrete is placed. There shall be sufficient forms placed ahead of the pouring operations to maintain uninterrupted placement of concrete.
- F. The use of slip form pavers can be allowed when approved by the ENGINEER in lieu of the construction system described above.

### **3.7 JOINTS**

- A. Sidewalk joints shall be installed per PennDOT Section 676.

## SIDEWALKS AND DRIVEWAYS

- B. Transverse and longitudinal expansion and plane-of- weakness joints shall be constructed at the locations specified herein, or as indicated on the Plans or as approved by the ENGINEER.
- C. The transverse expansion joints shall be placed for the full width and depth of the new Work. The transverse expansion joints placed against any existing pavement shall be a minimum of six (6) inches (150 mm) deep but no less than the thickness of the concrete being placed.
- D. Longitudinal expansion joints shall conform to the same requirements as transverse expansion joints.
- E. Joints shall be constructed true to line with their faces perpendicular to the surface of the sidewalk. The top shall be slightly below the finished surface of the sidewalk. Transverse joints shall be constructed at right angles to the centerline of the sidewalk and longitudinal joints shall be constructed parallel to the centerline or as determined by the ENGINEER.
- F. Unless otherwise specified on the Plans or unless otherwise determined by the ENGINEER, when the sidewalk is constructed in partial width slabs, transverse joints in the succeeding slabs shall be placed in line with like joints in the adjacent slab. Also, in the case of widening existing sidewalks, transverse joints shall be placed in line with like joint in the existing sidewalk.
- G. Transverse expansion joints, 3/4 inch (20 mm) thick, shall be placed through the sidewalk at uniform intervals of not more than 50 feet (15 m) and elsewhere as shown on the Plans, or as determined by the ENGINEER.
- H. Expansion joints, 3/4 inch (20 mm) thick, shall also be placed between the sidewalk and back of abutting parallel curb, buildings or other rigid structures, concrete driveways and driveway approaches. The expansion joint between sidewalks and buildings shall be placed 1-foot from the property line and parallel to it.
- I. Expansion joints, 1-inch (25 mm) thick, shall be placed between sidewalk ramps or driveway approaches and the back of curbs.
- J. Plane-of-weakness joints shall be formed every five (5) feet (1.5 m) and shall be produced by use of slab divisions forms extending to the full depth of the concrete or by cutting joints in the concrete, after floating, to a depth equal to 1/4 the thickness of the sidewalk. The cut joints shall not be less than 1/8 inch (3 mm) nor more than 1/4 inch (5 mm) in width and shall be finished smooth and shall be at right angles to the centerline of the sidewalk.

### 3.8 PLACING AND FINISHING CONCRETE

- A. Concrete shall be placed per PennDOT Section 676.3 (d).

## **SIDEWALKS AND DRIVEWAYS**

- B. All concrete shall be placed on a prepared unfrozen, smooth, leveled, rolled and properly compacted base as indicated on the Plans. The surface of the subbase shall be moist with no visible water present prior to placement of the concrete.
- C. The concrete shall be deposited, in a single layer, to the depth specified in the Plans or in the Proposal. The concrete shall be thoroughly spaded or vibrated and compacted to fill in all the voids along the forms and joints. The concrete shall be struck off with a strike board until all voids are removed and the surface has the required grade and cross section as indicated on the Plans.
- D. The surface of the concrete shall be floated just enough to produce a smooth surface free from irregularities. All edges and joints shall be rounded with an edger having a 1/4 inch (5 mm) radius. The surface of sidewalks, driveways and approaches shall be broomed to slightly roughen the surface.
- E. The surface of sidewalk ramps shall be textured with a coarse broom transversely to the ramp slope. The texture on sidewalk ramps shall be coarser than the remainder of the sidewalk.

### **3.9 CURING**

- A. Conform to PennDOT Section 501.3(l), except apply Type 2 white pigmented liquid membrane forming curing compound after finishing and texturing, and within 30 minutes of the dissipation of bleed water.
- B. Apply curing compound homogenously to produce a uniform, solid white opaque coverage on the horizontal and vertical surfaces of the sidewalk.
- C. Apply at or greater than the manufacturer's recommended application rate, and according to the manufacturer's recommendations.
- D. After curing a minimum of 28 days, clean the concrete surface of curing compound and apply a penetrating sealer.

### **3.10 BARRICADES**

- A. Suitable barricades and lights shall be placed around all newly poured sidewalks, sidewalk ramps, driveways, driveway approaches and curb and gutter section in order to protect the new Work from damage from pedestrians, vehicles and others until the concrete has hardened.
- B. Barricades shall be left in place for a minimum of two (2) days, except for driveway approaches and curb and gutter section. Barricades shall remain in place for a minimum of three (3) days.
- C. Any concrete that suffers surface or structural damage shall be removed and replaced by the CONTRACTOR at his expense.

## SIDEWALKS AND DRIVEWAYS

### 3.11 PROTECTION

- A. The CONTRACTOR shall adequately protect the new concrete from the effects of rain before the concrete has sufficiently hardened. For this Work the CONTRACTOR shall have available on the job site at all times enough burlap or 6-mil thick polyethylene film to cover and protect one (1) day's work. When rain appears eminent, all operations shall stop and personnel shall begin covering. As soon as the rain ceases, the concrete shall be uncovered and the surface burlap dragged where necessary. Curing compound shall be applied to any areas where the compound has been disturbed or washed away.
- B. If concrete is placed between October 15 and May 15, the CONTRACTOR shall have available on the site sufficient amount of clean, dry straw or hay to cover one day's production. If the temperature reaches 40 degrees F (4 ° C) and is falling, the hay or straw shall be placed 12 inches (305 mm) thick, immediately after the curing compound is applied. If the temperature is 30 degrees F (-1 ° C) and falling the curing shall be by 6-mil thick polyurethane film placed on the concrete as soon as the surface moisture has disappeared, and then covered with 12 inches (300 mm) of straw or hay.
  - 1. If the temperature in the shade falls below 50 degrees F (10 ° C), the water, sand and coarse aggregate shall be heated in that order sufficiently to maintain a uniform temperature of the concrete at between 70 degrees F and 80 degrees F (21 ° to 27 ° C).
- C. Concrete shall not be placed when the temperature of the concrete at the point of placement is above 90 degrees F (32 ° C).

### 3.12 CLEANUP

- A. After the concrete has gained sufficient strength, but no sooner than within 12 hours, the fixed forms shall be removed. After removal of forms, fill minor honeycombed areas with mortar. As directed by ENGINEER or OWNER, remove and replace defective major honeycombed areas.
- B. After the concrete has cured for at least 72 hours, backfill spaces adjacent to the sidewalk, using acceptable embankment material, as specified in PennDOT Section 206.3(b)4. The backfill shall be compacted, leveled and left in a neat, workmanlike condition.
- C. Repair or replace existing pavement, curb, and sidewalk damaged because of construction. Satisfactory dispose of unsuitable and surplus materials.
- D. At a seasonally correct time approved by the ENGINEER, the disturbed area shall be raked, have topsoil placed thereon, fertilized and seeded per the requirements of Section 32 92 19, Seeding, or sodded in accordance with Section 32 92 23, Sodding.

## SIDEWALKS AND DRIVEWAYS

### 3.13 TESTING

- A. The ENGINEER may require that a minimum of two cores be drilled from the sidewalk for each 500 (or fraction thereof) linear foot (150 m) section placed. At least one (1) core out of two (2) required will be taken from the sidewalk at the driveway. One (1) core may be required from every 20 (or fraction thereof) of driveway approaches or sidewalk ramps installed.
- B. The cores shall be checked for depth and compressive strength. The core drilling and tests shall be done by a testing laboratory designated by the OWNER and at the expense of the CONTRACTOR. The testing laboratory shall furnish the ENGINEER with two (2) certified copies of the test results.
- C. In the event the test results on a core indicates a deficiency in either thickness or compressive strength the following adjustments in the unit price for concrete shall be made:

#### 1. Thickness

<u>Under Required Thickness</u>	<u>Percent of Reduction in Unit Price</u>
0" to 1/4"	None
by more than a 1/4", but not exceeding a 1/2"	20
by more than a 1/2", but not exceeding 1"	50
by more than 1"	Remove & Replace

#### 2. Compressive Strength

<u>Under Required Compressive Strength</u>	<u>Percent of Reduction in Unit Price</u>
0 to 150 psi (0 to 1 MPa)	None
by more than 150 psi, but not exceeding 300 psi (1 MPa to 2 MPa)	20
by more than 300 psi, but not exceeding 500 psi (2 MPa to 3.5 MPa)	50
by more than 500 psi (Greater than 3.5 MPa)	Remove & Replace

- D. The area of the deficient core shall be determined by the drilling and testing of two (2) additional cores, one (1) on each side of the deficient core and 20 feet (6

## **SIDEWALKS AND DRIVEWAYS**

m) from it when possible. The extra core drilling and testing shall be at the expense of the CONTRACTOR.

- E. Reductions due to deficiencies in thickness or compressive strength are additive, that is, if an area is deficient by 3/8 inch (9 mm) and under strength by 200 psi (1.3 MPa), the total reduction is 20% plus 20% or 40% reduction.

END OF SECTION

**SECTION 32 17 23  
PAVEMENT MARKINGS**

**PART 1   GENERAL**

1.1   SCOPE OF WORK

- A.   This Section includes pavement markings complete with materials, layout of markings and preparation of pavement surfaces.

1.2   RELATED WORK SPECIFIED ELSEWHERE

- A.   Section 32 12 16: Bituminous Paving
- B.   Section 32 13 13: Concrete Paving

1.3   REFERENCE STANDARDS

- A.   Unless otherwise specified, the Work for this Section shall conform to the applicable portions of the following Standard Specifications:
  - 1.   ASTM - American Society of Testing and Materials
  - 2.   AASHTO - American Association of State Highways and Transportation Officials
  - 3.   PennDOT - Pennsylvania Department of Transportation, Standard Specifications for Construction, latest edition

1.4   REQUIREMENTS OF REGULATORY AGENCIES

- A.   Where applicable pavement markings shall conform to the current requirements of the Pennsylvania Manual of Uniform Traffic Control Devices issued under provisions of the Pennsylvania Code, Chapter 212, Title 67, as amended.

1.5   PRODUCT DELIVERY, STORAGE AND HANDLING

- A.   Deliver all materials to the Project site in original, unopened waterproof containers.
- B.   Packaging containers shall bear manufacturing labels intact and legible.
  - 1.   The label shall contain the following information:
    - a.   Name and address of manufacturer
    - b.   Shipping point
    - c.   Trade mark or trade name
    - d.   Type of paint
    - e.   Formula
    - f.   Amount in U.S. gallons
    - g.   Date of manufacture
    - h.   Lot number
    - i.   AASHTO Specification Number
- C.   Store all materials in waterproof containers, under protective covering, off the ground and away from extreme heat or cold until ready for use.

## **PAVEMENT MARKINGS**

- D. Handling of materials shall be in accordance with the manufacturer's recommendations.

### 1.6 ENVIRONMENTAL REQUIREMENTS

- A. CONTRACTOR shall comply with the appropriate environmental limitations (air temperature, pavement temperature, and relative humidity) as outlined in PennDOT's current Specifications.

## **PART 2      PRODUCTS**

### 2.1 WATERBORNE PAVEMENT MARKING PAINT

- A. Waterborne pavement markings shall conform to PennDOT Section and be selected from PennDOT Bulletin 15.

### 2.2 HOT THERMOPLASTIC PAVEMENT MARKINGS

- A. Hot applied thermoplastic pavement markings shall conform to AASHTO M249, white and yellow thermoplastic striping materials (solid form) and PennDOT Section 960, and be selected from PennDOT Bulletin 15.

### 2.3 EPOXY PAVEMENT MARKINGS

- A. Two-component, epoxy resin pavement markings shall conform to PennDOT Section 964 and be selected from PennDOT Bulletin 15.

### 2.4 TEMPORARY PAVEMENT MARKING TAPE

- A. Temporary Pavement Marking Tape shall conform to PennDOT Section 901 and be selected from PennDOT Bulletin 15.

### 2.5 GLASS BEADS

- A. Glass beads shall conform to PennDOT Section 1103.14 as well as the Sections for the type of paint specified above.

## **PART 3      EXECUTION**

### 3.1 VERIFICATION OF EXISTING CONDITIONS

- A. Prior to the placing of any pavement markings, examine the limits of the new Work and ascertain that the existing surfaces are adequate to receive the material to be installed.

### 3.2 PREPARATION OF SURFACE

- A. Surfaces to be painted must be thoroughly dry and free from dirt, loose paint, oil, grease, wax and other contaminants.

## PAVEMENT MARKINGS

- B. Costs incurred for removing and disposing of unsuitable materials in preparation of the surfaces to receive the new Work, shall be incidental to the Project.

### 3.3 PERFORMANCE – GENERAL

- A. Pavement marking operation shall be limited to the type of Work and the limits as specified on the Plans. If additional area is required by CONTRACTOR for storage of equipment or supplies, CONTRACTOR shall furnish ENGINEER with written permission obtained from the property owner of the storage area, permitting the storage.
- B. Unless otherwise specified on the Plans or approved by ENGINEER, CONTRACTOR shall conduct his operations and use of his equipment in such a manner that traffic will be maintained throughout the Project.
- C. For Work within public rights-of-way and other areas as determined by ENGINEER, the provisions for maintaining traffic shall be as specified in the Pennsylvania Manual of Uniform Traffic Control Devices, and PennDOT Specifications.
- D. All costs incurred in maintaining traffic shall be at CONTRACTOR's expense.
- E. CONTRACTOR's equipment shall have sufficient paint capacity to enable sustained pavement marking operations and shall be equipped to ensure uniform application of the pavement markings.
  - 1. Equipment shall have mechanical bead dispensers or pressurized bead dispensers.
  - 2. For parking lots and other small areas, approved portable equipment and use of hand methods will be allowed.
- F. The color of the paint, and the width or type of markings shall be as specified on the Plans or as directed by ENGINEER.
- G. Markings shall be applied so that they adhere adequately to the surface.
- H. Markings shall be applied in accordance with the applicable requirements of PennDOT's current Specifications for permanent and temporary pavement markings.
- I. Unless otherwise specified, removal of temporary pavement markings shall be incidental to the Project.
- J. CONTRACTOR shall be responsible for making the decision to apply waterborne paint on any specific day when there is a high probability of rain in the forecast. If applied lines are washed away because of rain, CONTRACTOR shall be responsible for re-applying the lines at no additional expense to OWNER.

## PAVEMENT MARKINGS

### 3.4 LAYOUT FOR MARKINGS

- A. Layout work necessary for the location and placing of markings, as specified on the Plans or as determined by ENGINEER, shall be the responsibility of CONTRACTOR and shall be at his expense.

### 3.5 APPLICATION OF WATERBORNE MARKINGS

- A. Waterborne paint shall be applied when the air temperature is 50 degrees Fahrenheit or higher and the pavement is dry.
- B. Markings shall not be placed before May 14, or after October 1.
- C. Waterborne pavement marking materials may be placed immediately on new bituminous pavement.
- D. Apply with an application thickness of 15 mils, except for edge line markings at 12 mils.
- E. Glass beads shall be added at the rate of 7 pounds per gallon of paint.

### 3.6 APPLICATION OF PRE-FORMED HOT-APPLIED THERMOPLASTIC MARKINGS

- A. Hot-Applied Thermoplastic Markings shall be applied when the air temperature is 50 degrees Fahrenheit or higher and the pavement is dry.
- B. Markings shall not be placed before May 14, or after October 1.
- C. Apply at a minimum thickness of 90 mils.
- D. For skip line patterns, maintain a tolerance of  $\pm 6$  inches for each 40-foot cycle, and  $\pm 3$  inches for each 10-foot skip line.
- E. Apply glass beads immediately after applying the markings at a minimum rate of 10 pounds per 100 square feet of markings.

### 3.7 APPLICATION OF EPOXY PAVEMENT MARKINGS

- A. Epoxy Markings shall be applied when the air temperature is 40 degrees Fahrenheit or higher and the pavement is dry.
- B. Markings shall not be placed before May 14, or after October 1.
- C. Apply at a minimum thickness of 20 mils.
- D. For skip line patterns, maintain a tolerance of  $\pm 6$  inches for each 40-foot cycle, and  $\pm 3$  inches for each 10-foot skip line.
- E. Apply glass beads immediately after applying the markings. Use the double drop method with a minimum rate of 10 pounds per gallon for Type A beads, and 10

## PAVEMENT MARKINGS

pounds per gallon for Type B beads for a total minimum of 20 pounds of glass beads per gallon of epoxy.

### 3.8 TOLERANCES

- A. New markings and/or retraced markings shall be placed, with reasonable tolerance, in their proper locations. Reasonable tolerances can be found in PennDOT Pub 408.
- B. Incorrect or misplaced markings shall be obliterated and remarked in accordance with ENGINEER's instructions. Costs incurred to obliterate and remark incorrect or misplaced markings will be at CONTRACTOR's expense.

### 3.9 PROTECTION OF MARKINGS

- A. Protection of the wet pavement markings shall be the responsibility of CONTRACTOR, and all costs incurred to provide the protection will be at his expense.

END OF SECTION

**SECTION 32 31 00  
FENCES AND GATES**

**PART 1   GENERAL**

1.1   SCOPE OF WORK

- A.   This Section includes the types of fencing work indicated on the Plans complete with layout of the Work, excavation and backfill, concrete foundation, fence framing and fabric, pickets and privacy slats, gates and hardware, and hardware adjustment and lubrication.

1.2   RELATED WORK SPECIFIED ELSEWHERE

- A.   Section 01 89 00: Site Construction Performance Requirements

1.3   REFERENCE STANDARDS

- A.   Unless otherwise specified, the Work of this Section shall conform to the applicable portions of the following Standards:
  - 1.   ASTM - ASTM International
  - 2.   AWWA - American Wood Preserves Association
  - 3.   PS - U.S. Department of Commerce, National Bureau of Standards Product Standard
  - 4.   FS - Federal Specifications

1.4   SUBMITTALS

- A.   Submit manufacturer's literature showing standard details of fence and gate materials.
- B.   Submit Shop Drawings showing details of fence and gate fabrication and installation.

**PART 2   PRODUCTS**

2.1   GENERAL

- A.   Framing members for fence and gate framing shall be fabricated of the types and sizes of steel framing indicated on the Plans and as specified in this Section. As a minimum, framing members shall conform to the requirements in the Articles in Part 2 of this Section.
- B.   Tubular Sections shall be hot-dipped galvanized steel tubular materials conforming to ASTM A120 for weight and coating. Steel tubular framing may be welded or seamless steel pipe reasonably straight and free from injurious defect. Burrs at ends of pipe shall be removed.

## FENCES AND GATES

- C. The average weight of the finished steel pipe shall not be less than 95% of the weight specified, which shall include the weight of galvanizing.
- D. Structural and roll-formed steel shapes conforming to ASTM A499, hot-dipped galvanized in accordance with ASTM A123. Framing members of structural and roll-formed shapes shall be fabricated of new rail steel billets, of the weights specified and galvanized.
- E. Weight of the zinc coating per square foot of actual surface shall average not less than 2.0 ounces (55 g) and no individual specimen shall show less than 1.8 ounces (50 g). Weight specified for structural and roll-formed shapes shall include the zinc coating, except that any weight of galvanizing over 4.0 ounces of zinc per square foot (lkg/m<sup>2</sup>) of surface shall be deducted from the weight.

## 2.2 POSTS AND RAILS

- A. Posts shall be round pipe or square rolled formed sections conforming to the dimensions and weights specified herein.
- B. Round posts shall be hot dipped galvanized with a minimum average zinc coating of 1.8 oz/dft<sup>2</sup> (0.55 kg/m<sup>2</sup>) meeting ASTM F1083 for standard weight (Schedule 40) galvanized pipe.
- C. Rolled form sections shall be produced from steel having minimum yield strength of 45,000 psi (310 mPa) and meet the strength and protective coating requirements of ASTM F1043.
- D. Intermediate Posts:
  - 1. Intermediate posts shall be round or square conforming to the following weights and dimensions (O.D.):
    - a. For fabric 6.0' (1.83 m) or less: 1.900" (48.3 mm) round weighing 2.72 lbs/ft (4.05 kg/m)
    - b. For fabric 7.0' to 10' (2.1 m to 3.0 m): 2.375" (60.0mm) round, weighing 3.65 lbs/ft (5.43 kg/m); or 2.0" (50.8 mm) square weighing 2.60 lbs/ft (3.87 kg/m).
    - c. For fabric over 10.0': 2.875" (73 mm) round weighing 5.79 lbs/ft (8.62 kg/m); or 2.5" (63.5 mm) square weighing 5.10 lbs/ft (7.6 kg/m).
- E. Terminal Posts, Angle Posts, Pull Posts and Brace Posts:
  - 1. Round or square conforming to the following weights and dimensions (O.D.):
    - a. For fabric 6.0' (1.83 m) or less: 2.375" (60.0mm) round, weighing 3.65 lbs/ft (5.43 kg/m); or 2.0" (50.8 mm) square weighing 2.60 lbs/ft (3.87 kg/m).
    - b. For fabric 7.0' to 10' (2.1 m to 3.0 m): 2.875" (73 mm) round weighing 5.79 lbs/ft (8.62 kg/m); or 2.5" (63.5 mm) square weighing 5.10 lbs/ft (7.6 kg/m).



## FENCES AND GATES

- C. Stretcher bars shall be one piece lengths equal to the full height of the fence fabric. Bands shall be approximately 1-inch (25 mm) wide with beveled edges to secure stretcher bars to end, corner, pull and gate posts.

### 2.5 WOVEN WIRE FABRIC

- A. Woven wire fabric shall be fabricated in accordance with the best commercial practices. The overall width of the fabric shall be not less than 46-1/2 inches (1.2 m). Fabric stays shall be uniformly spaced on 6-1/4 inch (160 mm) centers maximum.
- B. Galvanized steel woven wire fabric shall conform to ASTM A116, No. 11 Farm Fencing, Design Number 1047-6-11, Grade 60, Class I, Zinc Coating.
- C. Aluminum-coated steel woven wire fencing shall conform to ASTM A584, No. 11 Farm Fencing, Design Number 1047-6-11, Class I, Aluminum Coating.

### 2.6 CHAIN LINK FABRIC

- A. Fabric shall be zinc (galvanized) coated, vinyl coated or aluminum coated. Zinc coated fabric shall be galvanized after weaving.
  - 1. Zinc-Coated Steel Chain-Link Fence Fabric shall conform to ASTM A392, Class 2 Coating.
  - 2. Aluminum-Coated Steel Chain-Link Fence Fabric shall conform to ASTM A491, and ASTM A817.
  - 3. Vinyl-Coated Steel (Extruded Vinyl over Galvanized Steel Wire) Chain-Link Fence Fabric shall conform to ASTM F668, Class 2a.
  - 4. Fused Vinyl-Coated Steel (Thermally Fused Vinyl Coating over Galvanized Steel Wire) Chain-Link Fence Fabric shall conform to ASTM F668, Class 2b.
- B. Unless otherwise indicated on the Plans or directed by ENGINEER, chain link fabric regardless of type, shall be 11 gauge (3.05 mm), zinc coated steel.
- C. Mesh shall be two (2) inches (50 mm).
- D. Fabric 72 inches (1830 mm) in height and over shall have both selvages knuckled. Fabric less than 72 inches (1830 mm) in height shall have the top selvage knuckled.

### 2.8 TENSION WIRE

- A. Tension wire shall be No. 7 gage (4.50 mm) ASTM A824 with a Type I aluminum coating, a Type 11, Class 2 zinc coating, or shall be hot dipped with a Type 11, Class 1 galvanized coating followed by a thermally fused vinyl coating. Tension wire shall have a minimum breaking strength of 1,950 pounds (8670 N).

## FENCES AND GATES

### 2.9 FABRIC FASTENERS

- A. Fasteners for securing fabric to framing members shall be No. 12 gage (2.68 mm) minimum, galvanized, aluminum coated or vinyl coated as compatible with fabric.
- B. Hog rings shall be 11-gage (3.05 mm) minimum galvanized, aluminum or vinyl coated as compatible with fabric.
- C. Coatings for fasteners shall conform to the requirements of ASTM A641, Class 111.

### 2.10 WOOD POSTS

- A. Wood posts will only be acceptable when woven wire fencing is specified on the plans or in the Proposal. Wood posts shall be Cedar, Red Oak, White Oak, Beech, Hard Maple, White Ash, Yellow Birch, Norway Pine, Northern White Pine or other species acceptable to the ENGINEER.
- B. Posts shall have been cut from timber seasoned by stacking in a manner acceptable by the ENGINEER. Timber as a minimum shall be equal to No. 3 Grade Southern Pine.

### 2.11 WOOD FRAMING, PICKETS, AND GATES

- A. Framing pickets and gates used in woven wire fencing shall conform to the requirements of U.S. Department of Commerce Standard for Softwood Lumber (PS 20) for the specific application as described in ASTM F537. Wood bracing shall be either Cedar Oak or other approved wood poles not less than 4 1/2 inches (115 mm) in diameter.

### 2.12 WOOD PRESERVATIVES

- A. Framing pickets and gates used in woven wire fencing shall conform to the requirements of U.S. Department of Commerce Standard for Softwood Lumber (PS 20) for the specific application as described in ASTM F537. Wood bracing shall be either Cedar Oak or other approved wood poles not less than 4 1/2 inches (115 mm) in diameter.
- B. Brush coated treatment of wood fencing materials shall conform to the applicable portions of AWPA
- C. AWPA Standard M4.
- D. Oil born treatment of wood fencing materials is not acceptable.

### 2.13 METAL FASTENERS FOR WOVEN WIRE FENCING

- A. All metal fasteners used in the construction and installation of woven wire fencing shall be corrosive resistant type conforming to ASTM F537 unless otherwise

## FENCES AND GATES

indicated on the Plans. Staples shall be No. 9 gage (3.75 mm) steel wire, 1 1/2 inch (40 mm) minimum for softwood and 1 inch (25 mm) minimum for hardwood.

### 2.14 PRIVATE SLATS

- A. Privacy slats where shown shall be of type and sizes indicated on the Plans.

### 2.15 CONCRETE

- A. Use 3,000 psi (21 MPa) strength; Type I cement; 5.5 sacks cement per cubic yard (306 kg/m<sup>3</sup>); aggregate per PennDOT's Specifications; 6.5% ± 1.5% air content; 4-inch (100 mm) maximum slump;
- B. No admixtures without ENGINEER'S approval.

### 2.16 GATES

- A. Frames for gates shall be fabricated of Zinc-coated steel frames in accordance with ASTM F1043.
- B. Welded joints shall be coated in accordance with Practice A780, employing zinc rich primer. Gates shall be provided with intermediate braces and truss rods of sufficient strength to form a rigid frame without twist or sag. Members shall not sag in excess of the lesser of 1% of the gate leaf width or 2-inches (50 mm).
- C. Gate frame members shall be in accordance with the following table, at a minimum:

Gate Leaf Width feet (m)	Outside Dimension Inches (mm)	Min Weight lbs/ft (kg/m)
For Fabric Ht. 6.0 ft (1.8 m) or less		
Round tubular steel	1.66" (42.2)	1.83 (2.72)
Rectangular tubular steel	1.5" (38.1)	1.84 (2.74)
For Fabric Ht. over 6.0 ft (1.8 m)		
Round tubular steel	1.90" (48.3)	2.28 (3.39)
Rectangular tubular steel	2.00" (50.8)	2.52 (3.75)
Interior Bracing		
Round tubular steel	1.66" (42.2)	1.83 (2.72)
Rectangular tubular steel	1.50" (38.1)	1.84 (2.74)

- D. Fabric used for gates shall be the same as that used for fencing unless otherwise indicated on the Plans. Install fabric with stretcher bars at vertical edges, and tie wires at top and bottom edges.
- E. Install stretcher bars to gate frame at not more than 15-inch (300 mm) centers. Attach hardware with approved fasteners that will provide security against removal or breakage.

## FENCES AND GATES

- F. Hinges shall be non-lift-off type, offset to permit 180-degree gate opening. Hinges shall be structurally capable of supporting the gate leaf and allow the gate to open and close without binding. The hinges shall be so designed to permit the gate to swing a full 180 degrees.
- G. Latch shall be forked or plunger bar type with integral padlock eye and shall be operable from either side of gate.
- H. Keeper, where required, shall automatically engage the gate leaf and hold it in the open position until manually released. Keepers shall be provided on each gate leaf over 5-ft. (1.5 m) wide.
- I. Double gates shall be provided with mushroom type or flat plate gate stops and anchors. Stops shall be designed to engage the center drop rod or plunger bar of both leaves.
- J. Sliding gates shall comply with ASTM F1184. Slide gates shall be horizontal slide gates supported only from above or cantilever slide gates spanning an opening without a top or bottom support as indicated on the plans. Cantilever slide gates shall be supplied with zinc coated steel frames using external or internal rollers per ASTM F1184.

### **PART 3 EXECUTION**

#### 3.1 FINAL GRADING

- A. Verify that final grading in the area to receive fencing has been completed. Grades shall be without irregularities that would interfere with the fence installation. Report all discrepancies in final grades that would interfere with the new Work to ENGINEER. Do not commence Work until all unsatisfactory conditions have been corrected.

#### 3.2 MEASUREMENT AND LAYOUT

- A. Measure and layout the complete fence line as indicated on the Plans. Measurements for installation of fence work shall be measured parallel to the surface of the ground.
- B. Do all locating and marking of fencing post positions. Locate line posts at equal spacings, center to center, as indicated on the Plans and specified in this Section. Locate and mark corner post positions at changes in fencing runs exceeding 30 degrees.

#### 3.3 INSTALLATION - GENERAL

- A. Installation of fencing and gates shall meet the requirements of ASTM F567 and Chain Link Manufacturers Institute, Product Manual CLF 2445.
- B. Work shall be installed in accordance with the best trade practices, to the best workmanship and in a manner acceptable to ENGINEER.

## FENCES AND GATES

- C. Finished fence shall be plumb, taut, true to line and ground contour and rigidly secured in position.

### 3.4 INSTALLATION OF WOVEN WIRE FENCE

- A. Line posts shall be spaced not more than 16'-6" (5 m) center to center. Line posts adjacent to any end, corner, gate or intermediate braced post shall be spaced not more than ten (10) feet (3 m), center-to-center.
- B. Posts shall be set in holes dug minimum depth of 4'-6" (1.5 m) except that a tolerance of \* three (3) (75 mm) inches is permitted provided the exposed portion of the post will not be less than 4'-4" (1.1 m). Posts shall be set with large end down, plumb on side to receive fabric.
- C. Angle posts shall be installed where a deflection in fence alignment exceeds 30 degrees. Install intersection posts in line of intersecting fencing runs. Intersecting runs of fence shall be connected to a common post.
- D. Metal posts shall be driven with a suitable driver acceptable to ENGINEER. Metal posts shall be driven to the proper depth, plumb and in conformity with fence lines indicated on the Plans. Metal posts which are bent or otherwise damaged during driving shall be removed and replaced.
- E. End, corner, gate, angle, intersection and intermediate braced posts shall be set in concrete at least 18 inches (450 mm) in diameter and 4'-6" (1.5 m) deep. Braces shall be set in concrete at least 18 inches (450 mm) in diameter and 18 inches (450 mm) deep.
- F. Corner, angle and intermediate braced posts shall be braced in both directions. Intersection posts shall be braced in three (3) directions. Braces shall be securely fastened to the post near the top. At grade depressions and alignment angles, line posts shall be set in concrete at least 18 inches (450 mm) in diameter and 4'-6" (1.5 m) deep.
- G. Woven wire fabric shall be installed to the lines and levels indicated on the Plans. Fabric shall be stretched taut and securely fastened to each post with the bottom of the fabric approximately two (2) inches (50 mm) above the ground. Each horizontal strand of wire shall be wrapped completely around the end, corner, gate, intermediate braced or angle post and securely fastened by winding the end about the wire where it leads up to the post. Line posts shall not be used as a stretching anchorage.
- H. Splicing of wire in woven wire fabric and barbed wire shall be accomplished in a manner which will develop the full strength of the wire. Distance between the vertical stays adjacent to the splice shall be the same as for the unspliced sections of the fabric. One (1) approved splice may be placed at the end of the roll of fence without regard to the distance from a post.

## FENCES AND GATES

- I. Fabric shall be securely fastened to each metal post with at least six (6) wire clamps.
- J. Fabric shall be attached to each wood post by at least one (1) fastener for each horizontal stand and as many other fasteners as required to secure wire firmly to post.
- K. Fabric shall be topped with barbed wire as indicated on the Plans. Barbed wire shall be securely fastened to each post.
- L. Gates shall be erected using methods acceptable to ENGINEER in the locations shown on the Plans.

### 3.5 INSTALLATION OF CHAIN LINK FENCE

- A. Posts for chain link fence shall be set and braced as indicated on the Plans, as specified herein, or if not indicated, installation shall meet the requirements of ASTM F567 and Chain Link Manufacturers Institute, Product Manual CLF 2445.
- B. Line posts shall be spaced not more than ten (10) feet (3 m) center-to-center. Angle posts shall be installed where a deflection of ten (10) degrees or more occurs in fence alignment.
- C. Intermediate, braced posts shall be spaced at 660-foot (200 m) intervals or midway between end posts, angle posts or corner posts when this distance is less than 1,320 feet (400 m) but more than 660 feet (200 m).
- D. Intersection (corner) posts shall be set in line with intersecting fences. Both intersecting fences shall be connected to the common post.
- E. Posts shall be set in concrete. Depth of concrete footings for line posts shall be not less than 3'-6" (1 m). Footing diameters shall be nine (9) inches (225 mm) minimum for line posts. Footing diameters for end, corner, angle, intersection, gate and intermediate braced posts shall be 18 inches (450 mm) minimum. Holes for post foundations shall be completely filled with concrete around post.
- F. Fences shall have at least a top rail and a bottom tension wire. Fences 10-feet or more in height, and where otherwise indicated on the plans, shall have center and bottom rails. Bottom and center rails shall be securely connected to posts by means of connections approved by ENGINEER.
- G. Top rail shall pass through the line post tops to form a continuous brace from end to end of each stretch of fence fabric. Splice joints shall be provided as indicated on the Plan. Suitable ties or clips shall be provided for attaching the fabric securely to the top rail at intervals not exceeding 24-inches (610 mm).
- H. Top, center and bottom rail shall be secured to gate, corner, pull, end and line posts as indicated on the Plans.

## FENCES AND GATES

- I. Horizontal braces of fencing six (6) feet (1830 mm) high and over shall be securely fastened to end, corner, angle, intersection, gate, and intermediate braced posts by means of suitable metal connections. Braces shall be positioned midway between top rail and ground and shall extend to the first line posts. Braces shall be trussed as indicated on the Plans.
- J. Posts shall be fitted with post tops.
- K. Install chain link fabric of height indicated on plans. Fabric shall be pulled taut and tied to posts, rails and tension wires. Fabric shall be secured to framing by means of suitable metal bands, hogs or clips. Fasteners shall be spaced not more than 12 inches (300 mm) apart on posts and not more than 15 inches (375 mm) apart on top rail. Hogs rings for connecting fabric to tension wire shall be spaced on not more than 24-inch (600 mm) centers.
- L. Install extension arms as indicated on the Plans.
- M. Intermediate extension arms shall have hole for passage of top rail. Extension arm shall carry three (3) barbed wires equally spaced with the topmost barbed wire approximately 12 inches (300 mm) in or out from the fence line.
- N. Provide one (1) stretcher bar for each gate and end post; provide two (2) stretcher bars for each center and pull post. Thread bars through fabric and secure to post with metal bands on 15-inch (375 mm) centers maximum.
- O. Fasten tie wires where shown and as required.
- P. Use U-shaped clips of wire securely fastened around pipe for clasping pipe and fabric. Bend ends of tie wire to minimize hazard to personnel and clothing.
- Q. Install gates of types and sizes and in locations indicated on the Plans.
  - 1. Install ground-set items in concrete for anchorage as recommended by the manufacturer of the chain link fence.
  - 2. Lower hinge of gate shall be placed on top of concrete footing in which gate post is set.
  - 3. Footing concrete shall extend up to the bottom of the lower hinge.
  - 4. Cone bolt sockets for double swing gates shall be set in concrete so that plunger pin fits in socket when gate is in closed position.
  - 5. Gates shall be erected to swing in direction indicated.
  - 6. Install gate stops to limit swing as shown on Plans.
  - 7. Gates shall be hung plumb, level and secure for full opening without interference.
- R. Privacy slats, where used, shall be of types and sizes indicated on the Plans.
  - 1. Slats shall be secured to fabric using suitable clinch-lock type fasteners acceptable to ENGINEER.
  - 2. Slats shall be secured to fabric by suitable metal fasteners on 6-inch (150 mm) vertical centers.

## FENCES AND GATES

### 3.6 ADJUSTMENT AND POST LEVELING

- A. After erection of fence, adjust gate hardware for smooth and positive operation.
- B. After erection of fences, the tops of wood posts shall be cut off to proper elevation.

### 3.7 LUBRICATION

- A. After completion of fence erection, lubricate all moving parts of gate hardware to insure smooth operation without binding.

END OF SECTION

**SECTION 32 90 00  
PLANTING**

**PART 1      GENERAL**

1.1      SCOPE

- A.      This Section includes furnishing trees, shrubs and ground cover as shown on the Plans, complete with the digging and preparation of holes, furnishing and placing of topsoil, planting, pruning, watering, fertilizing and cultivating; weed control fabric, and such other materials necessary to complete the Work and ensure proper and hardy growth.

1.2      RELATED WORK SPECIFIED ELSEWHERE

- A.      Section 01 89 00: Site Construction Performance Requirements

1.3      SOURCE QUALITY CONTROL

- A.      All trees, shrubs and ground cover shall comply with the state and federal laws with respect to inspection for plant diseases and insect infestation.

1.4      REFERENCE STANDARDS

- A.      AAN-            American Association of Nurserymen
- B.      AANLS-        American Association of Nurserymen Landscape Standards
- C.      ANSI -         American National Standards Institute
- D.      ASTM -         American Society for Testing and Materials
- E.      PennDOT -     Pennsylvania Department of Transportation Standard Specifications for Construction, latest edition

1.5      SUBMITTALS

- A.      The CONTRACTOR shall submit to the ENGINEER certificates of inspection for plant diseases and insect infestation.
- B.      Submit a certified analysis of imported topsoil from each off-site source prior to delivery. Deficiencies shall be corrected at CONTRACTOR's expense.
- C.      Submit sample of mulch and planting mixture prior to delivery to site.
- D.      Submit product data for anti-desiccants, tree wound dressing and herbicides prior to use.

1.6      PLANT SELECTION AND INSPECTION

- A.      All trees shall be inspected and accepted prior to planting. The CONTRACTOR may elect either of the following options as applicable:
- B.      For sources within 120 miles of the site, the ENGINEER will tag the trees at the source. The CONTRACTOR shall request, in writing, at least two weeks prior to any desired inspection date, inspection and approval of the trees at the source.

## PLANTING

Approved trees will be tagged by the ENGINEER and the tag shall remain on the tree until planting and final inspection. The CONTRACTOR shall accompany the ENGINEER on the inspection.

- C. Otherwise, the trees will be delivered to the site. Trees approved for use will be tagged by the ENGINEER and the tag shall remain on the tree until planting and final inspection. Rejected trees will not be tagged and shall be immediately removed from the site, and new trees shall be brought in for inspection and approval.
- D. All plant material shall be subject to approval by the ENGINEER at the site prior to planting.

### 1.7 PREPARATION OF SHIPMENTS

- A. All plant material shall be clearly labeled as to species and variety. The label or tag shall be securely attached to each plant and shall show the scientific name of the plant. Unless otherwise shown on the Plans, all plants shall be balled and burlapped or container grown.
- B. In preparation for spring planting, all balling operations for balled and burlapped stock shall be completed prior to "bud break." In preparation for fall planting of deciduous plants, balling operations shall not commence until after the plants have begun to "harden off."
- C. All stock shall be dug and packed with care immediately prior to shipment. Plants shall be dug and transported so as to provide and retain a firm ball of earth.
- D. The roots shall be carefully protected with wet straw, moss or other material. The root balls shall be adequately protected from rain or sudden changes in the weather. Balled and burlapped plants will not be accepted if the balls of earth are loosened or broken, or wrapped with material made from synthetics or plastic.
- E. Plants furnished in containers shall have their roots well established in the soil mass and shall have grown in the container for at least one (1) growing season. Containers shall be of a size large enough to provide an earth-root mass of adequate diameter and depth for the stem diameter and plant height or spread, as established by accepted nursery practice. No container grown stock will be accepted if it is root bound.
- F. The transporting of all nursery stock shall be in an enclosed or covered vehicle. Deliver plant material immediately prior to planting. Keep plant material moist.
- G. All plants will be rejected when the ball of earth surrounding the roots has been cracked or broken prior to or during the planting.
- H. All plants shall be rejected when the burlap, stakes, or ropes required in connection with transplanting have been displaced prior to final acceptance.

**1.8 STORAGE AND HANDLING**

- A. The roots of all plants shall be kept moist and adequately protected by topsoil or other approved covering until planted.
- B. The trunks and branches of all trees shall be carefully protected from injury of any kind during all operations of digging, loading, transporting and planting. Any trees that are injured may be rejected.

**1.9 PLANTING SEASON**

- A. The planting seasons for deciduous plants shall be between April 1 and May 15 and from October 15 until November or the ground becomes frozen, except that, when unusual planting conditions exist or when container-grown material is used, these planting seasons may be altered. When approved by the ENGINEER, plants, having a ball of earth attached, may be planted during the summer months, provided adequate moisture will and can be applied to the plants.
- B. The planting season for evergreen plants shall be between March 1 and May 1 and from August 1 to September 15.

**1.10 GUARANTEE AND ACCEPTANCE**

- A. The CONTRACTOR shall warrant that all trees have been grown, transported, handled and planted properly so as to be in a vigorous growing condition at the start of the establishment period.
- B. All trees, shrubs and ground cover shall be guaranteed for the establishment period(s). The CONTRACTOR shall replace all trees, shrubs and ground cover showing defective growth, more than 20% dieback, disease, insect infestation or other impairing defects during the Establishment Period with sound, healthy, vigorous growing trees, shrubs and ground cover at no additional expense to the OWNER and in accordance with the plans and specifications.
- C. At the end of the Establishment Period, the CONTRACTOR shall request final acceptance. Final acceptance will be made by the ENGINEER and OWNER provided the trees are healthy and all requirements of the Project have been fulfilled.

**1.11 EXPERIENCE AND QUALIFICATIONS**

- A. The CONTRACTOR or Subcontractor must be experienced and capable of completing the Work so that the plant materials are in a healthy, vigorous growing condition at the end of the Project. In order to show that the CONTRACTOR or Subcontractor is capable of completing the Work successfully, when requested by the ENGINEER, the CONTRACTOR shall submit references from the last five (5) projects of a similar nature. Failure to show successful completion of the last five projects of a similar nature may result in the CONTRACTOR or Subcontractor being deemed unacceptable for this Work on this Project.

## PLANTING

### PART 2      PRODUCTS

#### 2.1 TREES AND SHRUBS

- A. All trees and shrubs shall conform to the requirements of AANLS and as specified herein.
- B. Plant material shall conform to the sizes given in the plant list or Proposal. All measurements such as spread, ball size, number of canes, quality designations, etc. shall be in accordance with AAN "American Standard for Nursery Stock".
- C. Plant material shall be typical for their species or variety and shall be sound, healthy, vigorous, and free from plant diseases and insect pests or their eggs. They shall have healthy, well developed root systems.
- D. Plants designated "B&B" shall be balled and burlapped. They shall be dug with firm, natural balls of earth of sufficient diameter and depth to encompass the fibrous and feeding root system necessary for full recovery of the plant. Balls shall be securely wrapped with burlap and bound with cord. No balled and burlapped plant shall be planted if the ball is cracked or broken. No planting with rot proof burlap or ties shall be permitted. Sand balls are not acceptable.
- E. All trees shall be nursery grown stock which has been pruned to encourage single main stems, compact fibrous root systems and symmetrical branching. Trees of the same species shall be uniform in height and spread. All trees shall be free from all insects, diseases, mechanical injuries or other objectionable features. Root balls shall be of the sizes specified in AANLS for the tree root system.
- F. Container-grown stock shall have been grown in the containers for one (1) growing season minimum. Plants showing "Pot Bound" root ends will not be accepted.
- G. Trees caliper for trees less than 4-inch (100 mm) caliper shall be determined at a point six (6) inches (150mm) above ground when installed. Trees above 4-inch (100 mm) caliper shall be measured at a point twelve (12) inches (300 mm) above the ground.
- H. Ornamental trees and shrubs shall be well formed and shall have a crown typical of the species or variety. Low-branched crown types shall be furnished, unless the Plans or Proposal specify a tree form or a bush form. Material shall be balled and burlapped, unless otherwise indicated. Plant stock shall have grown to the required size in a normal progressive manner. Heading-back plants to meet sizes called for on the Plans will not be permitted.
- I. Evergreen trees of all sizes will require ball and burlap or other adequate root protection. Tops shall be of a form typical to the species and not unnaturally sheared or color treated. Anti-desiccant protection may be required for evergreen trees.

## PLANTING

- J. Plant material shall be nursery grown at sources in the same or higher hardiness zone as determined by the latest edition of the Plant Hardiness Zone Map, Agricultural Research Service, U.S. Department of Agriculture.
- K. Substitutions will be permitted only upon submission of proof that specified plants are not obtainable and with the authorization of the ENGINEER. All requests for substitutions and price adjustments due to substitutions must be submitted in accordance with the General Conditions.

## 2.2 MULCHING

- A. Mulching material shall be one of the following as specified on the plans. Suitability of chip material and size will be determined by visual inspection by the ENGINEER
- B. Compost
  - 1. Decomposed product derived from agricultural, food, and yard organic matter source. Composted at a DEP, Bureau of Waste Management permitted site under industry standards and U.S. EPA regulations, to provide a stable, weed free, nontoxic, soil amendment with a non-objectionable odor, and conforming to the following requirements:
    - a. Moisture content – 35 to 55%
    - b. Trace elements and heavy metals – meet U.S EPA Part 503 Exceptional Quality Concentration Limits
    - c. Particle size – pass through 1-inch standard screen
    - d. pH – 5.5 to 8.0
    - e. Soluble salt concentration – 3.0 dS maximum
    - f. Manufactured foreign material – less than 1% by weight.
  - 2. For plants requiring an acid soil, provide only compost that has the received the addition of liming agents or ash by-products and having a pH value ranging from 5.5 to 7.0.
  - 3. An annual report shall be submitted to PA DEP.
- C. Shredded Bark
  - 1. Shredded bark shall consist of tree bark which has been stripped and shredded from saw logs by means of a debarking machine.
  - 2. All shredded bark shall be produced from trees free of any insect and diseases.
  - 3. The material shall be sufficiently fine and free from extraneous material so that it will readily pass through a conventional mulch blower.
  - 4. Shall have a general size range of ¼ inch to 2 inches.
  - 5. Must comply with PennDOT Section 805.

## PLANTING

### 2.3 TOPSOIL

- A. Topsoil furnished and placed shall meet the standards set forth in PennDOT Section 802.
- B. Compost may be mixed with topsoil to obtain the desired content. Topsoil is to be final screened thru a 5/8-inch (15 mm) maximum mesh screen prior to delivery to the Project site. ENGINEER shall review source and final screen results prior to release of topsoil. CONTRACTOR shall submit a certified analysis of the topsoil from each source to the ENGINEER. Topsoil shall be placed in 4-inch (100 mm) minimum thickness throughout, or as specified in the plans or Specifications.
- C. The CONTRACTOR shall obtain his own topsoil borrow pit source and shall obtain all necessary permits and agreements for the use of such borrow pits at his own expense.

### 2.4 SAND

- A. Sand for planting mixture shall be clean, course, ungraded sand conforming to ASTM C3 for fine aggregates.

### 2.5 FERTILIZER

- A. 20-10-5 tablets (10 gram), 16-8-16 packets, and 19-6-12 fertilizers conforming to the requirements of PennDOT Section 804.2(a)2. When using packets, use in 4-ounce, individual, heat-sealed, polyethylene envelopes.
- B. Application rates are as shown on the Standard Drawings or as directed.
- C. Apply at manufacturer's recommendations and soil analysis.

### 2.6 PEAT

- A. Conform to the requirements of PennDOT Section 808.2(f)1.

### 2.7 LANDSCAPE WEED CONTROL FABRIC

- A. Weed barrier fabric shall consist of a geotextile fabric, spun-bonded polypropylene, non-woven fabric and a UV stabilizer.
- B. Conform to the requirements of PennDOT Section 805.2(d)

### 2.8 STEEL LANDSCAPE EDGING

- A. Comply with ASTM A36 or A283, hot-rolled, standard flexible carbon steel landscape edging, fabricated in sections with stake pockets stamped, punched, or welded to face of sections approximately thirty inches (30") apart to receive stakes. Steel landscape edging shall be double staked at overlap joints, and designed to receive tapered steel stakes.

## PLANTING

- B. Steel Edge shall be 12ga (.10"-105") x 4" wide, by 10' length, with 4 stakes. Painted finish shall be Sherwin Williams H68GT85 powder coat paint electrostatically applied and oven baked. Minimum thickness to be 1.5 mils. Color shall be green, brown, or black as determined by the OWNER.
- C. Steel stakes shall be Steel, tapered, 14" length and finished to match specified steel landscape edging. Stakes shall be designed specifically to anchor steel landscape edging in place, and made by the manufacturer of the steel landscape edging for which they will be used.
- D. Furnish and install manufacturer's standard start/end sections, 90° corners, and splicers as required.

### 2.9 STAKES FOR GUYING AND BRACING

- A. Stakes used for bracing or guying plants shall be sound wood of nominal 2" x 2" (50 mm x 50 mm) stock and shall be approximately 30 inches (750 mm) in length for guying or of the required length for bracing. The stakes shall be pointed on one end by beveling on two (2) sides.
- B. Metal stakes for bracing trees shall be green metal T-section posts with no anchor plates. Posts shall be at least 8 feet (2.5 m) long. Posts shall only be used where specified on the plans.

### 2.10 WIRE FOR GUYING AND BRACING

- A. All wire shall be new and free from bends or kinks.
- B. Wire used for guying trees four (4) inches (100 mm) or less in diameter shall be No. 11 steel wire.
- C. Wire used for guying trees over four (4) inches (100 mm) in diameter shall be No. 9 galvanized steel wire.

### 2.11 HOSE

- A. Hose used with wire for guying trees shall be new.
- B. 1/2-inch (10 mm) reinforced rubber garden hose or steam hose.

### 2.12 PLASTIC GUYING AND BRACING MATERIAL

- A. High density polyethylene, chain-lock type material, 1-inch (25 mm) wide with a breaking strength of 100 lbs minimum.
- B. Flat, woven, webbing type 3/4-inch (20 mm) wide tape constructed of polypropylene with a breaking strength of 900 lbs in either white or olive green.

## **PLANTING**

### **2.13 TREE BALLING BURLAP**

- A. Balling material shall be untreated burlap or other material which will readily decompose.
- B. Synthetic materials such as nylon or plastic will not be permitted.

### **2.14 PLANTING MIXTURE**

- A. Planting mixture shall be a mixture of 1/3 topsoil, 1/3 sand, and 1/3 peat. Add fertilizer at the quantity as recommended by the manufacturer.
- B. Planting mixture shall be free from stick, stones, sod clods or other material which might leave pockets around the roots.

### **2.15 BIORETENTION PLANTING MIXTURE**

- A. Bioretention planting mixture shall have a sandy loam, loamy sand, or loam texture per USDA textural triangle. Maximum clay content shall be >5%.
- B. The soil mixture shall have a pH between 5.5 and 6.5 and an organic content of 1.5 – 3.0%.
- C. The soil mixture shall have an infiltration rate greater than 0.5 in/hr.
- D. The soil shall be a uniform mix, free of stones, glass, trumps, roots, or other similar objects larger than 1-inch.
- E. No other material or substances shall be mixed or dumped with the bioretention mix that may be harmful to plant growth, or prove a hindrance to the planting or maintenance operations. The planting mixture shall be free of Bermuda Grass, Quack grass, Johnson Grass, Mugwort, Nutsedge, Poison Ivy, Canadian Thistle, Tearhub, or other noxious weeds.

## **PART 3 EXECUTION**

### **3.1 CONTRACTOR'S VERIFICATION**

- A. The CONTRACTOR shall stake all plant locations and confirm the locations and type of plants to be placed with the ENGINEER. Inspect trees, shrubs and ground cover for injury, insect infestation and improper pruning. Verify that all trees, shrubs, and ground cover are in healthy growing condition.

### **3.2 PREPARATION**

- A. The CONTRACTOR shall not begin excavation until stake out of tree and/or shrub locations are acceptable to the ENGINEER.
- B. The CONTRACTOR shall stake enough planting locations for two weeks work. The CONTRACTOR shall arrange periodic site meetings with the ENGINEER for

## PLANTING

the purpose of reviewing the work that has taken place in the prior two weeks and the staking for the next two weeks. The CONTRACTOR shall notify the ENGINEER at least three working days prior to the desired date for inspection of staking.

- C. The CONTRACTOR shall accurately stake plant material location according to the plans. Stakes for trees shall be 36" high above finished grade and painted a bright color to be clearly visible for inspection. Distinguish by color between types of material, i.e., evergreen trees, canopy trees, flowering trees. Staking for shrubs, perennials, and ground covers shall be staked 18" high above finished grade and painted white. Stakes shall be placed at the perimeter and at the bed line 30 feet on center. The ENGINEER shall review the locations and make changes in locations as necessary.

### 3.3 PLANTING

- A. Balled and burlapped plants shall be set plumb. Tree pits shall be excavated as shown on the plans. The CONTRACTOR shall dispose of subsoil dug from pits, trenches and beds.
- B. The CONTRACTOR is responsible for planting to correct grades and alignment and all plants shall be set so that, when settled, they will bear the same relation to finish grade as they did before being transplanted. No filling will be permitted around trunks or stems.
- C. At the start of the Work tree pits and beds are to be excavated and the CONTRACTOR shall request inspection and approval by ENGINEER. Approval must be received before backfilling occurs.
- D. The root ball shall be set on a compacted base as detailed. Burlap shall be cut away from top 1/3 of the root ball and all ropes, wires, etc. securing the ball shall be removed.
- E. All plastic tape and/or plastic fabric shall be completely removed from the root ball during the planting operation. "Rot proof" or treated burlap shall also be totally removed.
- F. Container-grown plants shall be planted as specified for balled and burlapped stock, except that when plants are furnished in nonplantable containers, the container shall be removed only at the time of planting. Plants furnished in plantable type containers shall have container sides severed in multiple places and the upper half of the container removed during the planting operation. Care shall be taken to protect tree roots during severing and removal operation.
- G. When the plant has been properly set, the pit shall be backfilled with planting mixture, gradually filling, tamping and settling with water. No soil in a frozen or muddy condition shall be used for backfilling. The backfill shall be placed to an elevation flush with the ground elevation and the rootball, except that a saucer shall be created near the edge of the hole to capture water.

## PLANTING

- H. During fall planting, an ENGINEER approved superphosphate fertilizer shall be applied over the planting mixture at a rate per the manufacturer's instructions.
- I. All evergreen plant material shall be sprayed with an ENGINEER approved anti-desiccant according to manufacturer's instructions and limitations immediately following planting and during final seasonal watering.

### 3.4 MULCHING

- A. After backfilling is completed, mulching material shall be placed over the plant hole area to a depth of five (5) to six (6) inches (125 - 150 mm) or as specified on the plans. Thoroughly soak all mulched areas. After watering, all mulched areas shall be raked and left in a complete and finished manner.
- B. Perennial areas shall have 3 inches (75 mm) of mulch or as specified on the plans. Mulch these areas first and then plant ground cover through the mulch.
- C. All planting beds shall be mulched with a 4 inch (100 mm) cover of mulch as shown on the drawings and details, unless otherwise indicated on the drawings. Mulch depths shall be 4 inches (100 mm) at time of inspection.
- D. For plants located on slopes, an earth saucer or berm shall be constructed halfway around each plant on the down slope side. The saucer or berm shall have an inside diameter equal to that of the planting hole, and a maximum height of six (6) inches (150 mm). A trench shall be dug on the down slope side and filled with planting mixture to allow for drainage.

### 3.5 BRACING AND GUYING

- A. Only evergreen trees equal to or larger than 5-feet (1.5 m) high and deciduous trees with a caliper equal to or larger than 2-inches (50 mm) need to be staked or guyed unless clay soil conditions exist, a tree is planted on a steep slope, or otherwise becomes apparent that a tree needs to be braced or guyed. Trees required to be braced, shall be braced or guyed immediately after planting. All plants required to be braced shall be braced with a minimum of two (2) stakes. Stakes shall be driven to avoid ball and shall be no closer than 1-foot (300 mm) from the trunk. Stakes shall be driven to a depth which will firmly anchor the plant, but in no case less than 12 inches (300 mm) below the bottom of the planting hole. The wide side of the stake shall face the trunk of the plant. Stakes shall extend to within four (4) inches (100 mm) of the lowest plant's main branches. Top of stake shall be firmly attached to the trunk with steel wire or plastic guying and bracing material.
- B. When using steel wire, place wire so it forms a figure eight (8) around the stake and trunk. Portions of wire around trunk shall be encased in water hose of sufficient length to contain the wire loop around the trunk. Enclosed trunk loops shall not restrict normal trunk growth. Stakes shall be positioned on opposite sides of trunks and secured to the trunk at approximately 2/3 the height of plant. Warning tape or ribbon shall be tied to the wiring between the tree and the stake.

**3.6 PRUNING**

- A. Where determined by the ENGINEER, pruning will be required. All pruning of the new plants shall be done by workmen experienced in this type of Work. Pruning shall be completed prior to planting. Hedge shears shall not be permitted for pruning. Pruning shall be done in accordance with the best standard practices.
  - 1. Deciduous trees shall have branches pruned to balance the loss of roots in such a manner as to retain the natural form of the tree type.
  - 2. Evergreen trees shall be pruned only to the extent of removing broken or damaged branches.
  - 3. All cuts shall be made flush, leaving no stubs. Paint all cuts over ¾" (20 mm) in diameter with tree paint.
  - 4. Notify the ENGINEER at least one (1) week prior to pruning operations.

**3.7 WATERING, FERTILIZING AND CULTIVATING**

- A. All plants shall be thoroughly soaked after planting. After all watering, all beds shall be raked and left in a complete and finished manner.
- B. Watering, Fertilizing and Cultivating is required during the Establishment Period. Watering, Fertilizing and Cultivating shall include all measures necessary to establish and maintain plants in a vigorous and healthy growing condition for the entire Establishment Period.
- C. The CONTRACTOR shall manually water the plants a minimum of once a week or as necessary to keep the plant in a thriving condition from May 15 until October 15 or for the duration of the Establishment Period.
- D. If the planted areas have an automatic irrigation system that the CONTRACTOR is relying upon, it is the responsibility of the CONTRACTOR to ensure that the irrigation system is running properly. If the CONTRACTOR concludes that at any time the irrigation system is not working properly, then they shall notify the ENGINEER or the OWNER so that it may be fixed in a timely manner. However, the CONTRACTOR will have to manually water the plants as necessary to keep them in a thriving condition at all times that the irrigation system is not working properly.
- E. Keep planting beds and tree saucers free from weeds to the satisfaction of the OWNER. Treat mulch with pre-emergent weed killer.
- F. Keep trees erect. Raise trees that settle below grade to the established elevation. Keep tree wrap and wire in neat condition. Prune dead or broken branches from all trees and shrubs. Fill to the original grade level areas that have settled around trees and shrubs.
- G. Winter protection shall include late fall spraying of all evergreen trees and evergreen shrubs with anti-desiccant, emulsion type agent, at the manufacturer's recommended rate to prevent winter desiccation and late fall watering if required by a dry season.

## PLANTING

- H. At the seasons first watering, an ENGINEER approved organic timed release, balanced fertilizer shall be applied to the ground around the tree at the rate instructed by the manufacturer. In lieu of organic fertilizer, pre-packaged, controlled release fertilizer packets may be used. Use one (1) 2-ounce packet of fertilizer per every inch (25 mm) caliper of tree, or one (1) 2-ounce packet for every shrub.
- I. During the first and second watering of the growing seasons, the water used for each plant shall be a nitrogen-enriched solution containing available nitrogen at the rate of 8.3 pounds per 1,000 gallons (1 kg/kl) of water (42 pounds of 20-0-0, or 18 pounds of 45-0-0, fertilizer per 1,000 gallons of water). No fertilizer shall be applied after July 7.
- J. During the establishment period(s) as called for in the Contract Documents, the CONTRACTOR shall do all required watering, cultivating, pruning, fertilizing, weeding, and all other work necessary to keep the planted material vigorously growing sound and healthy. The CONTRACTOR shall repair or replace any guying or bracing which is damaged, destroyed, or broken. The CONTRACTOR shall spray any plant material which becomes diseased or infested with insects.
- K. The CONTRACTOR shall repair or replace any trees which are blown over, knocked down, uprooted or otherwise become impaired or defective. The CONTRACTOR shall replace any plant material which is not in good physical condition, has more than 20% die back, shows defective growth, disease, signs of insect infestation, or any other signs of impairing defects during the Establishment Periods.
- L. The CONTRACTOR shall repair or replace any plant material damaged or impaired by wind, rain, snow, ice, sleet, sun, heat, drought, or any other weather related occurrences. The costs for all labor, material, and equipment necessary to carry out the provisions of this Article shall be included in the CONTRACTOR's bid price for the planting of trees unless otherwise indicated in the Proposal. The CONTRACTOR shall notify the ENGINEER prior to beginning any work called for under this Article.
- M. At the end of the Establishment Period, unless otherwise determined by the ENGINEER, the guying material, wrapping material, identification tags, and inspection tags shall be removed and disposed of off the project and the mulch around all the plants shall be replenished to the required depth of five to six inches (125 - 150 mm).

### 3.8 ESTABLISHMENT PERIOD

- A. The Establishment Period shall begin on the day of written acceptance of the installation of the trees, shrubs, bulbs, ground cover or other plant material. Each subsequent establishment period shall begin on the same day of the succeeding year(s). The Establishment Period shall be a minimum of one year unless otherwise indicated in the Contract Documents.

**3.9 SCHEDULES**

- A. The general planting location, type and size of tree or shrub shall be as indicated on the Plans. Any substitutions of plant material or alteration in plant sizes or specifications shall be approved by the ENGINEER prior to ordering.

**3.10 STEEL LANDSCAPE EDGING**

- A. Install steel landscape edging where indicated on Drawings, according to manufacturer's recommendations. Anchor with steel stakes spaced approximately 30 inches on-center, driven below top elevation of edging, or at every stake pocket location in landscape edging sections designed and manufactured to receive stakes. Stakes shall be located in solid undisturbed soil, or in soil compacted to 85% of its maximum density.
- B. Install straight sections true to the alignments as indicated, free of waves or bends, using strings as guides. Install curved sections true to the alignments as indicated, free of waves or bends, following marked alignments approved in the field by the ENGINEER. ENGINEER shall be given the opportunity to review the layouts. Set top of edging flush with finish grade. Set top of stake 1/2-inch below top of edging.
- C. Replace edging sections damaged by construction operations.

END OF SECTION

**SECTION 32 92 19  
SEEDING**

**PART 1      GENERAL**

1.1      SCOPE

- A.      This Section includes seeding complete with earth bed preparation, providing and placing topsoil, preparation and fertilizing topsoil, sowing of seed for lawns and other ground cover, protection of seeded areas, watering of seeded areas, mowing of seeded areas, protection and cleanup.

1.2      RELATED WORK SPECIFIED ELSEWHERE

- A.      Section 01 89 00: Site Construction Preparation Requirements
- B.      Section 32 92 23: Sodding

1.3      REQUIREMENTS OF REGULATORY AGENCIES

- A.      Comply with the applicable requirements of the Proceedings of the Association of Official Seed Analysts, Rules for Testing Seeds.
- B.      Chemical fertilizer shall comply with PennDOT Section 804.
- C.      Chapter 71 – Seed of the Pennsylvania Seed Act of 164 of 2004, effective January 29, 2005, and amendments.
- D.      Seed, Testing, and Certification Programs of the Pennsylvania Department of Agriculture (PDA), Bureau of Plant Industry.

1.4      SOURCE QUALITY CONTROL

- A.      A seed mixture proposed for use in the Work shall have been tested for purity and germination by the Seed Producer within nine (9) months of sowing.

1.5      REFERENCE STANDARDS

- A.      ASTM- American Society for Testing and Materials
- B.      PennDOT- Pennsylvania Department of Transportation, Standard Specifications for Construction, latest edition

1.6      SUBMITTALS

- A.      Submit Seed Producers Certification that seed meets the requirements of these Specifications.
- B.      Where required, submit test reports for all seed proposed for use in the Work to the ENGINEER, showing results of purity and germination tests, compliance with regulatory agencies, dates and location of tests.

## SEEDING

### 1.7 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. All material shall be delivered to the Project site in their original, unopened containers. Containers shall be clearly marked showing, name of manufacturer, brand name, trade name or generic name of material, warranty of analysis, net weight of contents and date of packaging, where applicable.
- B. Seed shall be delivered to the site in durable bags, tagged or labeled to show date of tests, warranty of purity and germination analysis, name, lot number and net weight of contents.
- C. Commercial fertilizers shall be delivered to the site of the Work in the original unopened bags. Bags shall not exceed 100 pounds (45 kg) net weight each and shall be clearly marked with guaranteed analysis in a conspicuous location on each bag.
- D. Material shall be stored at the Project site, under shelter, off the ground and shall be protected from damage by moisture, temperature, exposure to elements, vandalism or other action which might otherwise impair their use.
- E. All materials proposed for use in the Work shall be handled in a manner that will protect the material and the personnel involved in the Work. Handle seed in a manner which will protect the mixture from contamination or deterioration.

### 1.8 ENVIRONMENTAL REQUIREMENTS

- A. Seeding is limited to the following time periods:
  - 1. Formula B, L, T: March 15 to June 1 and August 1 to October 15
  - 2. Formula C, N, W, R, P, slope and wildflower enhancements: anytime
  - 3. Formula S, as indicated in PennDOT Section 804.
- B. Comply with the limitations placed on the use of certain soil protection materials because of prevailing temperatures as described in this Section.
- C. Comply with the limitation placed on seeding applications because of wind velocity as described-in this Section.

### 1.9 PROTECTION

- A. Provide suitably approved warning signs and barricades for protection of seeded areas from pedestrian or vehicular traffic. Protect all newly seeded areas during the progress of the Work and until completion of the turf establishment period.
- B. Protect all adjacent construction from topsoil spills and perform such cleanup of affected surfaces before it becomes compacted by traffic.

1.10 FINAL ACCEPTANCE

- A. The CONTRACTOR shall establish a dense cover of seeded grass on all disturbed areas. These areas shall be maintained until final acceptance of the Work by the ENGINEER. The ENGINEER will inspect the turf to ensure that the grass seed is well established, weed free, in a growing and vigorous condition. Areas that do not meet the approval of the ENGINEER shall be re-seeded at the CONTRACTOR's expense.

**PART 2      PRODUCTS**

2.1 SEED

- A. Seed and seeding mixtures shall be certified, mature, clean, dry, new crop seed products suitable for the specified applications and having the percentages of purity, germination and proportions, by weight, indicated in PennDOT Section 804.2(c) and Table B.

2.2 TOPSOIL

- A. Remove topsoil and replace with furnished topsoil as specified in PennDOT Sections 801, 802, and 803.

2.3 FERTILIZER

- A. Fertilizer shall conform to PennDOT Section 804.2

2.4 MULCHING MATERIAL

- A. Mulch shall comply with PennDOT Section 805.2(a)1, for the type indicated. Do not use wood mulch when seeding native species using hydroseeding procedures. When seeding native species, tackifier must not be greater than ½ inch thick.

2.5 MULCH BINDER

- A. Mulch binder shall comply with PennDOT Section 805.3(a).

2.6 WATER

- A. Suitable clean water may be used without testing. If the water source is relatively shallow, enclose the intake to exclude silt, mud, grass, or other undesirable foreign material.

**PART 3      EXECUTION**

3.1 PREPARATION

- A. Complete all fine grading within the areas to be covered with topsoil necessary to bring the surface of the proposed subgrade to the elevations indicated on the Plans and parallel to the proposed finished grade.

## SEEDING

### B. Tillage

1. On topsoiled areas, 3:1 and flatter, loosen the surface to a depth of at least 2 inches by disking, harrowing, or other acceptable methods until the tillage is satisfactory.
2. On untopsoiled areas, 3:1 and flatter, till only as directed by ENGINEER.
3. Till or scarify areas if the surface is glazed or crusted.
4. Correct surface irregularities by filling depressions and leveling rough or uneven areas.
5. Remove metal objects, stones larger than 2 inches in any dimension, and other debris or objects deemed detrimental to maintenance operations.

## 3.2 FERTILIZING

- A. Chemical fertilizer shall be applied at the rate specified in PennDOT Section 804 to prepare areas for seeding.
- B. Blend the fertilizer into the soil at least 2 inches, on topsoiled areas, by raking, disking, harrowing, or other acceptable methods during the tillage operation.

## 3.3 SEEDING

- A. Seeding during winds above 15 miles per hour (25 km/hr) shall not be permitted.
- B. Prior to placing seed materials, water topsoil to a depth of four (4) inches (100 mm) at least 48 hours prior to seeding operations to obtain a loose friable seed bed. Time and depth of watering operations shall be varied at the direction of the ENGINEER for varying conditions at the site of the Work.
- C. Apply seeds at a rate according to PennDOT Section 804 Table B. Sow seeds uniformly on the prepared areas by aerial, hydraulic placement, broadcasting, drilling, or hand seeding methods. See PennDOT Section 804 Table E for seeding methods.

## 3.4 ROLLING

- A. After broadcast seeding, roll topsoiled areas that are to be mowed. Use a roller with a weight not more than 65 pounds per foot. If soil is wet or frozen, roll only when directed by ENGINEER.

## 3.5 MULCHING

- A. Mulching shall consist of placing a mulch material on areas that have been or are to be seeded. Mulch shall be placed in a loose enough condition so as to allow penetration of sunlight and circulation of air, but thick enough to shade the ground, reduce rate of water evaporation and prevent or reduce erosion by wind or water.
- B. Mulch per PennDOT Section 805.3(a). Do not use wood mulch with native seed mixes.

**3.6 TURF ESTABLISHMENT**

- A. Seeded areas shall be watered whenever excessive drying is evident during the period set for establishment. Watering shall be done in a manner that will prevent erosion due to the application of excessive quantities and the watering equipment shall be of a type that will prevent damage to the cultivated surfaces. The CONTRACTOR shall be responsible for the proper care of the seeded areas until final acceptance of the entire Work covered by the Contract.
- B. Maintain lawns at a height of 3 inches. Initiate mowing operations when grass seedlings reach a height of 4 inches.
- C. When the amount of cut grass is heavy, cut grass shall be removed to prevent destruction of the underlying grass. If weeds or other undesirable vegetation threaten to smother the planted species, such vegetation shall be mowed, or in the case of rank growths, shall be uprooted, raked and legally disposed of from the area.
- D. Reseed and mulch areas larger than four (4) square inches (25 cm<sup>2</sup>) not having a dense, uniform, vigorous stand of grass acceptable to the ENGINEER.
- E. The establishment period shall extend for a period from the time of seeding until the seeded area has a uniform stand of grass acceptable to the ENGINEER. The minimum period shall be 30 days.
- F. If after 60 days from the initial seeding a dense, uniform, vigorous stand of grass has not been established by the CONTRACTOR, the OWNER may reseed the defective areas and all costs will be deducted from the CONTRACTOR's payments.

END OF SECTION

**SECTION 32 92 23  
SODDING**

**PART 1      GENERAL**

1.1 SCOPE OF WORK

- A. This Section includes sodding complete with earth bed preparation, providing and placing topsoil, compacting and finishing topsoil, furnishing and placing sod, furnishing and placing stakes, watering sod, rolling and tamping sod, mowing sod, replacing defective or deteriorated sod and maintenance and care of sod in place.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01 89 00: Site Construction Performance Requirements

1.3 SUBMITTALS

- A. CONTRACTOR shall submit copies of Sod Growers Certificate to ENGINEER indicating nursery from which sod was taken, grass species and percentages.
- B. When requested by ENGINEER, submit evidence of topsoil borrow pit agreement for pits used by CONTRACTOR.
- C. Submit test results for imported topsoil.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Sod shall be delivered to the project site on suitable wooden pallets. Sod shall be delivered in manageable rolls and the amount of sod delivered shall not exceed that which can be installed in one 24-hour period. Sod that has been damaged during delivery will be rejected.
- B. Store sod in such a manner as to protect roots and grass material from exposure to wind and sunlight, freezing or other injury. When stacked, sod shall be placed roots-to-roots or grass-to-grass in rolls. Sod shall be kept moist during storage, under shade or covered with moistened burlap. Sod that has been damaged or has deteriorated because of storage will be rejected.
- C. Sod shall be handled in a manner to prevent breaking or other damage. Sod shall not be handled by pitch forks or by dumping from trucks or other vehicles. Care shall be taken at all times to retain the native soil on the roots of each sod roll during stripping and handling. Sod that has been damaged by handling will be rejected.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Sod shall not be placed during drought nor between the dates of June 1 and August 15, inclusive, unless approved by ENGINEER.
- B. Sod shall not be placed when the ambient air temperature is below 32 degrees Fahrenheit (0 degrees Celsius).

## **SODDING**

### 1.6 PROTECTION OF WORK

- A. Provide suitably approved warning signs and barricades for protection of new sodding from pedestrian or vehicular traffic. Protect all newly sodded areas during the progress of the Work and until the completion of the turf establishment period.
- B. Protect all adjacent construction from topsoil spills and perform such cleanup of affected surfaces before it becomes compacted by traffic.

### 1.7 PLANTING SCHEDULE

- A. CONTRACTOR will be required to have a minimum of 90% of the sod placed at least one (1) month prior to final acceptance of the complete Project to ensure adequate rooting of the sod.

### 1.8 FINAL ACCEPTANCE

- A. CONTRACTOR shall establish a dense cover of sod grass on all disturbed areas. These areas shall be maintained until final acceptance of the Work by ENGINEER.
- B. ENGINEER will inspect the sodded turf to insure that the sod is well established, weed free, in a growing and vigorous condition. Areas that do not meet the approval of ENGINEER shall be re-sodded at CONTRACTOR's expense.

## **PART 2 PRODUCTS**

### 2.1 SOD

- A. Conforming to the current edition of the Turfgrass Producers International's Guideline Specifications to Turfgrass Sodding, and as follows:
  - 1. Certified sod cultivated of two or more approved Kentucky bluegrass varieties.
  - 2. Containing not more than 10% of other fine turf grass species.
  - 3. Entirely free from weeds, as defined in the Pennsylvania Seed Act of 1965 and amendments.
  - 4. Free from harmful insects, disease, and nematodes.
  - 5. Cultured in mineral soil.
  - 6. Certified by the Pennsylvania Department of Agriculture or the Department of Agriculture of the state from which sod is obtained.
  - 7. Rectangular machine sections 12 inches to 24 inches wide, 2 feet to 6 feet long, with a uniform soil thickness of approximately 3/4 inch excluding top growth and thatch. Broken sections or sections having torn, or uneven ends will not be accepted.
  - 8. Grass height, maximum 1 1/2 inches.
  - 9. Well-moistened condition.
  - 10. Relatively free of thatch (up to 1/2 inch uncompressed thickness acceptable).
- B. Net sod may be used after submitting a sample to obtain acceptance

2.2 LIME

- A. Lime shall conform with the requirements of PennDOT Section 804.2(a)1.

2.3 FERTILIZER

- A. Fertilizer shall conform to PennDOT Section 804.2(a)2.

2.4 WATER

- A. Suitable clean water may be used without testing. If the water source is relatively shallow, enclose the intake to exclude silt, mud, grass, or other undesirable foreign material.

**PART 3 EXECUTION**

3.1 SOD

- A. During the stripping process and all other handling of the sod, care shall be taken to retain the native soil on the roots.
- B. Sod shall be cut and moved only when the soil moisture conditions are such that favorable results can be expected.
- C. Place sod within 36 hours after having been cut.
- D. For sod in temporary storage, protect from drying because of sunlight or wind. Keep sod moist.

3.2 SITE PREPARATION

- A. Before placing sod, complete soil preparation or topsoiling, as specified in PennDOT Section 802.3. Provide a sod bed graded so that, after placing, the top of the sod is flush with the surrounding grade.
- B. Ascertain that the grades have been made smooth, uniform, and parallel to the finished grades. Do no placing of topsoil until all earth bed conditions are accepted by the ENGINEER.
- C. Apply soil supplements, as specified in PennDOT Section 804.3(c) to areas to be sodded. Moisten soil before placing sod.
- D. After spreading topsoil, all large lumps, rocks, roots, debris or other foreign matter shall be removed from the topsoil by raking and disposed of off the site of the Work. Spreading shall be completed in such a manner that sodding operations can proceed without additional moving of topsoil. Topsoil furnished and placed shall be incidental to the sodding operations.

## **SODDING**

### **3.3 PLACING SOD**

- A. Place sod only when soil moisture and temperature conditions are suitable for growth. Do not cut or place sod when the air temperature is below 32°F (0°C) or when the sod is frozen.
- B. Place sod by hand with joints tightly butted and without overlap. Lay sod in straight rows, with strips placed parallel to and firmly against each other, and stagger transverse joints. . All gaps between sections of sod and openings at angles shall be plugged with sod.
- C. Do not dump sod from vehicles or use tools that may tear or otherwise damage the sod.
- D. Immediately after placement, thoroughly water the sod to saturate the full depth of the sod and sod bed. After initial watering, tamp sod to close joints and ensure intimate contact with the sod bed, producing a smooth, even surface free of irregularities. When directed by ENGINEER or OWNER, perform final firming using a roller weighing not more than 65 pounds per foot of width.
- E. In ditches, place sod strips with the long dimension perpendicular to the direction of water flow. At locations where runoff will pass over a sodded area, turn the upper edge of the sod into the soil and place compacted earth at the junction to convey water over the sod edge.
- F. On slopes, place sod with the long dimension parallel to the contour, beginning at the bottom of the slope and progressing upward. Stagger joints in all slope installations.
- G. In ditches and on slopes 3:1 or steeper, secure sod using a minimum of one wooden stake per 2 square feet of sod. Use stakes approximately 1/2 inch by 1 inch, 8 to 12 inches long, driven flush with the sod surface and oriented with the wide face parallel to the slope contour.
- H. Damaged, deteriorated or otherwise defective sod will be rejected, and except as otherwise provided herein, removed from the Project. Sod which has been permitted to dry out or become otherwise injured during transportation, handling, storage or placing shall be rejected. Where permitted by the ENGINEER, rejected sod, if suitable, may be pulverized and used for filling, where necessary.

### **3.7 TURF ESTABLISHMENT AND MAINTENANCE**

- A. After laying, the sod shall be watered until saturated. Sod shall be watered whenever excessive drying is evident during the period set for establishment. Sufficient water shall be applied to wet the sod through completely and to wet at least two (2) inches (50 mm) of the sod bed each time watering is required. Watering shall be done in a manner that will prevent erosion due to the application quantities of water. The watering equipment shall be of a type that will prevent damage to the finished surfaces of topsoil and sod. The sod shall be watered as required until firmly knit in place and in a vigorous growing condition.

## **SODDING**

- B. Two weeks after sodding, sod shall be fertilized at the rate of 140 lbs/1000yd<sup>2</sup> of 10-20-20 (or equivalent nutrient) fertilizer.
- C. Properly maintain sodded areas until the project has been accepted. This includes repeated watering, mowing, and repairs or replacement of sod in areas that fail to show a uniform growth of grass, or that are damaged in any way. All costs of maintenance are incidental to the project.
- D. Do not mow sodded areas until sod is firmly rooted and secured in place. Maintain grass height at 1 1/2 inches unless otherwise directed by ENGINEER or OWNER.
- E. Where weeds or other undesirable vegetation threaten to smother the planted species, such vegetation shall be mowed or, in the case of rank growths, uprooted, raked and removed from the area. All mowed cuttings, uprooted or raked vegetation, shall be legally disposed of away from the Project Site.
- F. The establishment period shall extend for a period from the time of sodding until the sodded area have received final acceptance of the entire Work covered by the Contract. The minimum period shall be 45 days.

END OF SECTION

**SECTION 33 01 30  
CIPP LINER**

**PART 1      GENERAL**

1.1 SCOPE OF WORK

- A. It is the intent of this specification to provide for rehabilitating pipelines by the insertion of a resin impregnated flexible lining and cured in place to form a pipe. The cured in place pipe (CIPP) shall be saturated with a thermosetting resin and inserted into the existing pipeline. Curing shall be accomplished by circulating hot water, heated air, or ambient cure, to harden the resin into a hard impermeable pipe. When cured, the hardened CIPP shall be a tight-fitting watertight pipe within a pipe. When full length liners are specified, the CIPP shall be continuous from manhole to manhole with no circumferential joints or seams.
- B. Removal and replacement of fences, damage repair to yards, lawns, sidewalks, driveways, and other property, due to actions or processes related to the Work being performed shall be included in the cost of the project.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 33 01 33: Sewer Cleaning
- B. Section 33 01 34: Television Inspection of Sewers

1.3 REFERENCE STANDARDS

- A. Unless otherwise specified, the Work for this section shall conform to the applicable portions of the following Standard Specifications.
  - 1. ASTM D 5813
  - 2. ASTM F 1216
  - 3. ASTM F 1743
- B. However, where the requirements of the ASTM conflict with the requirements of this section, this section shall govern.

1.4 PRODUCT QUALIFICATION

- A. For a CIPP system to be considered acceptable, the CIPP system must have at least two million linear feet of successful, documented installations, a minimum of 250,000 linear feet of which shall have been in the state in which the work is located.
- B. When requested by the OWNER, the CONTRACTOR shall submit test results from previous field installations of the same resin system and tube materials as proposed for this installation. The test results must verify that the CIPP physical properties specified in this Section have been achieved in the field.

## **CIPP LINER**

### **1.5 INSTALLER QUALIFICATIONS**

- A. The Installer shall have at least 100,000 linear feet and five (5) years documented experience in CIPP liners of all types specified for use in this Project with a minimum of 500 separate installs. Installations must have been in northern states or Canada.

### **1.6 SUBMITTALS**

#### **A. CCTV**

- 1. After the Work is completed, the CONTRACTOR shall provide the ENGINEER with CCTV showing both the before and after conditions including the restored connections.
- 2. CCTV shall be completed by the requirements stated in Section 33 01 34 – Television Inspection of Sewers.

#### **B. Material Tests**

- 1. The CONTRACTOR shall furnish to the ENGINEER for review and approval prior to beginning the rehabilitation work, satisfactory written guarantee of his compliance with the standards specified for all materials, techniques, and installation methods being used in the rehabilitation process.
- 2. Design per Article 1.7 of this section shall be furnished to ENGINEER with the Bid.

#### **C. Requests for Deviations**

- 1. The existing sanitary sewers were pre-design television inspected to determine their condition and to determine the type and extent of rehabilitation needed. Should the pre-rehabilitation inspection reveal the pipes to be in substantially different conditions than noted in the pre-design television inspection reports or in this specification, then the CONTRACTOR shall submit in writing a report detailing the differences and a recommendation for alternate design.
- 2. The CONTRACTOR shall provide adequate testing of the existing sewage at each location. Should this testing indicate that there is a substantial difference between existing sewage composition and normal domestic sewage or the composition given in the schedule, if any, such that an alternate resin or liner would be required, the CONTRACTOR shall submit in writing a report and recommendation for a change.
- 3. If conditions in the sewer during rehabilitation are such that spot repairs will be required, the CONTRACTOR shall submit in writing a request for authorization to perform spot repairs along with sufficient proof that these repairs are indeed necessary.

## CIPP LINER

- a. Such requests shall include method of spot repair, type and manufacturer of repair pipe, method of connection, etc., and shall be submitted prior to commencement of the rehabilitation process.
- b. If the pre-design video tape reveals areas that need a spot repair, these spot repairs shall be included in the CONTRACTOR's Bid. Spot repairs will only be paid for separately when the condition of the sanitary sewer has deteriorated to the point of making a spot repair necessary since the pre-design video tape.

### D. Bypass Plan

1. Submit detailed sewer bypass plan to ENGINEER for review three (3) days prior to beginning work.

### 1.7 DESIGN CONSIDERATIONS

The finished pipe shall be designed per ASTM F 1216 Appendix X1; per the requirements of this specification, for the following condition:

Condition:	Fully deteriorated gravity pipe
Safety Factor:	2
Soil Density:	130 lbs/cft
Soil Modulus:	700 psi for pipe inverts up to and including 15 feet deep 1,000 psi for pipe inverts greater than 15 feet deep
Surcharge Loading:	HS-20 (Highway) when any part of the sewer is under any major street, county road, or state highway; E-80 (Railroad) when under any railroad.

The acceptable resin system values to be incorporated into the formula for liner thickness shall not be greater than the following.

	<u>Polyester</u>	<u>Enhanced Polyester</u>	<u>Vinyl Ester</u>	<u>Epoxy</u>
Short Term Flexural Modulus	300,000	400,000	250,000	300,000
Long Term Flexural Modulus	150,000	200,000	125,000	150,000
Creep Retention Factor	50%	50%	50%	50%
Flexural Strength	4,500	4,500	4,500	5,000

- A. The CONTRACTOR shall determine the liner thickness and resin quantity per ASTM F 1216, Appendix X1.
- B. Liner thickness, resin and resin quantity shall be furnished to ENGINEER for review and approval prior to beginning work.
- C. The hydraulic cross-section shall be maintained as large as possible.

## **CIPP LINER**

- D. The CIPP shall have a minimum of the full flow capacity of the original pipe before rehabilitation.
- E. Calculated capacities may be derived using a commonly accepted roughness coefficient for the existing pipe material taking into consideration its age and condition.

### **1.8 NOTIFICATIONS**

- A. The CONTRACTOR shall notify the OWNER and all sewer users affected by the work a minimum of seven days prior to beginning work. Notification shall be by means of a written notice on OWNER letterhead, delivered to each user and shall advise user as to when service will be interrupted and to minimize water usage during this period. The CONTRACTOR shall ensure that every user is notified. Notification shall include telephone number(s) for contacting the CONTRACTOR at any time, day or night.
- B. A second notice to the sewer users affected shall be provided one working day prior to the installation work affecting those users.
- C. The CONTRACTOR shall also provide a completion notice to each user within 12 hours of completion of the CIPP installation and restoring of service connections.

## **PART 2      PRODUCTS**

### **2.1 FELT LINER TUBE**

- A. The Tube shall consist of one or more layers of flexible, needled felt or an equivalent non woven material. The material shall be capable of carrying the specified resin, be able to withstand installation pressures and curing temperatures, and be compatible with the resin used.
- B. The outer Tube coating shall consist of a translucent elastomer that allows for visual inspection and verification of proper resin impregnation.
- C. The plastic coating shall hold the resin inside the Tube without leakage, accommodate installation, and stretch to the size and shape of the existing sewer, and shall not delaminate before, during, or after curing.
- D. The Tube shall have a uniform thickness that when compressed at installation pressures will meet or exceed the design thickness. The thickness of the Tube shall be calculated based upon the resin system values given in this Section.
- E. The CIPP wall thickness shall be calculated from the equation in ASTM F 1216, Appendix X1, based upon the parameters given in this Section. The minimum CIPP wall thickness shall be not less than the value calculated by that equation. Any layers of tube that are not saturated with resin and totally cured shall not be included in the CIPP wall thickness.

## CIPP LINER

- F. The Tube shall be fabricated to a size that when installed will tightly fit the internal circumference of the conduit to be lined as specified by the ENGINEER. Allowance for circumferential stretching of the pipe during insertion shall be made as per manufacturer's recommendations.
- G. The Tube shall be homogeneous across the entire wall thickness containing no intermediate or encapsulated elastomeric layers. No material shall be included in the Tube that may cause delamination in the cured CIPP. No dry or unsaturated layers shall be evident.
- H. The tube shall be constructed to withstand installation pressures and have sufficient strength to bridge missing pipe while meeting or exceeding the design wall thickness at all pipe location during installation conditions and pressures.
- I. The wall color of the interior pipe surface of the CIPP after installation shall be a light reflective color so that a clear detail examination with closed circuit television inspection equipment may be made.
- J. Seams in the Tube shall be stronger than the unseamed felt. Where the length requires joining along the circumference of the Tube, the sewn joint shall not be perpendicular to the long axis but spirally formed and sewn.
- K. The outside of the Tube shall be marked for distance at regular intervals along its entire length, not to exceed five (5) feet. Such markings shall include the manufacturers name or identifying symbol.
- L. The length of the Tube shall be that deemed necessary by the CONTRACTOR to effectively carry out the insertion and seal the pipe at the inlet and outlet points. The CONTRACTOR shall verify the lengths in the field before cutting the Tube to length.
- M. Lengths of sewer can be lined over one or more access points as determined in the field by the CONTRACTOR and approved by the ENGINEER.

## 2.2 RESIN

- A. Resin shall be polyester, enhanced polyester, vinyl ester, or epoxy. Resin selected shall be resistant to the chemical composition of the sewage.
- B. Resin with higher than minimum physical properties may be required for CONTRACTOR to meet minimum field cured physical properties of the completed liner.
- C. The resin shall be thermosetting resin that is compatible with the lining process and shall meet the requirements of ASTM F 1216 except as otherwise specified in this section.
- D. The resin shall be able to cure in water with an initiation temperature for cure of not less than 120°F.

## **CIPP LINER**

- E. The cured resin/felt system shall be suitable for the expected conditions within the existing sanitary sewer.
- F. Alternate resins shall only be allowed per Article 1.6.C of this section.

### **2.3 FIELD CURED LINER**

- A. The completed liner as installed and fully cured in place shall meet the following minimum physical properties for short term flexural modulus and flexural strength given in Article 1.7 of this Section.
- B. The layers of the cured CIPP shall be uniformly bonded. It shall not be possible to separate any two layers with a probe or point of a knife blade so that the layers separate cleanly or the probe or knife blade moves freely between the layers. If separation of the layers occur during testing of field samples, new samples will be cut from the work. Any reoccurrence may cause rejection of the work.

## **PART 3      EXECUTION**

### **3.1 SAFETY**

- A. The CONTRACTOR shall carry out his operations in strict accordance with all OSHA, PAOSHA, and manufacturer's safety requirements.

### **3.2 CLEANING OF PIPELINES**

- A. Prior to rehabilitation of any sewer, it shall be the responsibility of the CONTRACTOR to remove all internal deposits from the pipeline. This shall include dirt, debris, mud, bricks, mineral deposits, pieces of broken pipe, roots, etc.
- B. Cleaning of sewers shall be in accordance with Section 33 01 33, Sewer Cleaning.

### **3.3 PRE-REHABILITATION INSPECTION OF PIPELINES**

- A. Inspection of pipelines shall be performed after the pipe has been cleaned, by experienced personnel trained in locating breaks, obstacles, and service connections by closed circuit television.
- B. CCTV shall be in accordance with Section 33 01 34, Television Inspection of Sewers.
- C. The interior of the pipeline shall be carefully inspected to determine the location and extent of any structural failures. The location of any conditions which may prevent proper installation of lining materials into the pipelines shall be noted so that these conditions can be corrected as specified in Article 3.5 of this Section.

3.4 BYPASSING FLOW

- A. The CONTRACTOR shall provide for the transfer of main line flow around the section or sections of pipe that are to be rehabilitated.
- B. The bypass shall be made by diversion of the main line flow at an existing upstream access point or manhole and pumping the flow into a downstream access point or manhole or by any other method approved by the OWNER which will not cause a sewer backup.
- C. The pump and bypass lines shall be of adequate capacity and size to handle wet weather flow.
- D. Bypass pumping shall be in accordance with Section 01 50 00, Temporary Facilities and Controls, and Section 01 89 33, Temporary Bypass Pumping.
- E. Adequate backup equipment shall be readily available at the site to handle equipment breakdown.
- F. The CONTRACTOR shall submit a bypass plan to the ENGINEER for review three days prior to beginning work.

3.5 LINE OBSTRUCTIONS

- A. It shall be the responsibility of the CONTRACTOR to clear the line of obstructions such as solids, dropped joints, protruding branch connections or broken pipe that will prevent proper insertion of the liner. If inspection reveals an obstruction that cannot be removed by conventional cleaning equipment, then the obstruction shall be removed by equipment operating within the pipeline.
- B. Services which protrude more than 3/4 inch in 10-inch through 21-inch sewer lines or services which protrude more than 1-inch in 24-inch through 30-inch sewer lines shall be ground down as flush as possible with the wall of the sanitary sewer.
  - 1. Grinding shall be done with equipment operating inside of the sewer and shall not cause damage to the sewer or the service being ground.
  - 2. The use of flail type equipment to remove protruding services is not allowed.
  - 3. If the protruding service is in such condition that grinding is not possible, or if the condition of the sewer is such that repairs cannot be done from inside the sewer then the CONTRACTOR shall make a spot repair excavation, to uncover and remove or repair the obstruction. Such excavation shall be approved in writing by the ENGINEER prior to the commencement of the work.
  - 4. Spot repairs shall be completed as shown on the details in the Contract Documents.

## CIPP LINER

### 3.6 INSTALLATION OF RESIN IMPREGNATED TUBE

- A. The CONTRACTOR shall designate a location where the uncured resin in the original containers and the unimpregnated liner will be resin impregnated prior to installation.
- B. The CONTRACTOR shall allow the ENGINEER to inspect the materials and procedure.
- C. A resin and catalyst system compatible with the requirement of this section shall be used.
- D. The quantities of the liquid thermosetting materials shall be per manufacturer's standards to provide the cured liner properties specified. Sufficient resin shall be used to fill the volume of air voids in the liner with additional allowance for polymerization, shrinkage and loss of resin through cracks and irregularities in host pipe wall. The CONTRACTOR shall ensure that the proper amount of resin is uniformly distributed throughout the entire length of the Tube.
- E. The wetting out, installation, and curing of the resin impregnated Tube shall be in accordance with ASTM F 1216.
- F. The Tube shall be inserted through an existing manhole or other approved access by means of an inversion process, the application of a hydrostatic head sufficient to fully extend the liner to the next designated access point, or any other means approved by the ENGINEER.
- G. The process will be adjusted as necessary to ensure a complete lining without overstressing or tearing the lining; and with sufficient pressure to hold the liner snug to the pipe wall and to produce dimples at side connections and flared ends at the entrance and exit access points.
- H. The use of a lubricant is recommended and if used, such lubricant shall be compatible with the rehabilitation process.
- I. The manufacturer's standards shall be closely followed during the elevated curing temperature so as to not over stress the felt fiber and cause damage or failure of the liner prior to cure.

### 3.7 CURING

- A. Hot water or heat cured liners are required for full length liners. Ambient cure liners may be used for spot repair liners.
- B. After installation of the resin impregnated liner is completed the CONTRACTOR shall supply a suitable heat source and water recirculation equipment when necessary to cure the liner.

## CIPP LINER

1. The equipment shall be capable of delivering hot water to the far end of the liner through a hose, which has been perforated per manufacturer's recommendations, to uniformly raise the water temperature in the entire pipe above the temperature required to effect a cure of the resin.
  2. This temperature shall be determined by the resin/catalyst system employed.
  3. The heat source shall be fitted with suitable monitors to gauge the temperature of the incoming and outgoing circulating water/air.
  4. Thermocouples shall be placed between the Tube and existing pipe at the access points to determine the temperature of the cure.
  5. Temperature in the line during the cure period shall be not less than 150°F or more than 200°F as measured at the heat exchanger return line.
- C. Initial cure shall be deemed to be completed when inspection of the exposed portions of the liner appear to be hard and sound and the thermocouples indicate that an exotherm has occurred.
- D. The cure period shall be of a duration recommended by the resin manufacturer, as modified for the lining process, during which time the recirculation of the water/air and cycling of the heat exchanger to maintain the temperature in the liner continues.

### 3.8 COOL-DOWN

- A. The CONTRACTOR shall cool the CIPP to a temperature below 100°F before relieving the static head in the liner.
- B. Cool-down may be accomplished by the introduction of cool water into the liner to replace water being drained from the downstream end.
- C. Care shall be taken in the release of the static head such that a vacuum will not be developed that could damage the newly installed liner.

### 3.9 FINISH

- A. The cured liner shall be continuous over the entire length of an insertion run and be as free as commercially practicable from visual defects such as foreign inclusions, dry spots, pinholes and delamination.
- B. The lining shall be impervious and free of any leakage.
- C. Any defects which will affect the integrity of the liner, or any deficiencies in required strengths or thicknesses, shall be repaired or removed and replaced at the CONTRACTOR's expense, in a manner acceptable to the ENGINEER.

## **CIPP LINER**

### **3.10 SEALING LINER AT THE ENDS**

- A. The CONTRACTOR shall terminate the cured-in-place liner at the manhole by trimming the inverted pipe end back within approximately two (2) inches of the outlet.
- B. Hydraulic cement shall be used to finish the liner invert connection at both ends.
- C. If due to broken or misaligned pipe at the access point, the lining fails to make a tight seal, the CONTRACTOR shall apply a seal at that point. The seal shall be of a resin mixture compatible with the installed liner.

### **3.11 BRANCH OR SERVICE CONNECTIONS**

- A. After the liner has been cured, the CONTRACTOR shall reconnect the existing service connections. This shall generally be done without excavation and in the case of non-man entry pipes, from the interior of the pipeline by means of a television camera and a cutting device that re-establishes them to operational capacity.
- B. Reconnection of services shall begin immediately after curing of the CIPP has been completed.
- C. No service shall be interrupted for more than 12 hours unless otherwise approved by the ENGINEER.
- D. Each lateral shall be fully reopened as much as possible without damaging the host pipe. Brushing of all lateral connections shall be completed to remove all rough and burned edges.
- E. The CONTRACTOR shall have a second robotic cutting device as a backup unit for reinstating the service connections on site prior to commencing with the installation of the CIPP.

### **3.12 POST REHABILITATION TELEVISION INSPECTION**

- A. The completed sewer shall be television inspected and color video taped, by the CONTRACTOR, with a suitable log and voice description, after completion of the service connections.
- B. Video shall be submitted in virtual format to the OWNER.
- C. CCTV shall be in accordance with Section 33 01 34, Television Inspection of Sewers.

### **3.13 CIPP PIPE TESTING**

- A. Testing in accordance with ASTM F 1216 (including appendixes) and ASTM D 5813 may be conducted at the discretion of the OWNER.

## CIPP LINER

1. Actual sample testing shall be paid for by the CONTRACTOR.
  2. Testing may be done anytime within one year of final completion except that air tests, or hydrostatic tests, if required, shall be done by the CONTRACTOR, at no additional cost to the OWNER, prior to re-establishing service connections.
- B. The CONTRACTOR shall prepare samples of the liner for each section of sewer lined in accordance with Section 8 of ASTM F 1216.
1. Samples shall be labeled for date, diameter, section of sewer, and delivered to the OWNER for future testing.
  2. When tested, each sample shall meet the physical properties for flexural modulus and flexural strength used in the design calculations.
- C. Air testing on isolated sections of sewer (2 - 3 feet in length) shall be required if post-rehabilitation inspection indicates leaks in the liner.
1. Testing shall be paid for by the CONTRACTOR.
  2. The CONTRACTOR shall remove and replace or repair any defects in the installed liner to the satisfaction of the OWNER at no additional costs.

### 3.14 CLEAN-UP

- A. Upon completion of the installation work and after required testing indicates the linings are acceptable, the CONTRACTOR shall restore the project area affected by his operation.
- B. The cost of all restoration shall be incidental to project cost.

### 3.15 TRAFFIC CONTROL

- A. During the entire rehabilitation process, the CONTRACTOR shall provide all necessary barricades, signs, flagmen, minor traffic devices, etc., to maintain both vehicular and pedestrian traffic per the Pennsylvania Manual of Uniform Traffic Control Devices.

### 3.16 SCHEDULES

- A. Refer to plan set for pipes to be rehabilitated.

END OF SECTION

**SECTION 33 01 33  
SEWER CLEANING**

**PART 1      GENERAL**

1.1 SCOPE OF WORK

- A. This Section includes sewer cleaning, complete with removal and disposal of debris resultant of the cleaning operation.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 33 01 33: Television Inspection of Sewers

1.3 REFERENCE STANDARDS

- A. Unless otherwise specified, the Work of this Section shall conform to the applicable portions of the following Standard Specifications:

- 1. NASSCO - National Association of Sewer Service Companies

1.4 DEFINITIONS

- A. Clean: Removal of dirt, rocks, roots, also other foreign solid or semi-solid material and obstructions from designated sewer lines and structures, including disposal of the materials.
- B. Light Sewer Cleaning: Removal of deposits, debris and obstructions. This will require a 3-pass cleaning process for removal of debris from the sewer, collecting it, and removing it in the downstream manhole.
- C. Heavy Sewer Cleaning: Removal of obstructions, deposits and debris that exceed that established for light cleaning.
- D. Root Cutting: Mechanical removal of roots and deposit cutting in the sewer line.
- E. Deposit Cutting: Mechanical removal of attached encrustations, calcium deposits, mineral deposits and grease in the sewer line.
- F. Protruding Service Cutting: Grinding or cutting protruding services in the sewer line.

1.5 SUBMITTALS

- A. Work Schedule
  - 1. CONTRACTOR shall submit to the OWNER prior to beginning cleaning a schedule for sequence of sewer lines designated to be cleaned.
  - 2. Include means of cleaning operation with method of removal and disposal of resultant debris.

## SEWER CLEANING

### B. Cleaning Reports

1. Cleaning reports shall be submitted to the ENGINEER weekly.
2. Failure to submit reports in a timely shall be sufficient cause for only making partial payment for the cleaning Work.

## 1.6 JOB CONDITIONS

### A. Flood Prevention

1. Pressurized water or other cleaning tools which retard water flow shall be used in a manner to ensure that pressure within the sewer line does not cause flooding to public or private property served by the sewer being cleaned.
2. The CONTRACTOR shall immediately clean-up all resultant debris, from sewer backups, caused by his cleaning operation.
3. The CONTRACTOR shall not proceed with his cleaning operation until those clean-ups are resolved to the satisfaction of the OWNER.

### B. Debris Removal

1. Debris resultant of the cleaning operation shall be captured and removed from the sewer in the downstream manhole.
2. The debris shall be removed from the sewer system and placed directly into containers for disposal.
3. Discharge and/or stockpiling of debris on to pavement or easement surface will not be permitted.
4. CONTRACTOR is responsible for transporting and disposal of debris in accordance with current laws and regulations.

### C. Additional Fire Hydrant Use

1. Fire hydrants used, when permitted by the OWNER as additional source of water during the cleaning operation shall be provided with OWNER approved device to prevent backflow into the potable water system.
2. Hydrants used by the CONTRACTOR shall be pumped down by the CONTRACTOR to prevent freezing. Frozen hydrants that were used by the CONTRACTOR and not properly closed or pumped down shall be repaired by the CONTRACTOR at no additional cost

## SEWER CLEANING

### D. Confined Space Access

1. All access to sewers, manholes and other structures shall be in accordance with all local, state and federal regulations for confined spaces.

## 1.7 CONTRACTORS VERIFICATION

### A. Structure Access

1. Verify that arrangements for pedestrian and equipment access to structures within rear yard easements have been made.
2. Consideration shall be given to the rights of adjacent property owners.

## 1.8 INDEMNIFICATION

- A. The CONTRACTOR shall only dispose of debris resulting from the cleaning operation in landfill sites approved by the Pennsylvania Department of Environmental Protection (PA DEP).
- B. The CONTRACTOR agrees to indemnify and hold harmless the OWNER, its employees, boards, commissions, and authorities; and Wade Trim Associates, Inc. from any and all lawsuits, claims, judgments, settlements or any other monetary awards for personal injuries or damage to property caused by the CONTRACTOR's failure to dispose of the debris collected in an approved sanitary landfill in an approved manner.

## **PART 2** **PRODUCTS**

### 2.1 CLEANING EQUIPMENT

- A. All high velocity sewer cleaning equipment shall be constructed as a single unit.
- B. Equipment shall operate with maximum pressure of 2,000 psi.
- C. The equipment shall have a selection of two or more high velocity nozzles, utilizing a minimum of 1,500 psi for upstream and downstream propulsion. The nozzles shall be capable of producing a scouring action along the entire circumference of the sewer in all size lines designated to be cleaned.
- D. Equipment shall include a high velocity gun for washing and scouring manhole walls and floors. The gun shall be capable of producing flows from a fine spray to a long distance solid stream.
- E. Equipment shall carry a 1,000 gallon water tank and a vacuum for debris removal.
- F. The equipment shall have a minimum 600 feet of hose with hydraulically driven reel.

## **SEWER CLEANING**

- G. All controls shall be located so that the equipment can be operated from above ground.
- H. The CONTRACTOR shall furnish suitable power machinery which shall be used to remove tree roots, and deposits remaining after jet cleaning. All sewer lines shall be cleaned and root material and deposits removed prior to insertion of the cured in place pipe liner.

## **PART 3      EXECUTION**

### **3.1      PREPARATION**

- A. The CONTRACTOR shall locate all structures and note sewer diameter and direction of flow.
- B. Notify the OWNER of detrimental access, structure, and/or sewer conditions which may adversely affect the progress of the Work.

### **3.2      GENERAL CLEANING REQUIREMENTS**

- A. The CONTRACTOR shall at all times operate the equipment in a manner that will not cause any damage to the sewers or any of the buildings or homes attached to the sewers. CONTRACTOR shall be responsible for repairing or replacing any damage caused by his operations.
- B. The designated sewer shall be cleaned using the "Three Pass Cleaning Process" from the lower end of the sewer.
  - 1. The sewer shall be cleaned using high velocity cleaning equipment as specified.
  - 2. The equipment and methods selected shall be approved by the OWNER.
  - 3. The equipment selected for cleaning shall be capable of removing dirt, rocks, roots, sludge buildup, sand and other deleterious materials and obstructions from the sewer lines, manholes, diversion chambers, catch basins, and drop connections.
  - 4. Cleaning sewers shall include cleaning and removal of dirt, roots, sludge, debris, etc. from the structures on the sewer.
- C. The sewer shall be cleaned using equipment appropriate for the sewer section.
  - 1. In some sewers due to the size and type of debris, man-entry may be required to remove the debris.
  - 2. Where man-entry is required, the CONTRACTOR shall comply with all PAOSHA requirements for working within confined spaces.

## SEWER CLEANING

### D. Three Pass Cleaning Process:

1. The sewer shall be cleaned from the downstream manhole, cleaning the upstream sections(s).
2. The section of sewer shall be cleaned in three equal parts (one third of pipeline length).
3. The CONTRACTOR shall start by running the cleaner nozzle one third of the way up the sewer length, then slowly pulling the cleaning nozzle back while simultaneously removing the resultant debris at the downstream manhole.
4. Then, the nozzle is then run two thirds of the way up the length of the sewer and pulled back slowly while simultaneously removing the resultant debris at the downstream manhole, the same as before.
5. Finally, the cleaning nozzle is run all the way to the top of the section of sewer then slowly pulling the nozzle back while simultaneously removing the resultant debris at the downstream manhole.
6. It may be necessary to repeat the process several times to remove all of the debris in the sewer line.

### 3.3 BLOCKAGES

- A. It is possible there may be conditions such as severe broken or eroded pipe or major blockages which may prevent completion of the cleaning operation, or additional damage to the sewer line would be made if cleaning is attempted or continued.
1. Should these conditions be encountered, the CONTRACTOR shall immediately notify the OWNER and stop the cleaning operation until further direction by the OWNER.
  2. If cleaning of an entire sewer line section between structures cannot be successfully performed from the downstream structure, the equipment shall be reset up on the upstream structure of the line and cleaning of the section resumed.
    1. If again, the equipment fails to transverse the entire sewer line section, the CONTRACTOR shall note the exact location of the blockage and immediately notify the OWNER.

### 3.4 LIGHT CLEANING

- A. The CONTRACTOR shall clean the sewer, manholes, drop connections and benches and remove all deposits.

## SEWER CLEANING

- B. This does not include root cutting, cutting of mineral and other deposits, or grinding protruding services.
- C. Light cleaning is based upon cleaning and removing deposits up to and including the following amounts:

<b>Sewer Size</b>	<b>Amount of Deposits in Percent</b>
Up to 12 inch	25%
13 to 24 inch	15%
25 to 30 inch	10%

### 3.5 HEAVY SEWER CLEANING

- A. Removal of all obstructions and deposits that exceed the percentage established for light cleaning.
- B. Heavy sewer cleaning also includes bricks, rocks, roots, sticks, and attached deposits such as grease or mineral deposits if they can be removed with rotating nozzles or other mechanical means that doesn't include saws or cutters.
- C. Heavy sewer cleaning when included as a separate pay item shall be pre-approved by the ENGINEER prior to beginning the work.

### 3.6 DEBRIS

- A. Debris Removal
  - 1. Passing of debris between sewer line sections will not be permitted.
  - 2. All debris resultant of the cleaning operation shall be removed at the downstream structure of the sewer line section being cleaned.
- B. Debris Disposal
  - 1. Debris resultant of the sewer cleaning operation shall be removed from the site and properly disposed of by the CONTRACTOR, at his expense.
  - 2. All debris shall be removed from the site no less than at the end of each workday.
  - 3. The CONTRACTOR will not be permitted to accumulate debris on the site of the cleaning operation.

### 3.7 ROOT REMOVAL/CUTTING

- A. Roots shall be removed where root intrusion is found.
- B. Special precautions shall be used during the cleaning operation to assure removal of visible roots from the joint area which could prevent the proper mechanical seal or application of chemical sealants.

## SEWER CLEANING

- C. Root removal may include the use of mechanical devices, hydraulic procedures or chemical root treatment.
- D. Mechanical root removal equipment shall be properly sized for the section of sewer being cleaned and shall not be capable of damaging the sewer pipe in any way.
- E. The CONTRACTOR shall use CCTV equipment to monitor the progress of the work and ensure the sewer is not damaged.
- F. Root removal/cutting when included as a separate pay item shall be pre-approved by the ENGINEER prior to beginning the work.
- G. Use of chemical root treatment for removal shall be subject to OWNER approval.
  - 1. The handling and application of the herbicide shall be in strict accordance with the manufacturer's recommendations and in such a manner to preclude any damage to surrounding vegetation.
  - 2. Any damaged vegetation shall be replaced at the expense of the CONTRACTOR.
  - 3. Where chemical root treatment is preceding CIPP lining, joint repairs or other similar sewer rehabilitation, where roots would impede the rehabilitation, then chemical root treatment shall occur at least 90 days prior to the sewer rehabilitation work.

### 3.8 DEPOSIT CUTTING

- A. Attached encrustation, attached grease, calcium deposits or other similar deposits or obstructions in the sewer shall be removed.
- B. Removal equipment shall include high velocity hydro-cleaning equipment, mechanical root cleaning equipment or other similar equipment that will not damage the sewer.
- C. The CONTRACTOR shall use CCTV equipment to monitor the progress of the work and ensure the sewer is not damaged.
- D. Deposit Cutting, when included as a separate pay item, shall be pre-approved by the ENGINEER prior to beginning the work.

### 3.9 CUTTING PROTRUDING SERVICES

- A. The CONTRACTOR shall be cut/grind protruding services by using a remote grinding/cutting device capable of removing concrete, vitrified clay, PVC and other types of pipe material.

## SEWER CLEANING

- B. The device shall be specifically designed to cut/grind protruding service connections.
- C. The CONTRACTOR shall use CCTV equipment to monitor the progress of the work and ensure the sewer is not damaged.
- D. The protruding service shall be cut/ground flush to the main sewer pipe without damaging the sewer pipe or service connection.
- E. Cutting Protruding Services when included as a separate pay item shall be pre-approved by the ENGINEER prior to beginning the work.

### 3.10 REPORTING

- A. CONTRACTOR shall submit to the ENGINEER cleaning reports for the sections of sewers cleaned. Reports shall include:
  - 1. Date
  - 2. Time
  - 3. Manhole to Manhole section numbers
  - 4. Any problems encountered in section
  - 5. Roots, heavy deposits, or other notable observations

### 3.11 MAINTAINING TRAFFIC, RESTORATION, AND PROTECTION OF EXISTING IMPROVEMENTS

- A. CONTRACTOR shall be responsible for maintaining traffic at all times in accordance with Section 01 50 00, Temporary Facilities and Control.
- B. Any damage to any existing improvements including fences, utilities, landscaping, lighting, lawns, structures or any other items, shall be restored to their original condition in accordance with Section 01 89 00, Site Construction Performance Requirements.

END OF SECTION

**SECTION 33 01 34**  
**TELEVISION INSPECTION OF SEWERS**

**PART 1**      **GENERAL**

1.1 SCOPE OF WORK

- A. This Section provides for the color closed-circuit television (CCTV) inspection, performing dye testing of existing sewer connections as appropriate, and electronic recording of existing sewers for the purpose of locating and observing the condition and possible extraneous connections.
- B. The Work is to be performed by current NASSCO PACP certified operators, with current PACP coding, and delivered entirely in electronic format.
  - 1. CONTRACTOR shall note that CCTV software compatibility with OWNER's software and databases is required and a Pre-Inspection deliverable is required to be submitted and approved before beginning Work. See "Software Compatibility" below.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 33 01 30: CIPP Liner
- B. Section 33 01 33: Sewer Cleaning

1.3 QUALITY ASSURANCE

- A. Unless otherwise specified, the work for this Section shall conform to the applicable portions of the following standard specifications:
  - 1. NASSCO - National Association of Sewer Service Companies
  - 2. PACP - Pipeline Assessment Certification Program
- B. Qualifications
  - 1. All CCTV operators shall be NASSCO-PACP certified.
  - 2. Database shall be version 8.0 NASSCO-PACP Certified Access Database as approved by the ENGINEER.
  - 3. CCTV software shall be current NASSCO-PACP Certified.
  - 4. CCTV inspections (Video and Data Collected) will be delivered entirely in digital format.

1.4 SOFTWARE COMPATIBILITY

- A. Upon award of Contract, the CONTRACTOR shall CCTV inspect at least three (3) segments or 1,000 feet of pipe and submit the data to the OWNER to verify that the CCTV database is compatible with the OWNER's PACP Data Management software, GIS integrations software; and that the deliverables are acceptable to the OWNER.

## TELEVISION INSPECTION OF SEWERS

- B. The OWNER shall verify acceptability of the deliverables within five (5) business days of receipt. The CONTRACTOR shall not begin Work on the Project until this software compatibility has been approved.

### 1.5 SCHEDULE OF WORK

- A. CONTRACTOR shall submit to the OWNER prior to beginning television inspection a schedule for sequence of sewer lines designated to be televised and dye tested.

### 1.6 SUBMITTALS

#### A. Electronic Inspections

1. All work shall conform to the NASSCO, Pipeline Assessment and Certification Program (PACP) standards (version 8.0.0).
2. The documentation of the work shall consist of NASSCO PACP CCTV Reports, NASSCO PACP database, logs, electronic reports, etc. noting defects and observations encountered during the inspection.
3. The importance of accurate distance measurements is emphasized to enable location of the defects for rehabilitation work.
4. Electronic Television Inspection shall include:
  - a. Protruding services with extent of protrusion
  - b. Location of broken and/or collapsed pipes with beginning and ending distance, extent of damage, etc.
  - c. Percent of Ovality in deformed pipes
  - d. Percent of restriction for sewers with root intrusion, mineral deposits, etc.
5. All CCTV inspections shall include complete and accurate PACP mandatory header information and report coding for all sections of sewer. In addition to the required header information, the following additional information is required for this Project:
  - a. Time
  - b. Pipe section reference
  - c. Pipe lining
  - d. Total Length
  - e. Length surveyed
6. All data shall be submitted digitally and shall be properly identified as to Project, location, time, and date in a manner acceptable to the OWNER.
7. The purpose of video inspection recordings shall be to supply an electronic visual and audio record of problem areas of the lines that may be replayed. The CCTV inspection shall be entirely recorded in a PACP

## TELEVISION INSPECTION OF SEWERS

approved electronic format submitted with electronic links between the data and the video.

### B. Database Software

1. Provide database in a read-only format using PACP approved software.
2. Provide the read only version of software used for collection and encoding data, and for report preparation.
3. Videos and photos must be in a readable format with standard PACP approved inspection management software.

### C. GIS Integration

1. Submit shape files of televising and inspection records.
  - a. Shape files shall include points along the mainline sewer indicating the location of factory taps, roots, failed joints, or any other feature where PACP code is recorded as a part of the sewer and manhole inspection.
  - b. Shape files shall include the following information:
    - (1) Manhole number
    - (2) Observation date
    - (3) Observation time
    - (4) PACP code
    - (5) PACP score
    - (6) Remarks or notes
    - (7) Name and certification number of the inspector
    - (8) Report sheet number
    - (9) Video number
    - (10) Client name
    - (11) Location.
  - c. In addition, pipe reports, screen shots or photos of the observation (factory taps, joints, plugs etc.), and videos shall be hyperlinked to the features in the shape files.

## 1.7 JOB CONDITIONS

### A. Sewer Flow Control

1. When sewer line depth of flow at the upstream manhole of the sewer section being worked is above the maximum allowable for television inspection, the flow shall be reduced to the level shown below by operation of pump stations, plugging or blocking of the flow, or by pumping and bypassing of the flow as specified.

## TELEVISION INSPECTION OF SEWERS

2. Depth of flow shall not exceed that shown below for the respective pipe sizes as measured in the manhole when performing television inspection.
    - a. Maximum Depth of Flow for Television Inspection of Sewer
      - (1) 6" - 10" Pipe 20% of pipe diameter
      - (2) 12" - 24" Pipe 25% of pipe diameter
      - (3) 27" & up Pipe 30% of pipe diameter
  3. Plugging or Blocking
    - a. A sewer line plug shall be inserted into the line upstream of the section being worked. The plug shall be designed that all or any portion of the sewage can be released.
    - b. During CCTV inspection flow shall be reduced to within the limits specified above. After the work has been completed, flow shall be restored to normal.
  4. Pumping and Bypassing
    - a. When pumping and bypassing is required the CONTRACTOR shall supply the pumps, conduits, and other equipment to divert the flow of sewage around the manhole section in which work is to be performed.
    - b. The bypass system shall be of sufficient capacity to handle existing flow plus additional flow that may occur during a rainstorm.
    - c. The CONTRACTOR will be responsible for furnishing the necessary labor and supervision to set up and operate the pumping and bypassing system.
    - d. If pumping is required on a 24-hour basis, engines shall be equipped in a manner to keep noise to a minimum.
- B. Flood Prevention
1. When flow in a sewer line is plugged, blocked, bypassed, or in any other way restricted, sufficient precautions must be taken to protect the sewer lines from damage that might result from sewer surcharging.
  2. Further, precautions must be taken to ensure that sewer flow control operations do not cause flooding or damage to public or private property being served by the sewers involved.

## TELEVISION INSPECTION OF SEWERS

### 1.8 CONTRACTOR'S VERIFICATION

- A. Verify that arrangements for pedestrian and equipment access to structures within rear yard easements have been made. Consideration shall be given to the rights of adjacent property owners.

## **PART 2**      **PRODUCTS**

### 2.1 TELEVISION CAMERA AND EQUIPMENT

- A. The television camera used for the inspection shall be one specifically designed and constructed for such inspection.
  - 1. Camera shall be color, pan, tilt and zoom; or a sidewall scanning (panoramic) camera specifically designed and constructed for sewer inspection.
  - 2. Lighting for the camera shall be suitable to allow a clear picture of the entire periphery of the pipe.
  - 3. Camera shall be operative in 100% humidity conditions.
- B. The camera, monitor, and other components of the video system shall be capable of producing picture quality to the satisfaction of the ENGINEER; and if unsatisfactory, equipment shall be removed and no payment will be made for an unsatisfactory inspection.
- C. The importance of accurate distance measurements is emphasized.
  - 1. Measurement for location of defects shall be above ground by means of a meter device. Marking on the cable, or the like, which would require interpolation for depth of manhole, will not be allowed.
  - 2. Accuracy of the distance meter shall be checked by use of a walking meter, roll-a-tape, or other suitable device, and the accuracy shall be within  $\pm 2$  feet.

### 2.2 DYE MATERIALS

#### A. Fluorescent Dye

- 1. Use approved powdered or liquid fluorescent dyes suitable for sanitary sewer tracing. Dye shall be:

## **TELEVISION INSPECTION OF SEWERS**

- a. Non-toxic to aquatic life at specified concentrations
- b. Readily visible in wastewater flows
- c. Environmentally safe per PA DEP guidance
- d. Available in sufficient quantity for multiple tests

### **PART 3      EXECUTION**

#### **3.1      LOCATING THE WORK**

- A.      The CONTRACTOR shall locate all structures and note sewer diameter and direction of flow.
- B.      Notify the OWNER of detrimental access, structure, and/or sewer conditions which may adversely affect the progress of the Work.
- C.      Any manholes found that are not shown on the maps issued for the Project shall be identified as to exact location (with addresses as applicable) (state plane coordinates to horizontal accuracy of  $\pm 3$  feet or less), distance and direction of adjoining manholes, sizes of connecting sewers, and shall be submitted in writing to the ENGINEER.
- D.      Any manholes not found or found in a location different than as shown on the maps, shall also be similarly identified.

#### **3.2      CLEANING SEWERS**

- A.      Prior to the CONTRACTOR televising the existing sewers, it shall be the responsibility of the CONTRACTOR to clean each sewer line in accordance with Section 33 01 32, Sewer Cleaning.

#### **3.3      PERFORMANCE**

- A.      After cleaning, the sewer sections shall be inspected by means of closed-circuit television. The inspection will be done one sewer section at a time and the flow in the section being inspected will be suitably controlled as specified.
- B.      The camera shall be moved through the line in the direction of the flow (downstream) except when not physically possible or when doing a reverse inspection.
- C.      The maximum rate of travel shall be 30 feet per minute unless otherwise approved by the ENGINEER. In all instances, the speed of travel shall be slow enough to inspect each pipe joint, connection, structural deterioration, inflow and infiltration (I&I) source and deposits.

## TELEVISION INSPECTION OF SEWERS

- D. The camera shall pause, pan, and visually inspect all service connections, maintenance defects, structural defects, miscellaneous abnormal sewer conditions, and anywhere when necessary to permit proper documentation of the sewer's condition.
  - 1. If utilizing a side wall scanning camera, pausing, and panning of each lateral is not necessary if the image clearly depicts the inside of the lateral for post processing.
- E. If during the inspection operation, the television camera will not pass through the entire section of sewer from manhole to manhole, the CONTRACTOR shall set up his equipment so that the inspection can be performed from the opposite manhole (Reverse Inspection).
  - 1. If during the reverse inspection the television camera will not pass through the entire section of sewer, the inspection shall be considered complete.
  - 2. If however, root cutting, deposit cutting, or cutting intruding services is required to complete the inspection, this Work, upon approved by the ENGINEER prior to beginning the Work, shall be completed before the television inspection shall be considered complete.
- F. The camera shall be positioned in the line in such a manner so as it is always as near to the center of the line as possible.
- G. If observed defects are such that further operations may compromise the structural integrity or cause damage to the pipe, the CONTRACTOR shall notify the ENGINEER in writing of the observed condition and reason(s) continued CCTV inspection would be harmful.
- H. All recording shall be done during times of good visibility.
  - 1. No recording shall be done during periods of visible fog or steam in the sewer, or when the camera lens is dirty, coated, or under water unless otherwise authorized by the OWNER.
  - 2. The image quality shall be adequate for post-inspection coding.
- I. All television inspection reports shall be with-in +/- two (2) feet of the measured linear footage between manholes along the existing sewer centerline from the start of pipe to end of pipe.
- J. All OWNER and PACP required header information must be fully and accurately entered on all CCTV reports. Work not following these specifications may be rejected for payment and the CONTRACTOR may be required to re-do the work.
- K. The CONTRACTOR shall provide a PACP certified operator on site at all times during the entire CCTV inspection. If video is to be coded separately from the

## TELEVISION INSPECTION OF SEWERS

actual recording, both the onsite Operator and the individual performing the PACP coding shall be PACP certified.

- L. Any portion of the Video inspection recording that is of insufficient quality as determined by the ENGINEER shall be redone by the CONTRACTOR at no additional cost to the OWNER.
- M. For lateral verification of existing properties, the CONTRACTOR shall verify all active laterals by way of a dye test.
  - 1. Introduce dye into the lateral at cleanouts or by flushing down sinks or toilets, or into suspected illicit sources such as roof gutters, yard drains, sump pump discharge, storm inlet, etc.
  - 2. Monitor the downstream manhole or mainline connection for evidence of dye.

### 3.4 MAINTAINING TRAFFIC, RESTORATION, AND PROTECTION OF EXISTING IMPROVEMENTS

- A. CONTRACTOR shall be responsible for maintaining traffic at all times in accordance with Section 01 50 00, Temporary Facilities and Control.
- B. The CONTRACTOR shall furnish, erect and maintain all signs, barricades, lights, and traffic regulators, in accordance with the requirements of the current "Pennsylvania Manual of Uniform Traffic Control Devices".
- C. Furnish all flagmen and watchmen as are necessary to maintain and safeguard traffic during the Work.
- D. Furnishing, installing, and maintaining traffic control devices shall be incidental to the Project.
- E. Any damage to any existing improvements including fences, utilities, landscaping, lighting, lawns, trees, structures or any other items, shall be restored to their original condition in accordance with Section 01 89 00, Site Construction Performance Requirements.

### 3.5 CONTRACTOR'S USE OF PREMISES

- A. The CONTRACTOR shall not trespass upon or in any way disturb private property without first obtaining written permission from the property Owner as appropriate to do so. A copy of such written permission shall be furnished to the OWNER prior to accessing the site.
- B. It shall be the CONTRACTOR's responsibility to work equipment around poles, trees, or other obstructions and to do so at his own expense.

## TELEVISION INSPECTION OF SEWERS

- C. If the CONTRACTOR finds it necessary to obtain additional working area, it shall be the CONTRACTOR's responsibility for its acquisition.
- D. The CONTRACTOR shall, at no additional expense, restore such property to the original condition in the sole and unfettered opinion of the OWNER. The CONTRACTOR must take photographs and/or videos of existing properties prior to disturbance of each property, and make a copy available to the OWNER.
- E. All items within the street right-of-way or sewer easement shall be removed, removed and replaced, or restored as directed by the OWNER.
- F. The CONTRACTOR shall ensure all employees have a badge or visible identification during any time that they are on the project site or within private property. This identification must be worn so that it is readily recognized and readable to the public.

END OF SECTION

**SECTION 33 30 00**  
**SANITARY UTILITY SEWERAGE PIPING**

**PART 1   GENERAL**

1.1   SCOPE OF WORK

- A.   This Section includes sanitary sewer Work indicated on the Plans complete with pipe, joints, structures, pipe bedding, installation, television inspection and testing, including smoke testing of existing sewers prior to lateral reconnections for identifying illegal connections and inflow sources with the sanitary sewer.

1.2   RELATED WORK SPECIFIED ELSEWHERE

- A.   Section 31 23 19: Dewatering
- B.   Section 31 23 33: Trenching and Backfilling
- C.   Section 33 01 34: Television Inspection of Sewers

1.3   REQUIREMENTS OF REGULATORY AGENCIES

- A.   Testing shall conform to the applicable requirements of State and local authorities having jurisdiction, and shall include such tests as: deflection, air, exfiltration and infiltration.

1.4   REFERENCE STANDARDS

- A.   Unless otherwise specified, the Work for this Section shall conform to the applicable portions of the following Standard Specifications:
  - 1.   ANSI - American National Standard Institute
  - 2.   ASTM - ASTM International
  - 3.   PennDOT - Pennsylvania Department of Transportation, Standard Specifications for Construction, latest edition
  - 4.   NCPI - National Clay Pipe Institute

1.5   SOURCE QUALITY CONTROL

- A.   Laboratory test not less than one (1) percent, with a minimum of three (3) pieces, each size, material and class of gravity pipe required in the Work.

1.6   TOLERANCES

- A.   The actual grade of the invert of the sewer shall not deviate from plan grade by more than 0.1 feet/100 feet (0.03 m/30 m), and not more than 0.2 ft. (60 mm) in total for a sewer run from manhole to manhole.
- B.   Alignment of sewer shall be within 0.2 feet/100 feet (0.06 m/30 m) and within 0.5 feet (150 mm) in total for a sewer run from manhole to manhole.

1.7   SUBMITTALS

- A.   Submit independent grade checks in accordance with Article 3.6 of this section.

## **SANITARY UTILITY SEWERAGE PIPING**

- B. Submit manufacturer's data for pipe bulkheading devices in accordance with Article 3.14 of this Section.
- C. A complete field report of the location of all wyes, risers and building leads shall be submitted to the ENGINEER at the end of each sewer section of the Project or on the last day of each week, whichever occurs first.
- D. The complete field report shall include witnessing by the CONTRACTOR of the ends of all building leads placed.
  - 1. Witnessing shall consist of:
    - a. Recording three (3) horizontal distances to the nearest foot (0.3 m) with the lines of measurement at minimum angles of 45 degrees with respect to one another.
    - b. Recording of the depth to nearest 1/2 foot (0.1 m) from the invert at the end of the lead to the finish ground above the end of the lead.
  - 2. No payment will be made for un-witnessed installation or for improperly witnessed installations.
- E. As part of the television inspection, a wye location report shall be submitted to the ENGINEER. The report shall contain the precise location of each wye, notes, photographs, and other pertinent information.
- F. Submit two (2) copies of the laboratory test reports required per Article 1.5 of this Section to the ENGINEER.
- G. Shop Drawings shall be provided of all manhole tees.

### **1.8 STORAGE OF MATERIALS**

- A. Piping material shall not be stacked higher than four (4) feet (1.2 m).
  - 1. Suitable racks, chairs, and other supports shall be provided to protect preformed pipe mating surfaces from damage.
  - 2. Store bottom tiers off the ground, alternate tiers and chock tier ends.
- B. All joint and sealing materials used in the sanitary sewer system shall be protected from sunlight and stored in cool and clean place until ready for installation.

### **1.9 HANDLING OF MATERIAL**

- A. Load and unload piping using suitably approved hoists, skids, etc.
- B. Piping shall not be dropped, bumped or allowed to impact against itself.

## SANITARY UTILITY SEWERAGE PIPING

- C. Damaged piping not be used by the CONTRACTOR.
- D. Lifting devices shall be suited to the Work and shall protect surfaces from damage.

### 1.10 PRE-NOTIFICATION AND PUBLIC OUTREACH

- A. The CONTRACTOR shall notify all affected residents in the work area that smoke testing will occur no more than two weeks prior and not less than one week prior to the date of the testing. This notification will be by using a printed flyer hung on each door of affected homeowners and/or a press release in the official newspaper of the City.
- B. The CONTRACTOR shall notify local police and fire departments, County authorities, County Department of Health, and PA Department of Environmental Protection just prior to distributing public flyers.
- C. 24 hours in advance of performing smoke testing, CONTRACTOR shall notify all providers of emergency services by phone, and all residences and businesses by hand delivery, door hangers, or other acceptable methods.

## **PART 2**      **PRODUCTS**

### 2.1 SCOPE

- A. It is the intent of the Articles in Part 2 of this specification section to specify in detail the various types of sewer pipe, joints, manholes, etc. which have been indicated throughout the Plans and Specifications.
- B. These Articles shall not be construed as allowing any alternate type of material to that which is indicated on the Plans or elsewhere in the Specifications.

### 2.2 PVC SOLID WALL PIPE

- A. PVC Solid Wall Pipe in sizes 6-inch through 15-inch (150 mm through 375 mm) shall be ASTM D3034, SDR 35, and in sizes 18-inch through 30-inch (450 mm through 750 mm) shall be ASTM F679 SDR35, polyvinyl chloride pipe (PVC).
- B. Joints for polyvinyl chloride pipe (PVC) shall be ASTM D3212, push-on type. A joint in which an elastomeric ring gasket is compressed in the annular space between a bell end or socket and a spigot end of pipe. Joint gaskets shall meet the requirements of ASTM F477 and be installed before placing succeeding pipe sections, according to manufacturer's recommendations.
- C. Wyes or tees shall be a molded wye or tee fitting per ASTM D2680, with gasketed joints on each end suitable for directly inserting in the mainline pipe. Wye and tee fittings shall be furnished with the spurs securely fastened by the manufacturer to the barrel of the pipe. There shall be no projection on the inner surface of the pipe. Branch connection fitting shall be a gasketed joint suitable for the house lead pipe specified. Saddle connections are not permitted.

## SANITARY UTILITY SEWERAGE PIPING

### 2.3 STRUCTURES

- A. Material for sanitary sewer structures shall conform to the requirements as indicated on the plans and as specified below. Precast concrete structures are required except when constructing a structure over an existing sewer may require limited use of concrete block or brick as approved by the ENGINEER.
- B. Precast Concrete:
1. Class AA Cement Concrete Modified. Provide cement concrete as specified in PennDOT Section 704; except, with a minimum 28-day compressive strength of 4,000 psi.
  2. Precast Concrete Manholes shall be in accordance with the requirements of PennDOT Sections 605 and 714, and RC-72M.
- C. Manhole Steps:
1. Steel reinforced plastic manhole steps shall be of suitably approved co-polymer polypropylene plastic conforming to ASTM D4101, Table PP, Group 3, Class 2, 3, or 4, any of grades 1 through 9, with a deformed reinforcing bar conforming to ASTM A615, Grade 60.
  2. Shall conform to all requirements in PennDOT Section 605 and be selected from Bulletin 15.
  3. Manhole steps shall be of the types and sizes indicated on the Plans and shall comply with applicable occupational safety and health standards.
- D. Frames and Covers:
1. Manhole frames and covers shall be gray iron castings conforming to AASHTO M 105 (ASTM A48), Class 35B and AASHTO M 306, unless otherwise indicated or specified.
  2. Cover shall say SANITARY in raised letters on the cover.
  3. The castings shall be neatly made and free from cracks, holes and other defects. Surfaces of casting shall be ground to assure proper fit and to prevent rocking.
  4. Shall conform to all requirements in PennDOT Section 1105, RC-72M, and be selected from Bulletin 15.

### 2.4 BOLTS, STUDS, NUTS

- A. Bolt, studs, and nuts shall conform to the following ASTM Standards:

## SANITARY UTILITY SEWERAGE PIPING

1. Cadmium Plating: ASTM B766, Grade N.S.
  2. Zinc Coating: ASTM A153 or B663, Type G.S.
- B. Shall conform to all requirements in PennDOT Section 1105, RC-72M, and be selected from Bulletin 15.

### 2.5 CAST-IN-PLACE CONCRETE

- A. Class A Cement Concrete, Modified, with a design compressive strength of 3,000 PSI.
- B. Shall conform to all requirements in PennDOT Section 605 and RC-72M.
- C. No admixtures without the ENGINEER's approval.

### 2.6 CONCRETE REINFORCEMENT

- A. In accordance with PennDOT Section 709, use ASTM A615, Grade 60 for bars and ASTM A1064 for welded wire fabric.
- B. Shall be selected from PennDOT Bulletin 15.

### 2.7 SMOKE GENERATION EQUIPMENT

- A. The CONTRACTOR shall provide a portable blower designed and built specifically for smoke testing. The blower shall be:
1. Self-contained and powered by a minimum of 3 horsepower (HP) gasoline engine
  2. Capable of producing a minimum of 2,000 cubic feet per minute (cfm) when working as a blow-in ventilator
  3. Capable of 4,000 cfm when working as a suction ventilator
  4. Equipped with appropriate adapters and seals to make a good connection to manholes without excessive loss of air and smoke
- B. Smoke Production Materials:
1. Smoke bombs or candles are strictly prohibited
  2. Only liquid smoke fluid shall be used that produces smoke when exposed to the heat of the exhaust system of the motor for the blower
  3. The smoke generated shall be white to gray smoke, leaving no residue
  4. Smoke shall be non-toxic and non-explosive

## **PART 3 EXECUTION**

### 3.1 VERIFICATION OF EXCAVATION AND BEDDING

## **SANITARY UTILITY SEWERAGE PIPING**

- A. Prior to the installation of any sanitary sewer piping, structures, or materials, examine all trenches and other excavations for the proper grades, lines, levels and clearances required to receive the new Work. Ascertain that all excavation bottoms, compacted subgrades and piping bedding are adequate to receive the sanitary sewer materials to be installed. Correct all defects and deficiencies before proceeding with the Work.

### **3.2 EXISTING SANITARY SEWERS**

- A. The CONTRACTOR shall expose the existing sanitary sewer and structures to which the new Work is to be connected and notify the ENGINEER of same. The ENGINEER will verify the vertical and horizontal locations of the existing system and shall inform the CONTRACTOR as to the necessary adjustments required to align the new sanitary sewer work with the existing system. Connecting to an existing manhole requires removing the existing flow channel and constructing a new flow channel as necessary.
- B. When connecting a new sewer to an existing sewer or a new building lead to an existing building lead, where the pipe joints are not compatible, use a "Fernco" rubber adapter, or equal. Use stainless steel shear ring type couplers.

### **3.3 VERIFICATION OF PIPE CLASS AND JOINTS**

- A. Prior to the installation of any sanitary sewer piping, ascertain that the class of pipe, joint material and bedding are as specified herein and as indicated on the Plans.

### **3.4 PREPARATION OF PIPE ENDS**

- A. The outside surface of the spigot end and the inside surface of the bell end shall be cleaned and free of any foreign material, other than sealant recommended by the manufacturer, prior to installation.

### **3.5 EXAMINATION OF MATERIAL**

- A. All pipe, frames, covers, accessories, and appurtenances shall be examined carefully for damage and other defects immediately before installation. Defective or damaged material shall be rejected and removed from the Project by the CONTRACTOR.

### **3.6 INSTALLATION - GENERAL**

- A. Installation procedures shall conform to PennDOT's current Specifications and RC-72M.
- B. Each section of pipe, when placed to grade and line, shall have firm bearing on the trench bedding throughout its length.
- C. All pipe shall be laid to the line and grade called for on the Plans. Each pipe as laid shall be checked by the CONTRACTOR with line and grade pole or laser system to insure proper result is obtained. When employing a laser system, the

## SANITARY UTILITY SEWERAGE PIPING

CONTRACTOR shall have an alternate and independent means of checking the line and grade. CONTRACTOR shall check line and grade every 100 feet minimum. The finished work shall be straight and shall be sighted through between manholes.

- D. Construction shall begin at the outlet end and proceed upstream with spigot ends pointing in direction of flow. Bell holes shall be excavated so that the full length of the barrel will bear uniformly on the bedding.
- E. Mechanical means shall be used for pulling home all pipe where manual means will not result in pushing and holding the pipe home. Mechanical means shall consist of a cable placed inside of the pipe with a suitable winch, jack, or come along for pulling the pipe home and holding the pipe in position.
- F. After laying of pipe, care shall be taken so as not to disturb its line and grade. Any pipe found off grade or out of line shall be re-laid.
- G. Cutting of pipe shall be done with approved tools and by approved methods suitable for the pipe material. Pipe cutting methods that produce a smooth, square-cut end without damage to the pipe and that minimize airborne particles shall be employed. Pipe cutting shall be performed using the recommendations of the manufacturer of the type of pipe materials being cut and according to the best trade practices. When cutting of pipe or fittings, care shall be taken to prevent damage to the lining and the exterior surface. Damage to either shall be cause for rejection of complete section.
- H. During the preparation of the pipe bedding and until the trench has been satisfactorily backfilled, the trench shall be kept free of water and sewage. A dewatering system, in accordance with Section 31 23 19, Dewatering, shall be provided and maintained by the CONTRACTOR. The dewatering system shall remain in operation until the trench is backfilled.
- I. Backfill shall be as indicated on the Plans and as specified in Section 31 23 33, Trenching and Backfilling.

### 3.7 PIPE LAYING

- A. Pipes shall be installed in accordance with the requirements in PennDOT Section 601 and RC-72M.
- B. Flexible Pipe:
  - 1. Installation of flexible pipe shall conform to ASTM D2321.
  - 2. Except as otherwise specified herein, installation of PVC piping shall be made in complete accordance with the published installation guide of the pipe manufacturer.
  - 3. Joints for PVC pipe shall be made by using a lubricant immediately before joining. Apply lubricant on the bell and spigot, coating the entire circumference of the bell and spigot bevel plus 1-inch (25 mm) behind the taper. Insert lubricated spigot into the bell, and using normal force insert spigot until insertion stripe mark is flush with the bell entrance.

## SANITARY UTILITY SEWERAGE PIPING

4. When jointing PVC pipe, rotate the pipe when inserting it approximately 1/4 to 1/2 turns.
5. Taps to previously installed PVC pipes, where in-line fittings are not provided, shall be made with chemically welded saddle fittings unless otherwise indicated on the Plans. Holes for saddle connections shall be by mechanical hole cutters, or by keyhole saw or saber saw. Holes for saddles shall be laid out with a template and shall be deburred and beveled to provide a smooth hole shaped to conform precisely to the fitting. After the cemented saddle has been fixed to the pipe surface, quickly install band clamps each side of the saddle and tighten.

### 3.8 PIPE BEDDING

- A. After the bottom of trench has been excavated the pipe bedding material will be installed in accordance with Section 31 23 33, Trenching and Backfilling. The pipe shall then be installed strictly in accordance with the manufacturer's recommendations. After the pipe is laid, the bedding shall be continued above the pipe as specified in Section 31 23 33, Trenching and Backfilling.

### 3.9 CONCRETE ANCHORS

- A. Sewers at a 20 percent slope or greater shall be anchored securely with concrete anchors or equal. The anchors shall be spaced as follows:
  1. Not over 36 feet center to center on grades 20 percent and up to 35 percent.
  2. Not over 24 feet center to center on grades 35 percent and up to 50 percent.
  3. Not over 16 feet center to center on grades 50 percent and over.

### 3.10 MANHOLE STRUCTURES

- A. Manhole structures shall be installed in accordance with the requirements in PennDOT Section 605 and RC-72M.
- B. Construct sanitary sewer manhole and other sanitary structures to the grades, lines and levels indicated on the Plans, or as specified herein. Structures shall be precast concrete, complete with concrete bases, reinforcing, frames, covers, and adjustment rings, as shown and as required for a complete installation. Sanitary manholes as called for on the Plans shall carry a stub opening as specified herein. Wye openings in manholes are prohibited unless indicated on Plans. Sanitary sewer structures shall conform to the type of material and dimensions indicated on the Plans.
- C. Manholes shall be completed and ready for final inspection either before 600 feet (180 m) of additional sewer construction is completed or within one (1) week after the manhole is constructed, whichever comes first.
- D. Block Structures:
  1. Sanitary manholes may only be constructed with block where specifically shown on the plans or where approved by the ENGINEER. The first course

## SANITARY UTILITY SEWERAGE PIPING

of concrete block shall be placed on the prepared base in a full bed of mortar. Mortar joints shall be full and closed in all courses. Courses shall be level throughout. Stagger joints in adjoining courses by one-half the length of the block as nearly as practicable. Joints shall be uniform in thickness throughout the structure. Strike all joints and properly point to provide true, smooth surfaces.

2. Prior to applying plaster coat, block shall be thoroughly wetted with water and the surface allowed to dry sufficiently to effect proper bonding.
- E. Construct as detailed on the Plans.
- F. Where precast doghouse sections cannot be used, the manhole shall be brick or block to eight (8) inches (200 mm) above top of highest pipe. Above that point manholes shall be precast concrete as shown on the plans.
- G. Cement mortar plaster coat shall be applied to the exterior surfaces of all brick and/or concrete block sections of all manholes. Plaster coat shall be 1/2 inch (10 mm) thick.
- H. Provide and install all cast iron covers, frames, adjusting rings, and anchors to the elevation indicated on the Plans, or as specified herein. Castings shall be set on 1-inch (25 mm) diameter rubber "O" ring gasket, resting on adjustment rings. The casting shall be anchored to the precast concrete cone section as indicated on the Plans.
- I. Steps are to be installed at the plant by the manufacturer of precast units. Field install steps in other than precast structures of the types and in the locations indicated on the Plans.
- J. Pipe, 6-inch through 24-inch (150 mm through 600 mm) diameters, shall be connected to manholes using an approved mechanically compressible flexible joint as indicated on the Plans. The pipe shall be properly supported with compacted pipe bedding material from undisturbed ground so that any settlement will not disturb the connection.
- K. The joint for existing pipe, six (6) inches (150mm) in diameter and larger, over which the sanitary manhole will be constructed, shall be a grouted joint as indicated on the Plans.
- L. Concrete flow channels shall be constructed in each manhole, as indicated on the Plans. For manholes with outlet pipe diameter of 24 inches (600 mm) or less, construct concrete flow channel straight through a manhole to conform as closely as possible in shape, and slope to that of the connecting sewers. The channel walls shall be formed or shaped to the full height of the crown of the outlet sewer in such a manner to not obstruct maintenance, inspection or flow in the sewers. The concrete flow channel shall be constructed with a 3/4 inch to 1-1/4 inch (20 mm to 30 mm) gap provided at the pipe ends to maintain joint flexibility.

### 3.11 SANITARY SEWER STUB OPENING

## **SANITARY UTILITY SEWERAGE PIPING**

- A. Stub openings shall be at least two (2) pipe lengths, with a minimum length of ten (10) feet (3 m) (unless otherwise indicated on the Plan), and the first joint located approximately 18 inches (450 mm) from the outside manhole wall. The end of the stub shall have a manufactured bell, which shall be plugged with a watertight manufacturer plug that is blocked to prevent movement.

### **3.12 VENT ASSEMBLY**

- A. Provide all materials and construct vent assemblies where indicated on the Plans. Install all piping, fittings, joints, vents, etc., as detailed. Vent assemblies shall be installed on undisturbed earth and provided with restraints as indicated on the Plans, and as required for a complete installation. Vent assemblies shall be connected to manholes as indicated on the Plans.

### **3.13 DROP CONNECTION ASSEMBLY**

- A. Provide all materials and construct drop connection assembly where indicated on the Plans. Install all piping, fittings, joints, etc., as detailed.
- B. Tapping of existing manholes for drop connections shall be made by drilling holes through the wall of the manhole at 4-inch (100 mm) centers along the periphery of the opening, to create a plane of weakness joint, before breaking out section. Nonshrink grout shall be used to seal the opening and a 3,500 psi (24 MPa) concrete collar 12 inches (300 mm) thick shall be poured around the pipe. Drop connections to existing or new manholes shall be made as indicated on the Plans.

### **3.14 BULKHEADS**

- A. A solid masonry or approved water and airtight bulkhead shall be placed at each point of beginning and at each stub that is constructed or as indicated on the Plans.
- B. At the completion of construction and testing, all the bulkheads shall be removed, unless otherwise indicated on the Plans or as directed by the ENGINEER.

### **3.15 WYES**

- A. One 6-inch (150 mm) wye or tee branch shall be provided for each lot or parcel 100 feet (30 m) or less in width that is served by the sewer or every hundred feet (30 m) for lots or parcels in excess of 100 feet (30 m) in width that is served by the sewer, unless otherwise indicated on the Plans or specified.
- B. In all cases, unless otherwise indicated, wyes shall be placed as near as practical to the lower 1/3 point of vacant lots or parcels to be served, and it shall be the responsibility of the CONTRACTOR to see that the wyes are so placed. Wyes to developed lots or parcels shall be placed at the location nearest the existing sanitary service lead.
- C. If the CONTRACTOR fails to place any wyes as herein outlined he shall return to the site and place additional wyes, in an approved manner, at his expense.

## SANITARY UTILITY SEWERAGE PIPING

- D. If a concrete pipe with an inset opening is being used, a compression type joint shall be cast into bell end of the opening. Wye openings shall be closed with a 6-inch (150 mm) stopper, as recommended by the manufacturer, to make a watertight closure.

### 3.16 RISERS

- A. Risers shall be installed where the sewer is more than 12 feet (3.5 m) below the established grade or future grade, and carried to between nine (9) and ten (10) feet (2.5 m to 3.0 m) of the established grade or future grade, as indicated on the Plans. Six (6) inch (150 mm) pipe with approved compression type joints, shall be installed in the manner indicated on the Plans.
- B. Riser openings shall be closed with a stopper, as recommended by the manufacturer, to make a watertight closure.

### 3.17 BUILDING LEADS

- A. All building leads shall be 6-inch (150 mm) diameter pipe and shall be laid on a uniform slope of 1/8 inch per foot (10 millimeters per meter) unless greater slope will provide depth considered adequate by the ENGINEER.
- B. Building leads shall be provided to within 1-foot (300 mm) of property line for all lots or parcels on both sides of the street, unless otherwise indicated on the Plans. If in an easement, the lead shall be provided to within 1-foot (300 mm) of the easement line.
- C. Building lead depth, four-(4) feet (1.2 m) horizontal from property line or permanent easement line, shall be between eight (8) and nine (9) feet (2.5 m to 3.0 m). From this point, a 45-degree bend shall be placed and a short length of pipe such that the end depth will be between five (5) and six (6) feet (1.5 m to 1.8 m).
- D. Building leads under or within five (5) feet (1.5 m) of concrete or asphalt pavements shall be installed by boring or tunneling.
- E. Each building lead shall be closed with a stopper, as recommended by the manufacturer, to make a watertight closure.

### 3.18 WYE, RISER OR BUILDING LEAD MARKER

- A. Unless otherwise indicated in the Plans or Specifications, prior to the backfilling of a wye, riser or building lead, a 2" x 2" (50 mm x 50 mm) (minimum cross section) wooden marker shall be placed from a point immediately in front of the service connection to 1-foot (0.3 m) below the finish ground surface. Do not rest the marker on any portion of the service connection or stopper.

### 3.19 ABANDONING SANITARY SEWER WITH FLOWABLE FILL

## **SANITARY UTILITY SEWERAGE PIPING**

- A. Install a bulkhead in each end of the sanitary sewer to be abandoned leaving a small opening in the very top of each bulkhead.
- B. Install a minimum 2-inch (50 mm) diameter stand pipe in the top of the bulkhead of the sanitary sewer to be abandoned. The stand pipe should be installed such that it can be removed after use and the hole sealed.
- C. Install a minimum 2-inch (50 mm) air release pipe in the bulkhead in the opposite end of the sanitary sewer from the stand pipe. The air release pipe should bend up to a 90 degree angle with the end of the pipe being a minimum of six inches (150 mm) above the top of the sanitary sewer.
- D. Using the stand pipe, pump flowable fill into the sanitary sewer to be abandoned. The flowable fill shall be pumped into the sanitary sewer until free water flows from the air release pipe at the opposite end. Continue filling the sanitary sewer until the material released at the air release pipe is representative of the flowable fill being introduced at the fill end of the sanitary sewer.
- E. Remove the stand pipe and air release pipe and plug the hole in both bulkheads, per Article 3.14.

### **3.20 ABANDON EXISTING MANHOLES**

- A. Manholes on the existing sanitary sewer shall be abandoned and the structures shall be removed in accordance with the following:
  - 1. The removal of existing structures shall consist of removing and salvaging the existing frame and cover.
  - 2. The ends of the existing sanitary sewer shall be bulkheaded. Masonry shall be broken down to an elevation at least 30-inches (750 mm) below the proposed subgrade or finished grade.
  - 3. The abandoned structure shall be backfilled with flowable fill to 1-foot (0.3 m) above the pipes and the remainder of the structure with sand-cement mixture at a 10 to 1 ratio to subgrade elevation.

### **3.21 FIELD QUALITY CONTROL**

- A. After all the pipe, structures, and leads have been laid, constructed and backfilled, the system shall be final inspected and tested. The inspection and testing shall consist of the following parts: first inspection, television inspection and testing.
- B. The first inspection shall be completed and all repairs made in ample time so that the television inspection of the underground portion of the system, can be completed within four (4) weeks of the completion of the construction. Television inspection shall be considered completed when the necessary construction repairs have been made and the installation re-televised when required, and the system is acceptable

## SANITARY UTILITY SEWERAGE PIPING

for the testing phase. When re-television is necessary, an additional two (2) weeks will be allowed for completion. Testing of the system shall immediately follow the television inspection and shall be completed within a 2-week period.

- C. Failure to maintain a schedule in compliance with this specification will automatically cause the stoppage of other work at the particular site in question until such time as the final inspection of the completed underground portion of the system has progressed to within acceptable limits.
  
- D. First Inspection:
  - 1. The CONTRACTOR shall have the underground portion of the sewer system ready for the first inspection within two (2) weeks after the completion of each 2,000-foot (600 m) section of sewer installed.
  - 2. The first inspection shall consist of a visible and audible check of the sewers and manholes to ascertain that the manhole steps have been placed, all lift holes jointed, the channeling of the manhole bottoms completed, all visible or audible leaks stopped, all pipe has been placed straight and true to the proper grades and elevation, the required adjusting rings and frame and cover properly installed, all trenches and structures backfilled in a workmanlike manner and that the system has been thoroughly cleaned.
  - 3. The first inspection shall be considered completed when all the repairs have been made and the system is ready for television inspection.
  
- E. Television Inspection
  - 1. The CONTRACTOR shall provide for television inspection of the various sanitary sewer lines installed under this Contract.
  - 2. The CONTRACTOR shall arrange for, engage and pay all expenses involved for the services of a competent company to perform this television inspection.
  - 3. The television inspection shall be observed by representatives of the OWNER, ENGINEER, and the CONTRACTOR. Any television viewing performed in the absence of the ENGINEER will not be considered as a part of the final inspection.
  - 4. The inspection shall involve the visual observation by closed-circuit television of all sanitary sewer, eight (8) inches (200 mm) in diameter to 30 inches (750 mm) in diameter inclusive, installed as a part of this Contract.
  - 5. The inspection shall be performed at a maximum rate of speed of 30-feet per minute, which will allow examination of all points of infiltration, cracked or crushed pipe, defective joints, misalignment in line or grade, location of all wye openings and any defects or items of poor workmanship which may appear. Prior to television inspection, the CONTRACTOR shall run water down the line to show any dips or high spots in the line. Water shall be run

## SANITARY UTILITY SEWERAGE PIPING

continuously during television inspection if necessary to determine changes in grade in the line.

6. Any items which, in the opinion of the ENGINEER, require repair shall be precisely located and photographed along with a detailed statement of the condition.
7. The CONTRACTOR shall take immediate action to repair all such defects including excessive infiltration at any specific location, even though the infiltration limits as herein specified have not been exceeded for the entire length of sewer being inspected. Following completion of the repair, the OWNER or the ENGINEER, at their discretion, may require a second television inspection of any repaired areas. The CONTRACTOR shall arrange for and pay all costs involved in performing this re-inspection.
8. As a part of the television inspection, the precise location of each wye shall be noted in relation to the downstream manhole. These locations shall be entered on the Wye Location Sheet as supplied by the ENGINEER and verified by comparison with the locations as established at the time of construction. Any discrepancies in location between the field location record and the television inspection record shall be reconciled and the proper location of the wye determined as a part of the television inspection. Two (2) copies of all notes, photographs, wye locations and other pertinent information shall be made as a part of the television inspection. One (1) set of this information shall be turned over to the representative of the ENGINEER upon the completion of the inspection of each line. The second copy of the information shall be held by the television inspection company until completion of the project, at which time it shall be neatly assembled and turned over to the ENGINEER as a complete, comprehensive report on the television inspection of the project.
9. Television inspection shall be recorded and shall be submitted in virtual format , as specified by the ENGINEER.
10. Television inspection shall be considered completed when the necessary construction repairs have been made and the installation re-televised when required, and the system is acceptable for the testing phase.

### F. Testing:

1. The CONTRACTOR shall provide the necessary supervision, labor, tools, equipment and the materials necessary for the tests which shall be conducted in the presence of the ENGINEER.
2. The ENGINEER shall be notified two (2) working days in advance of all testing.
3. The CONTRACTOR shall be responsible for all testing costs.

## SANITARY UTILITY SEWERAGE PIPING

### 3.22 PIPE TESTING

#### A. Deflection Test

1. Deflection Tests shall be performed on all flexible pipe.
2. The test shall run not less than 30 days after final backfill has been placed.
3. No pipe shall exceed a deflection of five percent.
4. The rigid ball or mandrel used for the deflection test shall have a diameter not less than 95 percent of the base inside diameter or average inside diameter of the pipe, depending on which is specified in the ASTM Specification, including the appendix, to which the pipe is manufactured.
5. The pipe shall be measured in compliance with ASTM D 2122 Standard Test Method of Determining Dimensions of Thermoplastic Pipe and Fittings.
6. The test shall be performed without mechanical pulling devices.
7. Locations with excessive deflection shall be excavated and repaired by re-bedding and/or replacement of the pipe at the cost of the CONTRACTOR.

#### B. Leakage Test

1. Infiltration and exfiltration testing shall conform to the test procedure described in ASTM F2487.
2. The leakage exfiltration or infiltration shall not exceed 100 gallons per inch of pipe diameter per mile per day for any section of the system. An exfiltration or infiltration test shall be performed with a minimum positive head of two feet.

#### C. Air Test

1. Air testing shall conform to the test procedure described in ASTM F1417, and as recommended by the manufacturer.

### 3.23 MANHOLE TESTING

#### A. Exfiltration Test

1. Water testing shall conform to the test procedure described in ASTM C969.
2. In the water test, exfiltration shall not exceed a rate of 0.019 gallons-a-day per inch of manhole diameter per vertical foot of manhole during a continuous four hour test period.

#### B. Vacuum Test

## SANITARY UTILITY SEWERAGE PIPING

1. Vacuum testing shall conform to the test procedure described in ASTM C1244.
2. Vacuum testing shall be in accordance with the testing equipment manufacturer's written instructions and the test results compared to the manufacturer's published vacuum test tables.

### 3.24 SMOKE TESTING

#### A. Test section setup

1. Restrict ends of sewers adjacent to the test sewer section(s) to inhibit smoke from migrating into non-test sewer sections.
2. Unless otherwise approved, test sections shall consist of a central manhole where the blower will be positioned with upstream and downstream manhole(s) with sewer pipes between them. Maximum test length is 1,000 feet.

#### B. Pre-test system evacuation

1. Prior to placing smoke into a manhole, evacuate the system with a blower to ensure that any collection of explosive gas and odors have been dispersed. This may be accomplished by removing manhole covers of all manholes in the run, placing a vacuum on the manhole where the blower is located, or blower air into the manhole.

#### C. Smoke introduction

1. Place a portable air blower over a manhole or cleanout at one end of the test section. Introduce liquid smoke inside at the blower connection.

#### D. Observation and documentation

1. Field personnel shall observe connections or appurtenances in question for visual evidence of smoke. Take digital photographs of smoke emanating from extraneous flow sources and record findings.
2. For each sewer tested, the CONTRACTOR shall prepare a field log identifying each point of smoke exfiltration from roof gutters, patio or area drains, storm drain cross connections, or any other source not stated.

END OF SECTION

**SECTION 33 41 00  
STORM UTILITY DRAINAGE PIPING**

**PART 1   GENERAL**

1.1   SCOPE

- A.   This Section includes storm sewer Work indicated on the Plans complete with pipes, joints, structures, pipe bedding, final inspection and appurtenances.

1.2   RELATED WORK SPECIFIED ELSEWHERE

- A.   Section 31 23 19: Dewatering
- B.   Section 31 23 33: Trenching and Backfilling

1.3   REFERENCE STANDARDS

- A.   Unless otherwise specified, the Work for this Section shall conform to the applicable portions of the following Standard Specifications:
  - 1.   ANSI- American National Standard Institute
  - 2.   ASTM- ASTM International
  - 3.   AASHTO- American Association of State Highway Transportation Officials
  - 4.   PennDOT- Pennsylvania Department of Transportation, Standard Specifications for Construction, latest edition
  - 5.   NCPI- National Clay Pipe Institute

1.4   SOURCE QUALITY CONTROL

- A.   Laboratory test not less than one (1) percent, with a minimum of three (3) pieces each size, material and class of gravity pipe required in the Work.

1.5   SUBMITTALS

- A.   Submit a complete field report of the location of all wye openings and sump pump discharge leads to the ENGINEER at the end of each sewer section of the Project or on the last day of each week, whichever occurs first.
- B.   Submit two (2) copies of the laboratory test reports required per Article 1.4 of this Section to the ENGINEER.
- C.   Complete Shop Drawings for all manhole tees shall be submitted to the ENGINEER.
- D.   Submit shop drawings and design information for all precast concrete box sections.

1.6   STORAGE OF MATERIALS

- A.   Piping material shall not be stacked higher than four (4) feet (1.2 m) or as recommended by the manufacturer, whichever is lowest. Suitable racks, chairs, and other supports shall be provided to protect preformed pipe mating surfaces from damage. Store bottom tiers off the ground, alternate tiers and chock tier ends.

## **STORM UTILITY DRAINAGE PIPING**

- B. Jointing and sealing materials used in the storm sewer system shall be protected from sunlight and stored in as cool and clean a place as practicable until ready for application.

### **1.7 HANDLING OF MATERIAL**

- A. Load and unload materials using suitable approved equipment. Material shall not be dropped, bumped or allowed to impact against itself. Damaged material shall be rejected by the ENGINEER.
- B. Lifting devices shall be suited to the Work and shall protect surfaces from damage.

## **PART 2      PRODUCTS**

### **2.1 MATERIALS**

- A. It is the intent of the Articles in Part 2 of this specification section is to specify in detail the various types of sewer pipe, joints, manholes, etc. which have been indicated throughout the Plans and Specifications. These Articles shall not be construed as allowing any alternate type of material to that which is indicated on the Plans or elsewhere in the Specifications.

### **2.2 PRECAST CONCRETE BOX SECTION**

- A. Precast concrete box sections shall meet the requirements of ASTM C1433. Unless specified otherwise, CONTRACTOR shall use the same design conditions as exist at the time of construction or as planned for future development.
- B. Class AA Cement Concrete Modified. Provide cement concrete as specified in PennDOT Section 704; except, with a minimum 28-day compressive strength of 4,000 psi.

### **2.3 SMOOTH PLASTIC PIPE**

- A. Smooth plastic pipe for underdrains shall be polyvinyl chloride PVC meeting the requirements of AASHTO M278. Pipe shall be wrapped in a Geotextile Pipe Wrap per PennDOT Section 601.

### **2.4 PVC SOLID WALL PIPE**

- A. PVC Solid Wall Pipe in sizes 18-inch through 60-inch shall be ASTM F679 SDR35, polyvinyl chloride pipe (PVC).
- B. Joints for polyvinyl chloride pipe (PVC) shall be ASTM D3212, push-on type. A joint in which an elastomeric ring gasket is compressed in the annular space between a bell end or socket and a spigot end of pipe. Joint gaskets shall meet the requirements of ASTM F477 and be installed before placing succeeding pipe sections, according to manufacturer's recommendations.

2.5 STORM STRUCTURES

- A. Materials for storm sewer structures shall conform to the requirements indicated on the Plans and as specified below.
- B. Precast Concrete
  - 1. Class AA Cement Concrete Modified. Provide cement concrete as specified in PennDOT Section 704; except, with a minimum 28-day compressive strength of 4,000 psi.
  - 2. Precast Concrete Manholes shall be in accordance with the requirements of PennDOT Section 605 and 714, and RC-72M.
- C. Manhole Steps
  - 1. Steel reinforced plastic manhole steps shall be of suitably approved co-polymer polypropylene plastic conforming to ASTM D4101, Table PP, Group 3, Class 2, 3, or 4, any of grades 1 through 9, with a deformed reinforcing bar conforming to ASTM A615, Grade 60.
  - 2. Shall conform to all requirements in PennDOT Section 605, RC-72M, and be selected from Bulletin 15.
  - 3. Manhole steps shall be of the types and sizes indicated on the Plans and shall comply with applicable occupational safety and health standards.
- D. Frames and Covers
  - 1. Manhole frames and covers shall be gray iron castings conforming to AASHTO M 105 (ASTM A48), Class 35B and AASHTO M 306, unless otherwise indicated.
  - 2. Cover shall say STORM in raised letters on the cover.
  - 3. The castings shall be neatly made and free from cracks, holes and other defects. Surfaces of casting shall be ground to assure proper fit and to prevent rocking.
  - 4. Shall conform to the requirements in PennDOT RC-72M and be selected from PennDOT Bulletin 15.

2.6 CAST-IN-PLACE CONCRETE

- A. Class A Cement Concrete, Modified, with a design compressive strength of 3,000 PSI.
- B. Shall conform to all requirements in PennDOT Section 605 and RC-72M.
- C. No admixtures without the ENGINEER's approval.

## **STORM UTILITY DRAINAGE PIPING**

### **2.7 CONCRETE REINFORCEMENT**

- A. In accordance with PennDOT Section 709, use ASTM A615, Grade 60 for bars and ASTM A1064 for welded wire fabric.
- B. Shall be selected from PennDOT Bulletin 15.

## **PART 3 EXECUTION**

### **3.1 VERIFICATION OF EXCAVATION AND BEDDING**

- A. Prior to the installation of any storm sewer piping, structures, or materials, examine all trenches and other excavations for the proper grades, lines, levels and clearances required to receive the new Work. Ascertain that all excavation bottoms, compacted subgrades and pipe bedding are adequate to receive the storm sewer materials to be installed. Correct all defects and deficiencies before proceeding with the Work.

### **3.2 EXISTING STORM SEWERS AND DRAINS**

- A. Expose the existing storm sewer and structures to which the new Work is to be connected and notify the ENGINEER of same. The ENGINEER will verify the vertical and horizontal locations of the existing system and shall inform the CONTRACTOR as to the necessary adjustments required to align the new storm sewer Work with the existing system.

### **3.3 PREPARATION**

- A. The outside surface of the spigot end and the inside surface of the bell end of the pipe shall be cleaned and free of any foreign materials, other than the sealant recommended by the manufacturer, prior to installation.
- B. All pipe, frames, covers, accessories, and appurtenances shall be examined carefully for damage and other defects immediately prior to installation. Defective or damaged material shall be rejected and removed from the Project by the CONTRACTOR.

### **3.4 INSTALLATION – GENERAL**

- A. Installation procedures shall conform to PennDOT's current Specifications and RC-72M.
- B. Each section of pipe, when placed to grade and line, shall have firm bearing on the trench bedding throughout its length.
- C. Cutting of pipe shall be done with approved tools and by approved methods suitable for the pipe material. Pipe cutting methods that produce a smooth, square-cut end without damage to the pipe and that minimize air-borne particles, shall be employed. Pipe cutting shall be performed using the recommendations of the manufacturer of

## STORM UTILITY DRAINAGE PIPING

the type of the pipe materials being cut and according to the best trade practices. When cutting pipe, care shall be taken to prevent damage to the interior and exterior surfaces. Damage to either shall be cause for rejection of a complete section of pipe.

- D. During the preparation of the pipe bedding and until the trench has been satisfactorily backfilled, the trench shall be kept free of water. A dewatering system, in accordance with Section 31 23 19, Dewatering, shall be provided and maintained by the CONTRACTOR. The dewatering system shall remain in operation until the trench is backfilled.
- E. Backfill shall be as indicated on the Plans and as specified in Section 31 23 33, Trenching and Backfilling.

### 3.5 PIPE LAYING

- A. Pipes shall be installed in accordance with the requirements in PennDOT Section 601 and RC-72M.
- B. Installation of pipe shall conform to ASTM C12, and as recommended by the pipe manufacturer.
- C. The pipe shall be protected during handling against impact shocks and free fall. Hooks shall not be permitted to come in contact with premolded joint surfaces.
- D. Pipes having premolded joint rings or attached couplings shall be handled so that no weight, including the weight of the pipe itself, will bear on or be supported by the jointing material. Care shall be taken to avoid dragging any pipe on the ground or allowing it to be damaged by contact with gravel, crushed stone, or other hard objects.
- E. All pipe shall be laid to the line and grade called for on the Plans. Each pipe as laid, shall be checked by the CONTRACTOR with line and grade pole or laser system to insure that this result is obtained. When employing a laser system, the CONTRACTOR shall have an independent and alternate means of checking the line and grade. The finished work shall be straight and shall be sighted through between manholes.
- F. Construction shall begin at the outlet end and proceed upgrade with spigot ends pointing in direction of flow. Bell holes shall be excavated so that the full length of the barrel will bear uniformly on the bedding material.
- G. Lubricants, primers or adhesives as recommended by the pipe or joint manufacturer shall be used immediately prior to jointing.
- H. The pipe shall be centered in the bells or grooves and pushed tight together to form a smooth and continuous invert. After laying of pipe, care shall be taken so as not to disturb its line and grade. Any pipe found off grade or out of line shall be re-laid properly by the CONTRACTOR.

## STORM UTILITY DRAINAGE PIPING

- I. Mechanical means shall be used for pulling home all pipe where manual means will not result in pushing and holding the pipe home. Mechanical means shall consist of a cable placed inside of the pipe with a suitable winch, jack, or come along for pulling the pipe home and holding the pipe in position.

### 3.6 PIPE BEDDING

- A. After the bottom of trench has been excavated the pipe bedding material will be installed in accordance with Section 31 23 33, Trenching and Backfilling. The pipe shall then be installed strictly in accordance with the manufacturer's recommendations. After the pipe is laid, the bedding shall be continued above the pipe as specified in Section 31 23 33, Trenching and Backfilling.

### 3.7 STORM STRUCTURES

- A. Storm structures shall be installed in accordance with the requirements in PennDOT Section 605 and RC-72M.
- B. Construct storm sewer manholes, catch basins, inlets and other structures to the grades, lines and levels indicated on the Plans and as specified. Structures shall be complete with concrete bases, reinforcing, frames, covers, adjustment bricks, etc., as shown and as required for a complete installation. Storm sewer structures shall conform to the type of material and dimensions indicated on the Plans.
- C. Cast-in-place structures shall be constructed in accordance with Section 03 30 00, Cast-In-Place Concrete.
- D. Block Structures
  1. Construct concrete block structures in the locations and according to the details on the Plans. The first course of concrete blocks shall be placed on the prepared base or footings in a full bed of mortar. Mortar joints shall be full and close in all courses. Courses shall be level throughout. Stagger joints in adjoining courses by one-half the length of the block as nearly as practicable. Joints shall be uniform in thickness throughout the structures. Strike all joints and properly point to provide true, smooth surfaces.
  2. A cement mortar plaster coat shall be applied to the exterior surfaces of the brick and block sections of all storm structures as indicated on the Plans. Plaster coat shall be 1/2 inch (10 mm) thick.
- E. Precast Concrete Structures
  1. Construct precast concrete structures as detailed on the Plans. Provide mortar joints struck smooth. Provide three (3) to five (5) courses of 8-inch (200 mm) brick or concrete grade rings at top of structure for future adjustment of castings.

## STORM UTILITY DRAINAGE PIPING

- F. Provide and install all frames and covers to the elevations indicated on the Plans. Castings shall be set in a full bed of cement mortar 1/2 inch (10 mm) thick, minimum. Mortar joints shall be struck smooth.
- G. Steps shall be installed at the plant by the manufacturer of precast units. Field install steps for brick, block, or cast in place structures of the types and in the locations indicated on the Plans.
- H. Pipe up to 42 inches (1050 mm) in diameter, shall be connected to storm structures using a grouted joint, as indicated on the Plans. The pipe shall be properly supported, so that any settlement will not disturb the connection.
- I. For pipe, 48 inches (1200 mm) in diameter or larger, the pipe shall be installed as an integral part of the manhole (manhole tees) which shall be constructed of 3,500 psi (24 MPa) concrete and reinforcing, as indicated on the Plans.
- J. Manhole tees, as indicated on the Plans, may be used for pipe 42 inches (1050 mm) in diameter or larger. Connection to manhole tees shall be made using tees and pipe having the same type of joint. The pipe and tee shall be properly supported with concrete as indicated on the Plans.
- K. Sump shall be provided, as indicated on the Plans, in all catch basins and storm manholes having outlets of 18 inches (450 mm) in diameter or less.
- L. Flow channels shall be constructed in all structures not requiring a sump and shall be constructed as indicated on the Plans.

### 3.8 FIELD QUALITY CONTROL

- A. After all the pipe and structures have been laid, constructed and backfilled, the system shall be final inspected. The sewer system shall be ready for the final inspection within two (2) weeks after the completion of each 2,000-foot (600 m) section of sewer installed.
- B. The final inspection shall consist of a visible and audible check of the sewers and structures to ascertain that the steps have been placed, all lift holes jointed, the channeling of the manhole bottoms completed, all visible or audible leaks stopped, all pipe has been placed straight and true to the proper slopes and elevations, the required brick courses for adjustment, the frame and cover properly installed, the required end section installed, all trenches and structures backfilled in a workmanlike manner and that the system has been thoroughly cleaned.
- C. The final inspection shall be considered complete when all the repairs have been made.

### 3.9 REMOVE STORM SEWER

- A. Excavate and remove the existing storm sewer where indicated on the plans. Bulkhead the opening in storm sewers or structures where the existing storm sewer has been removed.

## **STORM UTILITY DRAINAGE PIPING**

- B. Where removal of existing storm sewer is occurring in essentially the same location as a new sewer or structure, the removal of the existing sewer is incidental to the project.

### **3.10 REMOVE CULVERTS**

- A. Excavate and remove culverts where indicated on the plans. Backfill the completed work as specified in Section 31 23 33, Trenching and Backfilling.

### **3.11 REMOVE STRUCTURE**

- A. Excavate and remove structures where indicated on the plans. Bulkhead the ends of any sewers remaining in place. Backfill the completed work as specified in Section 31 23 33, Trenching and Backfilling.
- B. Removal of existing storm structures is incidental to the project if a new structure or sewer is being constructed in essentially the same location.

### **3.12 REMOVE AND REPLACE STORM SEWER**

- A. Remove and replace storm sewer shall consist of the complete removal and disposal of the existing sewer and replacement with the size and type of sewer as called for on the plans or specified.
- B. All materials and installation shall be in accordance with the requirements of this section and Section 31 23 33, Trenching and Backfilling, as applicable.

### **3.13 REMOVE AND REPLACE STORM STRUCTURE**

- A. Remove and replace storm structure shall consist of the complete removal and disposal of the existing structure and replacement with the size and type of structure as called for on the plans or specified.
- B. All materials and installation shall be in accordance with the requirements of this section and Section 31 23 33, Trenching and Backfilling, as applicable.

### **3.14 PIPE TESTING**

- A. Deflection Test
  - 1. Deflection Tests shall be performed on all flexible pipe.
  - 2. The test shall run not less than 30 days after final backfill has been placed.
  - 3. No pipe shall exceed a deflection of five percent.
  - 4. The rigid ball or mandrel used for the deflection test shall have a diameter not less than 95 percent of the base inside diameter or average inside

## STORM UTILITY DRAINAGE PIPING

diameter of the pipe, depending on which is specified in the ASTM Specification, including the appendix, to which the pipe is manufactured.

5. The pipe shall be measured in compliance with ASTM D 2122 Standard Test Method of Determining Dimensions of Thermoplastic Pipe and Fittings.
6. The test shall be performed without mechanical pulling devices.
7. Locations with excessive deflection shall be excavated and repaired by re-bedding and/or replacement of the pipe at the cost of the CONTRACTOR.

### B. Leakage Test

1. Infiltration and exfiltration testing shall conform to the test procedure described in ASTM F2487.
2. The leakage exfiltration or infiltration shall not exceed 100 gallons per inch of pipe diameter per mile per day for any section of the system. An exfiltration or infiltration test shall be performed with a minimum positive head of two feet.

### C. Air Test

1. Air testing shall conform to the test procedure described in ASTM F1417, and as recommended by the manufacturer.

## 3.15 MANHOLE TESTING

### A. Exfiltration Test

1. Water testing shall conform to the test procedure described in ASTM C969.
2. In the water test, exfiltration shall not exceed a rate of 0.019 gallons-a-day per inch of manhole diameter per vertical foot of manhole during a continuous four hour test period.

### B. Vacuum Test

1. Vacuum testing shall conform to the test procedure described in ASTM C1244.
2. Vacuum testing shall be in accordance with the testing equipment manufacturer's written instructions and the test results compared to the manufacturer's published vacuum test tables.

END OF SECTION